



CEIOPS-SEC-71/06S

QIS2 – Summary Report

Public report

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Executive summary

Disclaimer

This report sets out the results from the second iteration of a series of quantitative impact studies conducted by CEIOPS to underpin the advice given to the European Commission to support the development of a sound solvency regime. This impact study (QIS2) was mainly designed to test structural design options exposed in previously published CEIOPS answers to Calls for Advice from the European Commission. In order to support this exercise, only some preliminary and very roughly calibrated parameters had been provided by CEIOPS for the model components tested. In addition, no guidance for the calculation of eligible capital was given for QIS2, so available capital was used as an indicator. Therefore, it should be noted that the numbers shown in this report are not indicative of the likely final outcome from Solvency II.

For QIS3, when a more definite structure for Solvency II will be tested, many of the parameters will have been recalibrated (and it may be noted that one of the purposes of QIS3 will be to collect data to assist with the calibration of the underwriting risk modules), so that the results may give a better indication of the impact of Solvency II.

Further, whenever in this report a reference is made to a statement from a clear minority of national supervisors (e.g. a reference to 'one supervisor'), this is done because CEIOPS feels it is important to retain as much information from the individual country reports as possible. When for any issue only the view of a minority of supervisors is given, this means that the other supervisors did not give an explicit view on this issue.

Due to time pressure, CEIOPS had not provided clear and unambiguous definitions for various parts of the technical specifications for QIS2. In these cases, both undertakings and national supervisors may have used different interpretations, to the detriment of the comparability of the results. This may also explain some of the dispersion between country data, a phenomenon also found at country level between participants.

Finally, the time pressure behind the QIS2 exercise, along with the tentative nature of the specifications, meant that there was no expectation that undertakings would audit their results, and these were provided by participants on a best efforts basis.

Since completing the QIS2 study, CEIOPS' thinking on a standard and harmonized way to assess Solvency in the future has progressed. As a result, a new consultative paper has been published on the CEIOPS website¹ in order to collect stakeholder reactions on the ways envisaged to address the issues identified during QIS2. The next step of this progressive design process will materialize in the third QIS which is scheduled to be conducted in the first half of 2007.

Context of the QIS2 exercise

CEIOPS recognises that QIS2 was intended to be an initial and tentative step towards the 'final' SCR, MCR and valuation standards. In addition, the complexity of the QIS2 exercise where a multiplicity of approaches was tested may have resulted in considerable use of time and expertise by the participants. CEIOPS is therefore encouraged by the increasing participation of the industry in the QIS2 exercise. However CEIOPS would like to emphasise that care is required when interpreting the high level results of the QIS2 exercise. CEIOPS would like to request the reader to keep in mind the disclaimer above when interpreting the results of this study.²

¹ Consultative Paper 20 published on www.ceiops.org.

² Indeed, a number of participants expressed the view that they were opposed to the disclosure of the QIS2 results on the CEIOPS website, due to possible misinterpretation by external readers.

Representativeness of data provided by undertakings

In total, 514 undertakings from 23 countries participated in QIS2, compared with 312 undertakings from 19 countries in QIS1. The market share of the respondents in these 23 countries is generally above 50%. The table below on the number of respondents shows that there is still a size bias present in QIS2, though less so than in QIS1.³

Number of respondents

Type of undertaking	Small	Medium	Large	Total
Life undertakings	38	73	50	161
Health undertakings	8	11	3	22
Non-life undertakings	89	101	46	237
Pure reinsurers	5	2	6	13
Respondents providing data for both life and non-life business	15	33	27	81
All respondents	155	220	132	514
<i>of which Mutual undertakings (included above)</i>	39	51	16	108

The table below gives the percentage of respondents that completed the various parts of QIS2.

Technical provisions & solvency requirements

Total gross provisions (% of total respondents)	Life	Non-life
	Best estimate	77
75th percentile	54	71
SST cost of capital	40	24
SCR and MCR calculations (% of total respondents)	Life	Non-life
MCR calculation	73	82
SCR placeholder calculation	78	80
SCR alternative calculation		
Interest rate risk	66	66
Equity risk	54	56
Property risk	47	50
Currency risk	36	34
Life mortality risk	59	
Life longevity risk	41	
Life morbidity risk	14	
Life disability risk	25	
Life lapse risk	50	
Life expense risk	46	
Non-life premium risk with undertaking specific factors		64
Application of k factor in SCR calculation	19	

³ In the Table 'Number of respondents', not all figures add up correctly because for some undertakings the size classification was unknown.

Impact of QIS2 on financial position of undertakings

QIS2 was about testing a possible methodology, not calibration, so that the results may not accurately represent the underlying risks, and may not correspond to a 99.5% confidence interval over a one year horizon. Since QIS2 is based on voluntary participation, there is unavoidably a sample bias present. The SCR based on QIS2 calculations uses the placeholder for those risk modules where more than one option is given, and for some of these risks the difference in outcome between the placeholder and alternative options is substantial. The correlations between the risk modules were not set by CEIOPS but were chosen by the participants or their national regulator based only on some general guidance from CEIOPS. *What follows is therefore purely indicative and the reader is advised to keep in mind the disclaimer found above.*

Using the QIS2 methodology and parameters, the technical provisions generally decrease and the capital requirements increase, but the available capital⁴ also increases. Overall, the ratio of available capital to required capital decreases for most life participants in eleven national markets, but remains above 100%. In another six the ratio increases for most life undertakings. For a number of life undertakings the placeholder SCR is near to or even less than zero. For non-life, the ratio of available capital to required capital decreases for most respondents in sixteen national markets, while one supervisor reports mixed results. For two national markets half of the participants ended up with a ratio of less than 100%.

For thirteen national markets all or the majority of the respondents had an MCR which was less than 75% of the placeholder SCR. Four national supervisors reported a substantial number of participants with an MCR/SCR ratio of more than 75%. In some of these countries this is mostly due to the k factor and expected profit/loss, which can reduce the SCR but not the MCR. This was generally considered to be problematic.

There is some evidence that, using the QIS2 methodology and parameters, small undertakings and mutuals may be affected more than large undertakings and proprietary undertakings. This holds even more for monoline non-life undertakings and with-profit undertakings. Discounting in non-life has a significant impact on the solvency ratio. The surrender value floor for life also has a significant impact but less so.

Summary of findings

QIS2 should be viewed as an opportunity to test the initial ideas towards the development of the technical provisions, MCR and SCR. A major outcome of the QIS2 exercise should be concrete steps to improve the formulation of the Standard Approach and participation for the QIS3 exercise to take place in early 2007.

The following is a summary of some of the key findings of QIS2 and lessons for QIS3.

⁴ QIS2 did not look at the definition of eligible elements of capital, but only at the available capital represented by the excess of the value of assets over insurance and other liabilities.

Suitability of methodology

A number of useful comments were received from undertakings and supervisors, particularly in relation to the further development of the underwriting risk modules, for both life and non-life insurance. CEIOPS has set out some further discussion on the development of the methodology for the SCR and MCR in CP20, and will consider these comments further as part of its preparation for QIS3.

Calibration of capital requirements

Although calibration was not in focus in this exercise, many critical comments were nevertheless received. Their general message is that some risk modules and correlations seem too prudent (e.g. market risk, non-life underwriting risk, size factor). It was also noted that the level of prudence in placeholder and alternative methods were not always equal. Some information and comparative figures of internal models were received.

Concerns were expressed by undertakings in most countries about the high size of a number of the correlations within the market risk component, particularly those between equities and property, and between equities and interest rates.

Many undertakings criticised the size of the present market-wide volatility factors for non-life underwriting risk as being too high, particularly for premium risk. Particular difficulties were observed for a number of specialist monoline insurers. The size factor was also criticised as being unsuitable by a number of smaller undertakings.

These comments will be considered further in the preparation of the calibration for QIS3. Moreover, it is intended that one of the objectives for QIS3 will be to obtain some relevant data from undertakings for the calibration of the underwriting risk models.

Operational issues

Several participants noted that the transparency of the Solvency II process could be improved by disclosing the rationale for the QIS calibration assumptions.

It was commented by a number of undertakings that the time period between the release of the QIS2 technical specification and Excel spreadsheet and the deadline was too short.

In some cases, the data presented by the companies in the spreadsheets were extremely heterogeneous, due to different interpretations that each undertaking gave to the spreadsheet instructions and to the technical specification. Accordingly, additional guidance or simplifications were requested on a number of issues.

For QIS3, more transparent and user-friendly technical specification, calibration, and spreadsheets were requested. Some additional guidance regarding practical approximations would be helpful for smaller undertakings. It was commented that a clear rationale for the methodology, together with detailed technical

guidance, will also need to be given to undertakings, in order to minimise potential differences in the interpretation and application of the specification.

The above should help to increase the potential level of participation by smaller undertakings, but in addition, it is likely that suitable approximations will need to be offered for such insurers, particularly for the assessment of provisions (either percentile or cost of capital), for the compilation of any historical data required (e.g. for non-life underwriting risk), and for the more complex technical areas of the SCR specification (e.g. the k factor, and the interest rate risk component).

For the natural catastrophe risks, it was observed that some further co-ordination of the relevant guidance within CEIOPS may be appropriate for QIS3.

CEIOPS shall endeavour to take these comments into account in the design and operation of the forthcoming QIS3 study.

Practicability, data, and resource issues

In many respects the findings are similar as in the earlier QIS1 exercise. Technical provisions remain the main challenge for most undertakings. Resource issues were again severe. It was noted that there was a lack of time, people, knowledge and guidance. In addition in relation to the SCR, some specific data problems were observed, e.g. it was often difficult for undertakings to provide relevant and reliable data for historical combined ratios over the last 15 years for homogeneous lines of non-life insurance business. Some have also questioned whether such a long back-set of data provides the most appropriate benchmark given changes over time in customer mix, contract terms and trends within the industry.

On average it took a couple of person months to complete the study. However the final form of Solvency II (and future QIS) should be less onerous for companies as guidance is improved, companies become more familiar with the new calculations, and techniques and fewer options are tested.

As a result, it is difficult for undertakings to estimate at this stage the level of initial investment that Solvency II regime would ultimately require.

Reliability of results

The results were generally considered sufficiently reliable for QIS2 purposes. However, QIS2 was heavy a package with a demanding schedule, which shows in the quality of data received. Not many undertakings were able to answer all the questions, and because of time and resource restrictions, approximations had to be made, which may have decreased the accuracy of results.

One factor that may undermine the reliability and comparability of the results is the current lack of comprehensive and harmonised actuarial standards for calculating the best estimate provisions in a number of member states. This issue is currently the subject of a discussion between CEIOPS, the insurance industry, and the Groupe Consultatif that represents European actuarial associations.

The problems that small undertakings may face when implementing Solvency II system seem to be similar in nature, although greater in magnitude than for larger undertakings. However, the information is limited for the time being because relatively few small undertakings participated in QIS2.

Comparison of 75th percentile and cost of capital approaches to provisions

In most countries, the differences between the percentile provision and the cost of capital provision were not significant. Although the answers provided may not form a representative sample, in most countries a majority of participants that expressed a view seems to prefer the cost of capital provision to the percentile provision because of its simplicity (in life insurance in particular) and economic interpretation. Approximate methods for the cost of capital calculation that did not require stochastic modelling were generally available, while this was not usually the case for the percentile approach.

Two caveats should be made: (1) the calculation of the best estimate, which is a significant part of the calculation of the technical provisions, lacks consistency across the participants as it is still in the process of becoming part of standard actuarial practice, and (2) the cost of capital approach depends on the SCR calculation, so the cost of capital margin may change significantly if the SCR methodology and/or the parameters change.

Practicability and harmonisation of the assessment of provisions, in particular with regard to hedgeable risks and future bonuses, continue to pose a challenge to the Solvency II process.

Comparison of placeholder and alternative approaches for components of SCR

For market interest rate risk, most countries expressing a view on the two approaches said that they had a preference for the scenario based approach. For other market risks, a majority of those countries expressing a view on the two approaches also preferred the scenario based approach. However, it was suggested that both approaches might be retained as optional alternatives.

Views on the two alternative approaches for life underwriting risk were fairly evenly divided, though it was commented by a number of countries that the risk drivers in the factor-based approach could be improved, and also there were observed to be substantial differences between the two approaches in the size of the capital charge, which needed to be resolved.

For non-life underwriting risk, the general view seemed to be that CEIOPS needs to develop some suitable blend between the use of EU-wide, national market and undertaking specific data for the purpose of calculating a capital charge for pricing risk, and to calibrate this with relevant and reliable data.

In light of the comments received, further work may be required to understand the practicability of a two tier standard approach incorporating both factors and

scenarios, as well as the inclusion of company specific information where this better reflects the company's risk profile.

Other key issues in determination of SCR or MCR

A key aspect of QIS2 supported by the industry was the recognition of the risk absorbing nature of profit sharing business as a powerful risk mitigation tool. A k factor approach to reflect the variability of future bonuses is understood to have been applied by a number of life undertakings in 8 countries. In many cases, this seems to have been set at a fairly arbitrary level by those undertakings. However, in some countries, the k factor was derived by undertakings through the use of a series of stress tests.

A number of countries commented that the k factor applied should be sensitive to a number of variables such as the specific business written, asset mix, likely management actions, policyholder expectations, allocation of future bonuses across different groups of policyholders, and the legal form of a undertaking, as well as to current financial market conditions (e.g. the level of market interest rates).

In general there are challenges in assessing the risk absorbing nature of future profit sharing but this is an important conceptual point for the Standard Approach as it takes into account the original design of profit sharing contracts where the risks are effectively shared with policyholders.

Comments from some countries were that the post transitional approach for the MCR was unnecessarily complex, and in certain cases the design is fundamentally flawed resulting in a poor interplay between the SCR and MCR.

This can cause the two control levels to be too close to each other and in some instances the MCR to exceed the SCR thereby disrupting the concept of the ladder of intervention. As a result, the current QIS2 post transitional approach for the MCR needs to be revisited.

Use of internal models and Group issues

There was a fairly wide dispersion noted in the number of medium and large sized, life and non-life, undertakings in each country that provided comparative figures from their internal models for part or all of the SCR calculation, and in the results derived from these models. However, the following features were observed in most countries:

- the life underwriting risk charges measured by the internal models consistently exceeded the corresponding risk module of the SCR by a significant amount
- for non-life underwriting risk, the internal models generally give lower outcomes than the placeholder SCR
- for credit risk, the internal models almost all give higher values for credit risk than the SCR

Few groups provided figures for the combined group, since this was not explicitly requested for QIS2. However, it is proposed that QIS3 will test out some detailed proposals for the assessment of the capital requirements for groups.

Where figures from different entities within a group were combined, then most groups took the consolidated balance sheets as a starting point for the assessment of both provisions and the SCR.

The reported reductions of group risk capital - including diversification effects - show a wide range from around 5% (where there were significant restrictions on the transfer of moneys from some life insurance funds) up to 55%.

Lessons learned for QIS3

In order to facilitate the successful operation of QIS3, and to obtain reliable and meaningful numbers, CEIOPS should apply a simple and transparent approach to both the methodology and the associated spreadsheet, with few if any options.

A clear rationale for the methodology, together with detailed technical guidance, will also need to be given to undertakings, in order to minimise potential differences in the interpretation and application of the specification.

The above should help to increase the potential level of participation by smaller undertakings, but in addition, it is likely that suitable approximations will need to be offered for such insurers, particularly for the assessment of provisions (either percentile or cost of capital), for the compilation of any historical data required (e.g. for non-life underwriting risk), and for the more complex technical areas of the SCR specification (e.g. the k factor, and the interest rate risk component).

Group requirements need to be tested on a more systematic basis in QIS3.

In short:

- More guidance
- Fewer options
- Clear definitions (including for eligible elements for capital)
- Aim for an even greater participation of small undertakings
- Additional focus on group SCR and on calibration

1. Introduction

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This report sets out the results from the second iteration of a series of quantitative impact studies conducted by CEIOPS to underpin the advice given to the European Commission to support the development of a sound solvency regime. This impact study (QIS2) was mainly designed to test structural design options exposed in previously published CEIOPS answers to Calls for Advice from the European Commission. In order to support this exercise, only some preliminary and very roughly calibrated parameters had been provided by CEIOPS for the model components tested. In addition, no guidance for the calculation of eligible capital was given for QIS2, so available capital was used as an indicator. Therefore, it should be noted that the numbers shown in this report are not indicative of the likely final outcome from Solvency II.

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Since completing the QIS2 study, CEIOPS' thinking on a standard and harmonized way to assess Solvency in the future has progressed. As a result, a new consultative paper has been published on the CEIOPS website⁵ in order to collect stakeholder reactions on the ways envisaged to address the issues identified during QIS2. The next step of this progressive design process will materialize in the third QIS which is scheduled to be conducted in the first half of 2007.

The European Commission (EC) requested the Committee of European Insurance and Occupational Pension Supervisors (CEIOPS) to advise on the development of a new solvency system (Solvency II) to be applied to European insurance and reinsurance undertakings.

In the second wave of Calls for Advice⁶ CEIOPS was requested to acquire insight into the possible quantitative impacts of the new solvency system through quantitative impact studies (QIS). The results of QIS will form a key input into the EC's Impact Assessment report of the Solvency II Framework Directive. CEIOPS conducted a first QIS (QIS1) during the autumn/winter of 2005 with a focus on testing the level of prudence in technical provisions under several hypotheses, the results of which were received in February 2006 (CEIOPS-FS-01/06). In the summer of 2006 CEIOPS conducted a more comprehensive second impact study (QIS2). QIS2 also tested solvency requirements: a solvency

⁵ Consultative Paper 20 published on www.ceiops.org.

⁶ The Calls for Advice as well as CEIOPS' answers are available on CEIOPS' website: www.ceiops.org.

capital requirement, SCR, and a minimum capital requirement, MCR. The focus of QIS2 is on the methodology of the solvency requirements. The calibration of the parameters is scheduled to be tested in QIS3. This third impact study is currently scheduled for mid 2007.

This document highlights the general trends and observations found in the country reports submitted by the national supervisors. The main objective is to give a clear and concise view of the findings. CEIOPS recognises that there is a possibility that this does not leave enough room to detail all country views.

CEIOPS points out that only the individual country reports can provide a complete picture of the national results. To interpret country-specific information, the context of the corresponding country report should be taken into account.

As requested by CEIOPS, each national supervisor that wished to participate in QIS2 invited a range of different types and sizes of undertakings to carry out calculations in line with the QIS2 specification that had been drawn up within CEIOPS working groups, and to complete a spreadsheet and questionnaire summarising the results.⁷ The calculations were generally based on data as at the end of the 2005 financial year, and were requested to be provided by undertakings by 31 July 2006.

CEIOPS stresses that the second quantitative impact study is a test of the methodology. It is not a proposal for the final Framework Directive.

The structure of this report closely follows the structure of the country reports filled in by the national supervisors. Chapter 2 studies the scope of the exercise by presenting information on the participating undertakings and the number of undertakings able to give quantitative input on the various calculations of the technical provisions and the solvency requirements. Chapter 3 focuses on the impact on the overall financial position of the participating undertakings. Chapter 4 discusses the practicability and suitability of the proposed methodology and also the estimated required resources. Chapter 5 treats the assessment of the technical provisions. Finally, Chapter 6 details issues relating to the calculation of SCR and MCR, internal models and eligible capital.

⁷ The QIS2 package may be found on the CEIOPS website (see footnote 2).

2. Representativeness of data provided

2.1 QIS2 participation [Q1]

A substantial number of European undertakings participated in this second quantitative impact study. Different sizes and types of undertakings are better represented in the sample than in QIS1, the first impact study. That is, the representativeness of QIS2 has substantially improved over its predecessor. Table 1 below summarises the results for the entire European Economic Area (EEA).⁸

Table 1: Number of respondents

Type of undertaking	Small	Medium	Large	Total
Life undertakings	38	73	50	161
Health undertakings	8	11	3	22
Non-life undertakings	89	101	46	237
Pure reinsurers	5	2	6	13
Respondents providing data for both life and non-life business	15	33	27	81
All respondents	155	220	132	514
<i>of which Mutual undertakings (included above)</i>	39	51	16	108

The total number of respondents is 514, an increase of 65% over QIS1, which had 312 respondents. Of these 514 respondents, 161 undertakings exercise life business, 22 exercise health business and 237 exercise non-life business. Another 81 undertakings exercise life and non-life business, either because they are composite undertakings or because they are groups with life and non-life entities. Finally, 13 pure reinsurers participated in QIS2. In QIS1, 150 life and 170 non-life undertakings participated, compared with 242 (161 plus 81) life and 318 (237 plus 81) non-life undertakings in QIS2. QIS1 had 4 participating pure reinsurers. Health undertakings were not separately identified. The number of participating countries increased from 19 for QIS1 to 23 for QIS2. Table 2 gives the respondents per type per country.

Table 2: Participation by country

Country	Life	Non-life	Reinsurance	Life & non-life	Total	<i>of which Health</i>
Austria	6	7		10	23	5
Belgium				9	9	
Czech Republic				2	2	
Denmark	12	9			21	
Estonia	3	1			4	
Finland	6	7			13	
France	17	44		15	76	
Germany	56	95	8		159	16
Hungary	1	1		3	5	
Iceland		2			2	

⁸ In Table 1, not all figures add up correctly because for some undertakings the size classification was unknown.

Ireland	4	1		5	
Italy	6	3		4	13
Lithuania	2	4			6
Luxembourg		2			2
Malta		2		1	3
Netherlands	6	7		4	17
Norway	2	14			16
Poland	9	13			22
Portugal	10	9		4	23
Slovenia	1		1	1	3
Spain	4	11	1	25	41
Sweden	6	2		1	9
United Kingdom	16	19	3	2	40
Total	167	253	13	81	514
					22

As Table 1 shows, for each size category a substantial number of undertakings participated in QIS2. For both the medium and large size classes, the sample size is large enough to be considered representative for the entire market. For the small size class, the number of companies present is too small to be considered representative and should be treated as only indicative for small undertakings in the EEA. It is not possible to compare QIS2 to the first QIS in this respect, because they use different size classifications. For QIS1 undertaking sizes were based on national discretion, whereas for QIS2 CEIOPS devised a standardised size classification.⁹

The market share covered by the impact study is substantial for life and non-life. For most countries the market share covered is over 50% for both types of undertaking. For health there were only three national supervisors that received quantitative contributions, covering between 23% and 88% of their respective markets.

Table 3: Market share (%)

Country	Life	Non-life	Health
Austria	79	82	88
Belgium	72	56	
Denmark	57	51	
Estonia	65	17	
Finland	72	86	
France	72	54	
Germany	76	69	65
Hungary	72	75	
Iceland		65	
Italy	30	37	
Lithuania	23	29	
Luxembourg		33	
Malta		60	
Netherlands	86	33	23
Norway	55	54	

⁹ Life: an undertaking with less than €1 bn gross technical provisions is small, one with more than €10 bn is large and any undertaking with a value in between these upper and lower bounds is medium-sized.

Non-life: an undertaking with less than €100 mln gross written premiums is small, one with more than €1,000 mln is large and any value in between is considered medium-sized.

Poland	76	75	
Portugal	94	76	
Slovenia	11	12	
Spain	45	44	
Sweden	47	38	
United Kingdom	65	67	
Total CEIOPS members¹⁰	65	56	

2.2 Data provided [Q2-3]

The tables below indicate the number of respondents able to fill in various parts of the QIS2 spreadsheet. They list the number of respondents providing data for the various calculations of the technical provisions, the placeholder new MCR and placeholder SCR calculations, the alternative calculations for certain sub-risk modules, and the k factor for discretionary future bonuses. As the tables indicate, none of the items listed here were filled by 100% of all respondents. Low numbers could be that this particular risk is nonexistent or that it was not calculated, either because of inability or because the undertaking did not agree with the methodology. Undertakings were asked to provide qualitative responses on the practicability and on the suitability of the methodology of the various risk modules. See Chapters 4 and 6 for more information.

Table 4: Life technical provisions

Respondents with life business	Best estimate provisions		75th percentile provisions		SST cost of capital provisions	
	Number	%	Number	%	Number	%
Total gross provisions	189	77	131	54	98	40
Total net of reinsurance provisions ¹¹	118	48	69	28	23	9

Table 4 gives the number of respondents that provided data for the best estimate of the technical provisions and the 75th percentile and cost of capital risk margins. Almost three quarters of the respondents gave a best estimate of gross of reinsurance provisions. About half also calculated the 75th percentile and finally 38% calculated the SST cost of capital result. In two national markets only the percentile approach was calculated, while in another two national markets only the cost of capital approach was provided by respondents.

Table 5: Life SCR and MCR

Respondents with life business	SCR and MCR calculations	
	Number	%
MCR calculation	177	73
SCR placeholder calculation	190	78

¹⁰ This is a rough estimate based on multiplying the market share for life with the total gross technical provisions and the market share for non-life with the total gross written premiums for each country. The results were then aggregated and listed as a percentage of the total for all CEIOPS members. No information was available for health undertakings.

¹¹ In some countries net figures were not requested or they were not significantly different from the gross provisions.

SCR alternative calculation		
Interest rate risk	162	66
Equity risk	131	54
Property risk	114	47
Currency risk	88	36
Life mortality risk	143	59
Life longevity risk	100	41
Life morbidity risk	35	14
Life disability risk	62	25
Life lapse risk	121	50
Life expense risk	113	46
Application of k factor in SCR calculation	47	19

Table 5 presents the life undertakings that were able to provide the placeholder MCR and SCR calculations, the alternative sub-risk modules for the SCR and the k factor. The 'MCR calculation' and 'SCR placeholder calculation' rows list the number of respondents that were able to complete the MCR placeholder calculation and the SCR placeholder calculation respectively. Undertakings providing a partial calculation are not included here. Nine national supervisors had no life respondents that provided a k factor, partly because the risk mitigating effect of future bonuses were taken into account in the eligible elements. See Chapter 6 for more information on the risk modules and the application of the k factor.

The number of non-life respondents which calculated the technical provisions can be found in Table 6 below. There are five national markets where no non-life undertaking calculated the SST cost of capital provisions and two national markets where no non-life undertaking calculated the 75th percentile provisions.

Table 6: Non-life technical provisions

Respondents with non-life business	Best estimate provisions		75th percentile provisions		SST cost of capital provisions	
	Number	%	Number	%	Number	%
Total gross provisions	272	82	234	71	78	24
Total net of reinsurance provisions	258	78	228	69	66	20

Table 7: Non-life SCR and MCR

Respondents with non-life business	SCR and MCR calculations	
	Number	%
MCR calculation	272	82
SCR placeholder calculation	263	80
SCR alternative calculation		
Interest rate risk	218	66
Equity risk	184	56
Property risk	166	50
Currency risk	112	34

Non-life premium risk with undertaking specific factors ¹²	210	64
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Finally, Table 7 gives the number of non-life undertakings that provided quantitative responses to the various risk modules: the placeholder MCR and SCR and the various alternative calculations of the sub-risk modules.

Undertakings providing only qualitative responses

CEIOPS acknowledges that the QIS2 exercise was challenging both due to its contents and the time constraints. Therefore, undertakings were provided with the option to give only a qualitative response to the QIS2 methodology. Few undertakings took up this option. On the other hand, there were a substantial number of undertakings providing only a quantitative response.

¹² The formula is made so that non-life premium risk with undertaking specific factors by definition equals non-life premium risk with market-wide factors if the number of historic combined ratios is less than 11. This figure therefore is a better indicator of the number of undertakings able to provide the placeholder calculation than of those able to provide the alternative calculation. However, one national supervisor [HU] only calculated those undertakings with at least 11 historic combined ratios.

3. Impact on overall financial position

This chapter discusses the potential impact on the overall financial position of the participants *if QIS2 were the actual Solvency II framework, including the QIS2 calibration*. QIS2 was about testing a possible methodology, not calibration, so that the results may not accurately represent the underlying risks, and may not correspond to a 99.5% confidence interval over a one year horizon. Since QIS2 is based on voluntary participation, there is unavoidably a sample bias present. The SCR based on QIS2 calculations uses the placeholder for those risk modules where more than one option is given, and for some of these risks the difference in outcome between the placeholder and alternative options is substantial. The correlations between the risk modules were not set by CEIOPS but were chosen by the participants or their national regulator based only on some general guidance from CEIOPS. *What follows is therefore purely indicative and the reader is advised to keep in mind the disclaimer found above.*

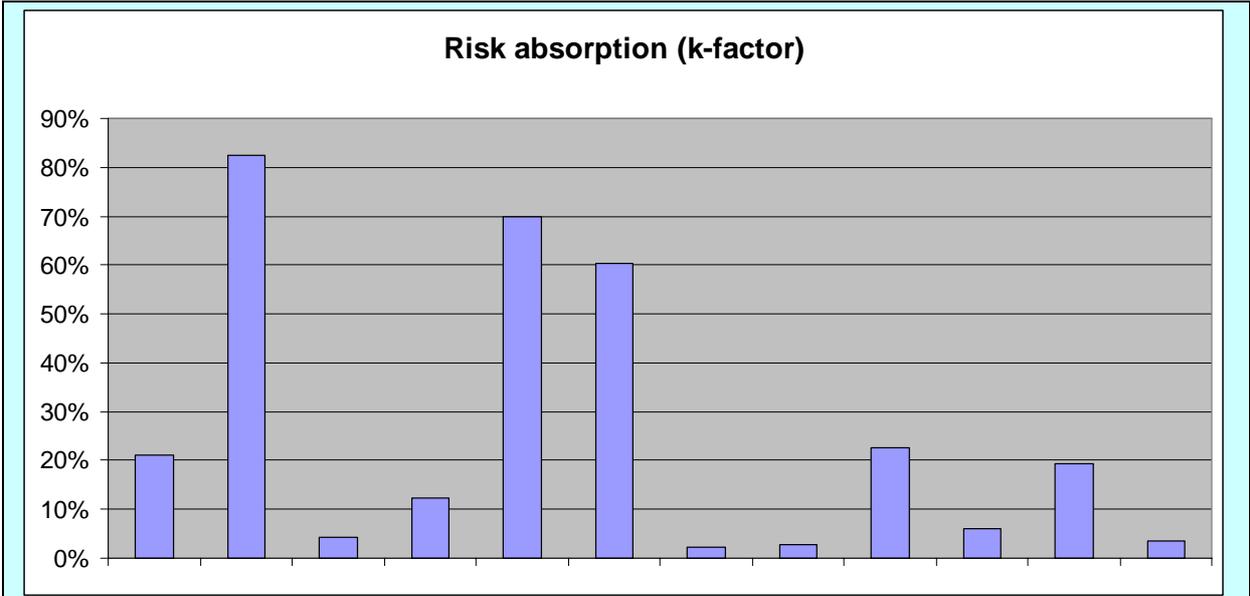
CEIOPS feels that the following provides important enough information to present it here. The potential impact of QIS2 provides us with a first, preliminary insight into the effects of a more risk-based system and into how this impact differs from one type of undertaking to another.

From the Basic SCR to the SCR

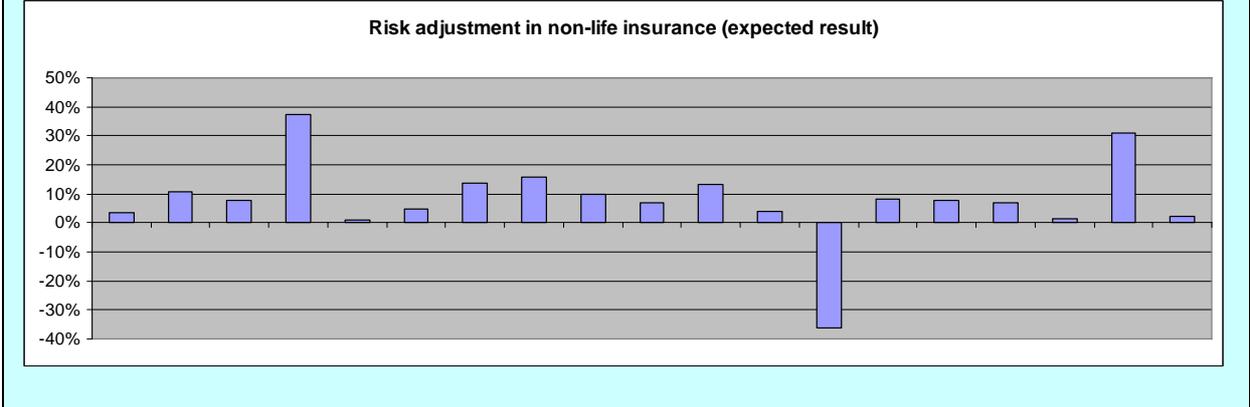
The SCR determination principles in the QIS2 were a two step process. First, a Basic SCR was determined whose aim was to evaluate the existing risks on the balance sheet. Then an adjustment was applied in order to recognize the risk absorbing capabilities of some deferred future benefits for with profit contracts in life insurance, and of the expected run-off and new business underwriting result in non-life insurance.

The countries where a risk adjustment in life insurance was applied (called a k factor) display a fairly wide dispersion of the resulting risk reduction, ranging from a few percents to about two thirds of the Basic SCR, reflecting in part the different characteristics of the with-profit products written in each national market, and in part the different approaches taken by undertakings to this calculation.

The percentages in the two graphs below show the reduction for life profit sharing and for future non-life profit and loss as a percentage of the Basic SCR. Some countries may appear twice in these graphs, one with the ratios reported for their life or non-life undertakings and one with the ratios reported for their composite undertakings.



Risk adjustment elements reported in non-life insurance are also dispersed, but to a lesser extent. Contrary to the life counterpart, the non-life adjustment can result in an increase of the Basic SCR.



3.1 QIS2 solvency position [Q4-7]

Potential impact on overall financial position

Life

The average change in solvency position for life undertakings can differ substantially from undertaking to undertaking. Generally speaking, the technical provisions decrease compared to Solvency I, the Basic SCR is greater than the Solvency I requirement, and the available elements for capital increase. The placeholder SCR, which equals the Basic SCR adjusted for profit sharing through a so-called k factor, is generally lower than the Basic SCR. For a number of undertakings the placeholder SCR is near to or even, in a few cases, less than zero. Eleven national supervisors report that the SCR solvency ratio (based on the placeholder SCR) as calculated for QIS2 is lower than the Solvency I requirement but still remains above 100% for most or all of their life undertakings, while there are six national supervisors reporting an increase in

the solvency ratio of most or a substantial number of life undertakings. The MCR solvency ratio is above 100% for almost all life undertakings.¹³

Non-life

Non-life undertakings also tend to end up with lower technical provisions, and so the available elements increase. On the other hand, the Basic SCR position is greater than the Solvency I requirement. Sixteen national supervisors report that the SCR solvency ratio for QIS2 is lower than the Solvency I requirement but remains above 100% for most undertakings. Still, there are more non-life than life undertakings which end up with a QIS2 solvency ratio of less than 100%. For two national markets, half of the participants ended up with a ratio of less than 100%. The number of undertakings ending up with an increased solvency ratio is lower than for life undertakings, but still substantial for two national market. The MCR solvency ratio is above 100% for most non-life undertakings.

Types of undertaking that would have to raise additional capital

While the group of undertakings ending with a solvency ratio of less than 100% is diverse, four national supervisors identify specific types of undertaking that would have to raise significant new amounts of capital to meet the placeholder SCR: small non-life undertakings, most of these monoline and/or mutuals. The main contributing factor seems to be the non-life underwriting risk charge since small undertakings lack the diversification benefits between lines of business and also receive the maximum size factor for the placeholder SCR risk. See Chapter 6 for more details on the contributions of specific modules to the total SCR risk charge.

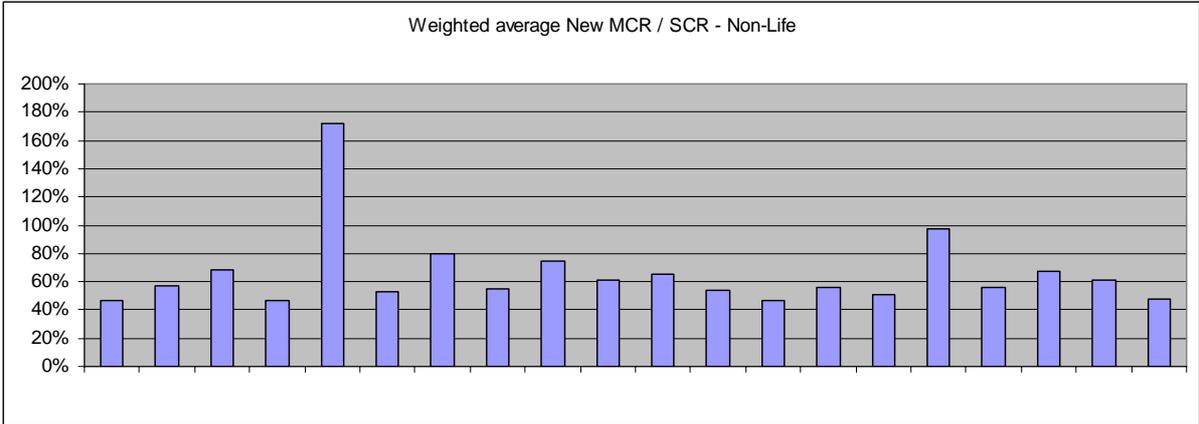
National supervisors were asked to provide information on any types of undertaking for which the placeholder SCR plus adjustments in the available elements would be more than 50% higher than the Solvency I required minimum margin of solvency (RMM). Most supervisors report at least one participant with a ratio of 150% or more. Ten supervisors find that especially non-life participants were likely to have a 50% or more increase, and five supervisors state that small and medium-sized specialised undertakings are mainly affected. Three supervisors find that life participants were equally or more likely than non-life participants to have a 50% or more increase. Finally, three supervisors had no participants with a 50% or more increase or had too few participants to reliably state that it is specific for that type of undertaking.

A similar question was also asked about the ratio of the MCR plus adjustments in the available elements being equal to or greater than the RMM. The results are broadly similar to those for the previous question, though now more life undertakings have a ratio greater than the indicated amount. This is partially explained by absence in the MCR of the k factor reduction.

3.2 Margin between the MCR and SCR [Q8]

¹³ Note that the MCR is not adjusted for the k factor so that some life undertakings end up with an SCR which is lower than the MCR. In some cases, this was by a substantial margin, and in some cases, this caused the solvency ratio to fall below 100%.

In order to assess the margin between the MCR and SCR to check that an undertaking breaching the SCR ratio would not immediately be in danger to break through the MCR ratio as well, national supervisors reported on the number and type of undertaking with an MCR/SCR ratio of 75% or greater and similarly for those with a Transitional MCR/SCR ratio of 75% or greater.



For thirteen national markets, all or the majority of the respondents had an MCR and a Transitional MCR less than 75% of the placeholder SCR. Four national supervisors reported a substantial number of participants with an MCR/SCR ratio of more than 75%. Of those supervisors which reported at least one participant with an MCR/SCR ratio greater than 75%, most stated that this was due to the k factor and expected profit/loss, which can reduce the SCR but not the MCR for life, health and non-life undertakings. One supervisor felt that the main explanation for their national market was the calibration of the non-life SCR

module as it affected undertakings with mainly non-life business. Other explanations given are that the scenario-based interest rate risk result for the SCR was lower than the factor-based interest rate risk result for the MCR, and the CAT risk element being similar in both the SCR and MCR for undertakings with effective reinsurance programmes limiting their exposures.

Finally, one national supervisor reports that the ratio of the Transitional MCR to the SCR is “unreasonably high” for pure life reinsurers. The explanation offered by this supervisor is that the MCR calculation was based on gross of reinsurance figures whereas the SCR is based on net of reinsurance figures.

The relationship between the SCR and MCR and the ladder of intervention between these two requirements was not explicitly addressed in QIS2 but is currently studied and will be addressed in the third impact study.

3.3 Impact by type of undertaking [Q9]

National supervisors were asked to assess the impact of the placeholder SCR and/or the new MCR on the different size classes, undertaking structures (independent or part of a group), legal structures (mutual or proprietary), lines of business written and business models. Caution is advised in assessing the findings below since some of these classifications may be correlated with each other. For instance, mutual undertakings tend to be smaller than proprietary undertakings, so a correlation between undertaking size and legal structure is to be expected. Further, for most of these undertaking classifications, most of the national supervisors did not have a view on the potential impact for that classification so that the following can only be seen as indicative.

Size

Four national supervisors find no clear relation between undertaking size and QIS2 impact. Six other supervisors see a stronger impact on the smaller undertakings. This impact appears to be greater with non-life undertakings than with life undertakings.

Undertaking structure

One supervisor finds evidence of a relationship between the structure of the undertaking and the financial impact: independent entities see a greater impact for this national market than undertakings belonging to a group. This could be explained by a strong correlation between undertaking size and undertaking structure, since the independent undertakings tended to be small. Five supervisors find no evidence of a relationship between the undertaking structure and the financial impact of QIS2. Note that in QIS2 there was no specification provided on how to value subsidiaries.

Legal structure

Three national supervisors found no difference in financial impact based on the legal structure of the undertaking. Three other supervisors did find such evidence and all point to a greater impact on the financial position of mutuals, leading to a larger decline in the QIS2 solvency position for these undertakings than for proprietary undertakings. In one of these countries, the surveyed mutuals are

also mainly non-life undertakings and consequently it is difficult to assess whether the reason of the impact is the legal form, the business model or both.

Lines of business written

Six national supervisors find evidence of an effect of the lines of business written on the impact of QIS2. These supervisors point to a greater effect on monoline undertakings, especially for non-life. One national supervisor names specific lines of business for which the solvency position seems to be more affected than others: life undertakings specialising in Class VII pension management business receive a substantial operational risk capital charge, life undertakings writing with-profit business are confronted with an MCR which is insufficiently risk sensitive and non-life undertakings writing commercial and reinsurance business face a high SCR. Another supervisor points to a smaller impact on life undertakings specialising in term insurance or disability insurance, a greater impact on life undertakings specialising in savings products and a greater impact on non-life undertakings specialising in risk groups with a high volatility factor. One national supervisor found that undertakings with dominant non-life business are confronted with a larger increase in capital requirements, since the non-life underwriting risk component contributes the most to the overall capital requirement. It might be necessary for these undertakings from that supervisor's national market to raise additional capital. Finally, a fourth national supervisor finds that the effect was greatest in monoline undertakings specialising in third party liability and the credit and suretyship class, mainly because there were no specifications about diversification inside each line of business.

One national supervisor feels that the market wide factors for non-life underwriting risk might lead to inappropriate SCR and MCR results. Finally, another two national supervisors find no evidence of a difference in the impact of QIS2 based on the lines of business written.

Business model

Two national supervisors found no evidence of an impact of the business model applied. Another three supervisors did find evidence but point to different evidence. One states that for its composite undertakings, the greater the weight of life business in the whole business, the less the solvency position worsens. Another notes concerns voiced over the suitability of the QIS2 methodology for a mutual run-off undertaking with only with-profit business, and this supervisor also notes for non-life that QIS2 seems to favour heavily reinsured undertakings. Finally, the third supervisor states that specialised undertakings face relatively higher capital requirements in QIS2 than broader, diversified undertakings.

3.4 Undiscounted provisions and surrender value floor [Q10]

For non-life business, national supervisors were requested to give an estimate of the impact of using undiscounted provisions on the financial position of these undertakings. Most national supervisors received the undiscounted provisions for several or all of the reporting non-life undertakings. In nearly all cases the technical provisions increase. Two national supervisors each report a case where the undiscounted technical provisions equal the discounted provisions. For several non-life undertakings, this could require the undertaking to raise additional capital.

For life business, national supervisors were asked to give the number of undertakings that were able to provide data on the aggregate amount of surrender values that would be payable if all policies were immediately surrendered and to provide an assessment of the potential impact on the overall financial position of these undertakings if a surrender value floor were established. Fifteen national supervisors had no undertakings providing this information or too few to be able to give an assessment. There were three national supervisors that were able to give an assessment. For most of the undertakings, the surrender value floor is up to seven percent higher than the percentile or cost of capital provisions. In nearly all cases, the undertaking would not have to raise additional capital. Finally, one supervisor did not have any quantitative figures but did state that a surrender value floor would have a "huge impact" on its life undertakings due to the liberal regulations on policy transfers.

4. Practicability, suitability and resource issues

This section outlines the questions and answers of QIS2 country reports that relate to practicability, suitability and resource issues.

The feedback from companies highlighted the limitations of the QIS2 exercise and indicated a number of areas where further work is required in the development of the technical provisions, MCR and SCR.

CEIOPS is in the process of studying the feedback provided and intends to use this as one of the inputs in the formulation of QIS3. Some of the issues raised are already being taken up as part of the Consultation Paper 20.

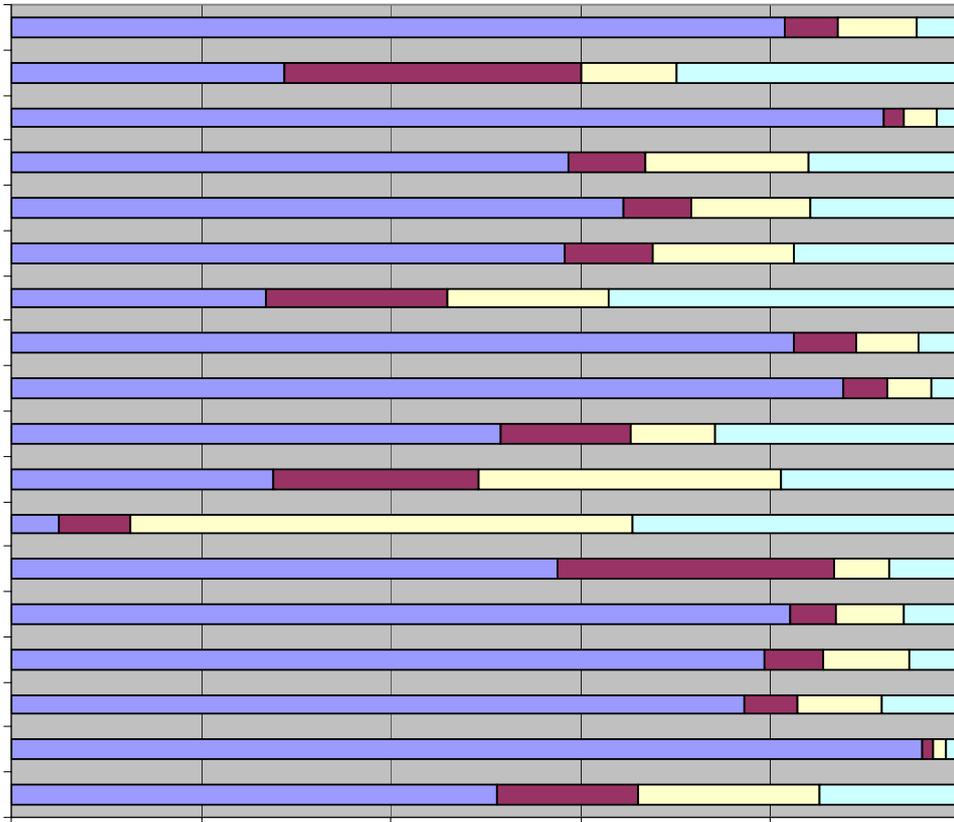
11. (a) Is there any particular component(s) in the calculation of the placeholder SCR or MCR that has given rise to any of the effects noted at paragraphs Q5 to Q8 above, or the variability noted at paragraph Q9 above? (b) Do you have any views about the suitability of the methodology, or about the suitability of the calibration of the formula (or scenario), for this component(s)?

The main critique towards the specification of the MCR in QIS2 focused on the poor interplay between the SCR and the MCR, which, according to several reports, caused these two levels being too close to each other. The general reason for this phenomenon was the different specification of the two solvency control levels, in particular the treatment of profit-sharing in life insurance (k factor) and of expected profits in non-life insurance and of risk mitigation (e.g. reinsurance). In several reports it was requested that these problems should be addressed and corrected in future work. Some participants and two supervisors even considered a fundamental reconsideration of the design of the MCR necessary to make it more sensitive to how insurers manage their risks.

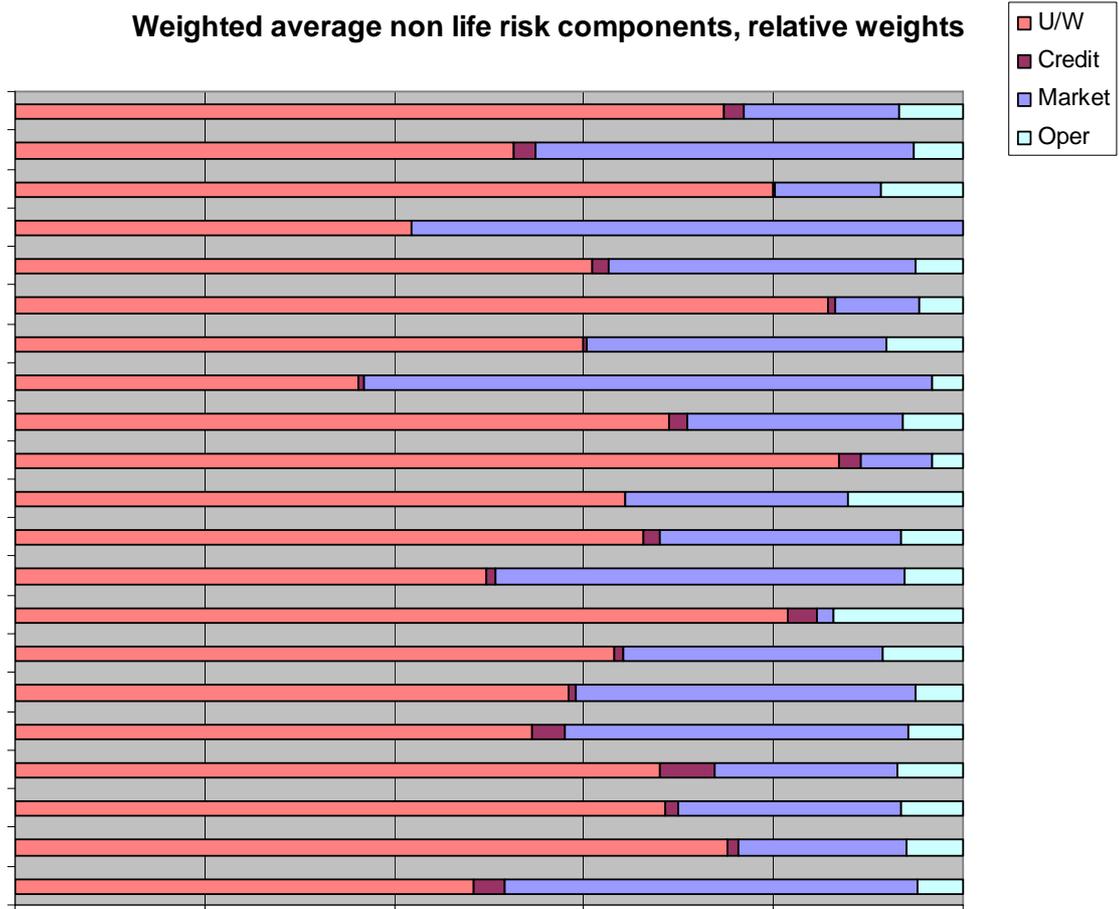
The two dominating risk factors in the SCR were typically underwriting risk in non-life insurance and market risk in life insurance. These together with other risk charges, correlations, size etc assumptions determine the financial impact for each insurer (for country-level summaries see the graphs below). Wide-ranging feedback was received from the participants on the impacts, much of which however concerned the calibration of parameters. In particular the calibration of market risk and non-life underwriting risk modules were considered too prudent by many undertakings (see sections 30-33 below).

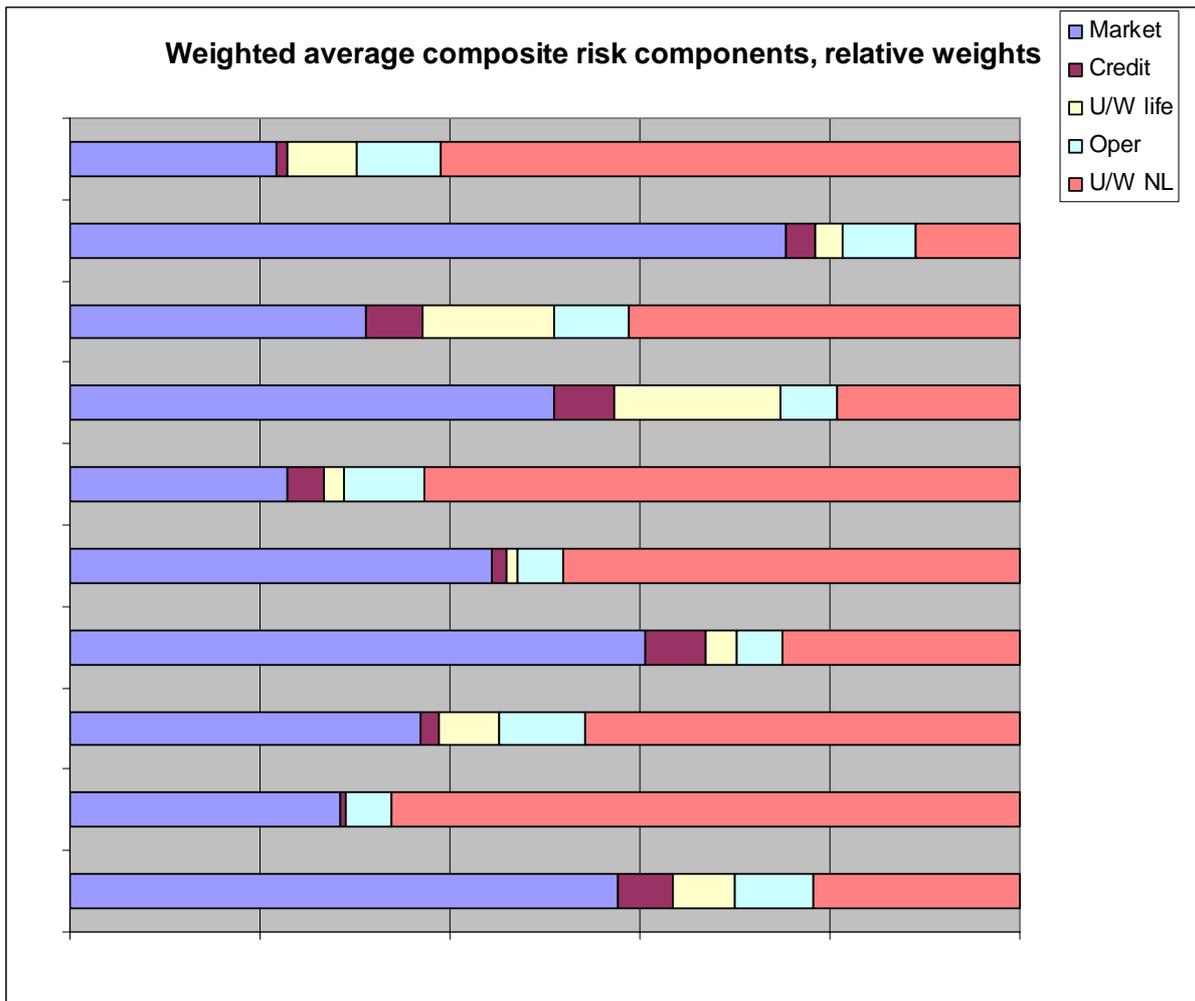
Weighted average life risk components, relative weights

- Market
- Credit
- U/W
- Oper



Weighted average non life risk components, relative weights





12. (a) Please summarise the views of undertakings and supervisors about the suitability and appropriateness of the methodology in the specification for the valuation of the assets and liabilities, and for the different risk components in the SCR and MCR, including both the placeholder and any alternative; and about the incentives for effective risk management provided to undertakings by this methodology. [From Question A.4 in the questionnaire and elsewhere]

The answers to these questions are summarised below. Additional discussion will follow later, e.g. in sections 30 and 33.

In general the modular, risk-based and more market consistent approach of QIS2 was appreciated as a useful step to recognise more effectively the economic drivers underlying the insurance business. With regard to technical provisions, similar problems as in QIS1 were commonly observed (e.g. too general and vague instructions, resource and know-how problems, high complexity of the exercise, comparability of estimates). Due to the profits at inception, some participants calculated negative technical provisions. It was not specified how to deal with such outcomes. In the majority of reports, the cost of capital approach was generally favoured over the percentile method by participants, in life insurance in particular (see also the more specific sections on

technical provisions for life, health and non-life insurance below). Regarding the placeholder and alternative approaches, some participants concluded that the scenario approach would in general be able to capture better the risk drivers, non-linearity etc issues, while some other participants favoured the factor approach for reasons of practicability.

The main areas where it was suggested that further development should be devoted are as follows:

- more clarity and some development work regarding the underwriting risk modules. For life business, this pertains to risk drivers for (for instance) mortality and longevity, expenses, k factor, treatment of unit linked insurance; in non-life underwriting risk more development is needed in e.g. treatment of premium risk, catastrophe scenarios, risk mitigation, 15-year combined ratios, size factor and special lines of business,
- more granular and transparent calibration of equity risk
- interest rate risk methodology: a number of commentators questioned the suitability of the factor based approach and the definition of interest rate sensitive assets was unclear
- operational risk: calibration and non-linearity of the formula
- currency risk: methodology and guidance for correlations
- credit risk: more clarity with regard to the time aspect of the methodology and the treatment of reinsurance
- requirement to treat similar life and non-life insurance risks equally
- suggestions to make the SCR more risk sensitive included simultaneous stresses on several risk factors, and addressing concentration and business risk
- the amount and type of assets included in the SCR calculation for market risk: how to deal with assets in excess of SCR, and asset classes such as commodity and alternative investments
- the scenario and factor approaches need consistent calibration, particularly for underwriting risk and interest rate risk
- some reinsurers noted that the underwriting risk modules were not suitable for their business

(b) In particular, are there any areas where you believe that the proposals under test in QIS2 seem either to (i) overstate or (ii) understate the level of risk? Do you think that these concerns could be adequately addressed by a change to some of the parameters? If not, how do you think that the QIS2 methodology could be refined to ensure that the true risk drivers are captured more appropriately?

The answers to these questions are addressed in more detail in paragraph (a) above and in Chapters 5 and 6 below when discussing technical provisions and capital requirements.

In general, it was observed in many reports that the participants feel that the SCR overstates certain risks, e.g. market risk (equity risk, market risk correlations), premium and reserve risk in non-life, and CAT risk for life and non-life business. This in turn will lead to higher premiums, anticipated some participants. In life insurance, a long-term view is often necessary, but a number of participants considered that the current parameters may lead to sub-optimal

investment policy. The SCR for life underwriting risk seemed too low to many reporters (e.g. longevity trend), in particular the factor-based approach, which differs sometimes substantially from the alternative method.

(c) As a result of studying the quantitative and qualitative responses from individual undertakings, do you think that there are any particular parts of the methodology, or particular parameters, in either the SCR or MCR, for which some discretion should exist to modify the standard (formulaic or scenario) approach in order to reflect more closely the underlying risks borne by undertakings? If so, what would be a suitable means to determine the appropriate modifications to be made?

Based on the initial ideas expressed in QIS2, the following were areas where some national supervisors feel discretion should exist include:

- One supervisor identified four areas where it seems most difficult for a standard formula to reflect closely the incidence of risks borne by undertakings: life policies containing options that are in the money or close to the money, non-proportional reinsurance policies accepted or ceded by non-life undertakings, large exposures to potential underwriting losses for non-life undertakings, and non-life undertakings writing specialised lines of business
- Equity risk should take account of differing indices, strategic holdings v normal shares and listed v non-listed equities
- Country specific effects in CAT risk might be taken into account, also there is a need for country specific volatilities in reserve risk
- The size factor should take account of country specific effects, e.g. by linking to the number of claims or policies rather than the amounts
- Some national supervisors stress that there should be as few options in the Standard Approach as possible
- One supervisor stresses that even if the internal model of an undertaking is not sophisticated enough to be recognised as an internal model to be used for Solvency II, the undertaking should be allowed – with prior authorisation from the supervisor – to use a partial internal model for one or more risk modules of the SCR, provided that the SCR measure obtained is believed to yield a more accurate and risk sensitive result

Further discussion on a number of these issues is contained in CP20, and these will then be considered further in the selection of the methodology that will be proposed for testing in QIS3.

13. Do you have any views about the degree of cross-sectoral consistency exhibited by the various components of the SCR? How do you think that the calibration of the different components in the SCR and MCR might best be accomplished in order to provide a similar standard of prudence for each risk module?

The responses included the mixed life/non-life product calibration problem mentioned in 12 (a) above, a request by a few participants to follow more closely Basel II on credit risk module, the potentially differing effects on the capital charges for insurance unit linked business v OEICS and UCITS (that are covered by a separate EU Directive) and the different treatment of operational risk for

undertakings writing Class VII pension management business (as defined in the 1st Life Directive). It was commented that a modular approach has a fundamental problem in that the impact of stresses is done on a modular level, and only in the aggregation are the cross-sectoral effects addressed; nevertheless it was recognised that for now a modular approach is more feasible than a global, complex scenario exercise.

These comments will be considered further during the selection of the methodology that will be proposed for testing in QIS3.

14. Please describe any economic or other rationale that undertakings may have provided for how they believe that the various components of the SCR and MCR, together with the relevant correlation factors, might suitably be calibrated to reflect the relevant risks, and any other views they may have expressed about the calibration. Were there any views expressed by undertakings about whether particular parameters should be set for the EU as a whole, determined by reference to local markets, or undertaking specific? [From Question A.13 in the questionnaire and elsewhere]

The main comment given by participants was that the parameters and correlations were too prudent. Some participants justified their views with data from their own internal modelling results. There was little agreement among participants on whether parameters should be determined at the EU-wide, local market or undertaking specific level. Supervisors also held differing views: some favoured a EU-wide approach while others preferred national calibration, for example for non-life underwriting risk. Other comments given include:

- The calibration of the credit default factors for ratings equal to or lower than A was inconsistent with the calibration of the factors for higher credit ratings
- Some undertakings in one national market emphasised the importance of ensuring that the European market remains a competitive platform by not setting the parameters at a more prudent level than other benchmarks (e.g. APRA factors, SST approach)
- Some national supervisors suggested default values for the SCR correlations during QIS2, and these default values were then used by most undertakings
- Historic data on e.g. the Spanish flu should be used for calibrating the mortality catastrophe charge
- In some reports, a multi-year risk calibration was suggested for certain long-term life risks
- Since the uncertainty related to premiums will be higher than that related to claims (since the latter can be evaluated by the run off on existing policies) the size factor should be calibrated to differing levels for premiums and claims

CEIOPS will consider these issues further as part of its preparation for QIS3.

15. Please summarise the views of undertakings and supervisors about

(a) the practicability of the various calculations, and any suggestions about how any practical problems that were encountered might be overcome [A.2],

The comments on technical provisions were similar to those that were received already during QIS1. For instance, more detailed and user-friendly technical specifications were requested, significant difficulties were faced in the stochastic modelling of life and health insurance (best estimates, percentiles, the market consistent valuation of guarantees and options, profit-sharing features), and resource and knowledge problems that the complexity of QIS2 exercise created were often severe. On the other hand when calculating the capital requirements i.e. SCR and MCR, the difficulties seem to be both conceptual and practical, but these could largely be solved with more detailed guidance and by adjusting the methodology.

Some reports mentioned that in non-life insurance, there were difficulties with risk groups, best estimate calculations, distributional assumptions, reinsurance, correlations, historic combined ratios, equalisation provisions. Other difficulties faced included a factor approach to interest rate risk, risk classification v internal classification, data definitions, and unit linked with guarantees.

(b) any simplifications or other changes that might sensibly be introduced to increase the practicability of the calculations [A.4],

Approximations were needed by many participants although they were not necessarily comprehensively listed in the reports. Many participants expressed the view that both in life and non-life insurance, the cost of capital approach would be more practicable. Some felt that, should the MCR be calculated more often than the SCR, it should be simplified. In one national market some participants suggested to use an approximation for q_x and I_x in the life underwriting risk module and to make the MCR for interest rate risk a proportion of the SCR. Finally, another supervisor felt that, next to better guidance, some simplifications could be made by basing the MCR on Solvency I and by providing more parameters (such as correlations between modules) instead of leaving these open for undertakings to fill in.

(c) the availability and reliability of the required input data [A.1],

Some undertakings did not include all lines of business or risk groups, and also the classification caused some problems (both in life and non-life insurance). In non-life insurance, historical combined ratios, reinsurance, and durations caused difficulties. Participants in one country stated that the historic combined ratios for non-life premium risk should be restricted to 5 years as a longer time period would not be representative of the real trend. One factor that may undermine the reliability and comparability of the results is the current lack of comprehensive and harmonised actuarial standards for calculating the best estimate provisions in a number of member states. Most participants used accounting data as a basis. One practical problem for some non-life undertakings is that they did not have

accident year information available. Some of these used underwriting year information instead.

(d) the level of resource that would be need to carry out these calculations[A.3]; distinguishing if possible between (i) the assessment of provisions, (ii) the valuation of assets, (iii) the calculation of the MCR, (iv) the calculation of the placeholder SCR and (v) the calculation of the alternative approach for the SCR. Please also distinguish these views, where possible, between different sizes and types of undertaking (categorised as in paragraph 9 above). [From Questions A.1 to A.4 in the questionnaire]

In general, the replies showed much variation in relation to the initial resource requirements, ranging from a few person months to a few person years. Subsequent yearly calculations would take approximately a couple of person months on average.

These comments will be considered further during the development of the revised specification for QIS3, and the associated guidance on the specification to be provided by CEIOPS.

16. Please give an indication of the average number of person days that were required by undertakings to complete QIS2, and the extent to which this varied across different sizes and types of undertaking (categorised as in paragraph 9 above). [From Question A.3 in the questionnaire]

The average figure was a couple of person months, though the estimate given differs substantially from undertaking to undertaking.

However CEIOPS believes that the final form of Solvency II (and future QIS) should be less onerous for companies, as guidance is improved, companies become more familiar with the new calculations and techniques, and fewer options are tested.

17. Please provide some assessment of the reliability and accuracy of all the results emerging from the QIS2 study? Please distinguish where possible between different sizes and types of undertaking (categorised as in paragraph 9 above). [From Question A.1 in the questionnaire and elsewhere]

The results were generally considered sufficiently reliable for QIS2 purposes. Many of the reservations relate to the limitations that were caused by too general guidance on the one hand, and time, human resource, data and technical problems on the other.

CEIOPS hopes that many of these limitations may be overcome for the forthcoming QIS3, so that the reliability of the results may become progressively higher.

18. Please summarise the main issues that have been identified for smaller undertakings.

The following illustrative topics were mentioned in the country reports. A brief assessment of the replies is given below. CEIOPS will attempt to address a number of these issues as part of QIS3.

a) Are there any input items of data for the spreadsheet that were particularly difficult for smaller undertakings to obtain?

A common problem was that few small undertakings participated in QIS2, which certainly indicates that the spreadsheet was not easy to fill in for them. There were problems relating to data availability (such as combined ratios for 15 years in non-life insurance, durations), and too few or even non-existent actuarial resources for calculating the technical provisions. In general, the small undertakings encountered the same problems as the other participants, but the severity appears to have been higher.

b) What is the most practicable and suitable approach to the assessment of provisions for smaller undertakings? In particular, is there a preference for a percentile approach or a cost of capital approach?

The cost of capital approach seemed generally easier to implement, even for the smaller undertakings, as it does not necessarily require stochastic modelling, is understandable also for other than actuaries, and on-line support was available. However, the best estimate calculation itself caused problems for many participants. See also the section on technical provisions below.

c) Is there scope for sharing of relevant experience data to assist in calculating the best estimate and the risk margins for the provisions? Should some appropriate benchmarks be published (please describe these)? Would it be easier to approximate the 75th percentile provisions through the application of a set of prescribed stress tests?

These ideas were generally supported, and in particular assistance and common databases and benchmarks for calculating the best estimate and the risk margin for technical provisions were requested. Examples of practical implementation typically included co-operation at national level via working parties etc.

d) Are there any simplifications or approximations that could sensibly be applied to any of the QIS2 methodology to make this more practicable or suitable for smaller undertakings?

The ideas that were mentioned in the reports include prescribed approximation formulae, and a simplified spreadsheet for smaller undertakings. Examples would also be helpful to make the QIS material more user-friendly.

e) Do smaller undertakings have particular views about the relative suitability of the placeholder approach and the alternative approach for the various components of the SCR?

The critical comments included the level of credibility applied to undertaking specific combined ratios for non-life insurance, calibration (e.g. correlations), and interest rate risk methodology.

f) Are there any particular problems identified by smaller life insurance undertakings with the assessment of the value of future bonuses, or with the application of the proposed k factor? Are there any possible simplifications that might be applied for this purpose?

This question raised some comments but they mainly related to the k factor approach in general, and not for smaller undertakings in particular. See also Section 32.

g) Is the 'size factor' in the non-life underwriting risk module suitable to reflect the potential volatility in claims from different sizes of portfolios of business? (See also Section 33 below)

The answers to this question were generally critical, mainly because of the overly prudent calibration. In some national markets, undertakings suggested to use counting measures (number of policies or claims) instead of or in addition to volume measures. See also Section 33.

19. (a) Please provide an outline of any general national guidance that was given to undertakings for the completion of QIS2, the reasons for providing this guidance, and the perceived effectiveness of this guidance in helping undertakings to complete QIS2 appropriately.

A translation of QIS2 material was provided by the supervisors in several countries. Some supervisors gave additional guidance which varied from meetings with the participants to extensive written guidance. Insurance associations also gave practical guidance at the EU level and sometimes also at a national level. In some non-euro countries the national supervisor provided their own yield curve.

(b) Do you think that more guidance may need to be given to undertakings about the assessment of the provisions or the calculation of the SCR and MCR, in order to ensure a consistent and reliable approach to these calculations. If so, are there any particular topics on which this guidance should focus, and do you have views on who would be best placed to provide this guidance?

Generally further guidance was requested on all main fronts, e.g. for SCR, MCR and technical provisions. Some preferred more guidance at a European level, others at a national level or at both levels. Guidance could be provided in the form of some calculation examples, but also in the form of more information on the rationale behind the methodology. It was noted though that it is virtually impossible to provide sufficient guidance covering all aspects of the assessment of technical provisions, and that the undertakings will very likely have to make their own assumptions on a number of issues.

A list of topics on which more guidance was sought by undertakings during QIS2 included:

- Risks to be included in 75th percentile provisions, and calculation of capital for cost of capital risk margins
- Calculation of 75th percentile margins for life insurance provisions
- Use of reinsurance pricing as a proxy for risk margins
- Provision to be made for expected level of reinsurance defaults
- Allocation of non-life direct business to appropriate risk groups, and similarly for reinsurance accepted
- Effect of diversification between risk groups when assessing provisions
- Application of the k factor
- Method of valuation of listed investments (e.g. mid-market or exit value), and valuation of other types of asset (e.g. subsidiaries)
- Allowance to be made for future inflation of expenses for life undertakings
- Provision to be made for future expenses by non-life undertakings
- Allowance to be made for deferred taxation
- Provision to be made for staff pension scheme costs

It is anticipated that guidance on these and other topics will again be provided by either CEIOPS or national supervisors for the purpose of completing QIS3.

5. Assessment of technical provisions

20. How much consistency was there between undertakings in their approach (e.g. risk classes and factors identified, and the choice of models and assumptions applied for each risk factor) to the assessment of the risk margins for the 75th percentile valuation of the liabilities?

Non-life insurance

Most supervisors observed a broad consistency in relation to modelling approaches and distribution assumptions, though, differences in the approaches were reported with regard to:

- the approach to the percentile estimation (bootstrapping or Mack method);
- distribution assumptions;
- risk factors; and
- segmentation.

In some countries premium provisions were not re-evaluated, or they were only evaluated through a simple deterministic approach.

Life insurance

Consistency appears to be lower in life insurance. Some supervisors noticed an overall consistency in approaches, but others reported the absence of a common methodology and differences in:

- the estimation approach (by means of simulation or deterministically);
- the risk factors taken into account; and
- distribution assumptions.

In two countries, consistency of life risk margins was ensured by providing pre-specified stress tests.

Health insurance

Only a limited consistency between approaches to provisions for health insurance with features similar to life business was reported.

Some supervisors could not answer the question because no or only few participants calculated percentile provisions, or because methods were not disclosed by the participants.

No supervisor quantified the impact of any inconsistencies observed.

It is difficult to assess the consistency across countries from the information provided.

21. For which risk factors did undertakings apply a risk margin approach for the assessment of the 75th percentile calculation of the provisions? Which risk factors did undertakings consider to be hedgeable in the 75th percentile valuations? [From Question A.5 in the questionnaire]

In life insurance, risk factors were allowed for in the risk margin as follows:

- mortality
- longevity
- disability
- morbidity
- lapse
- expenses
- operational risk (in some countries)
- closure to new business (in some countries)
- inflationary escalation (in one country)

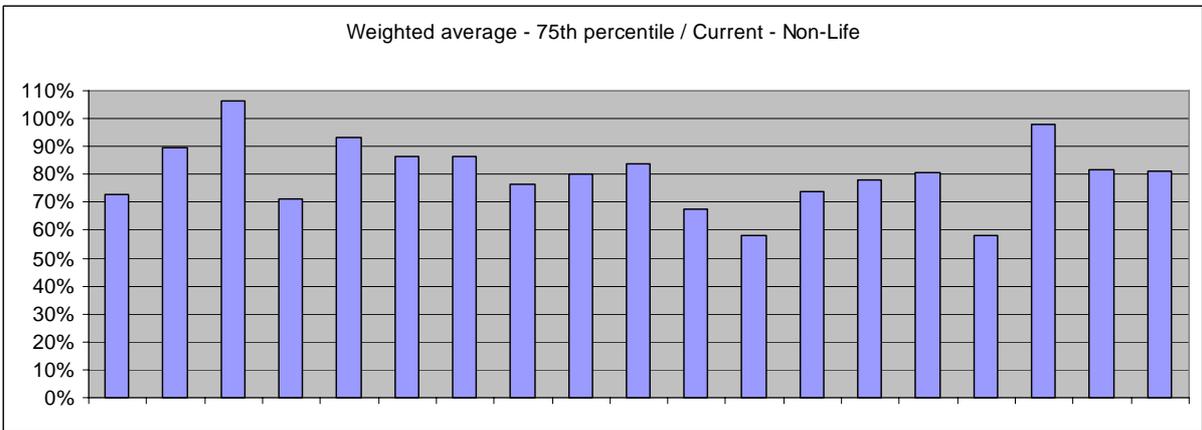
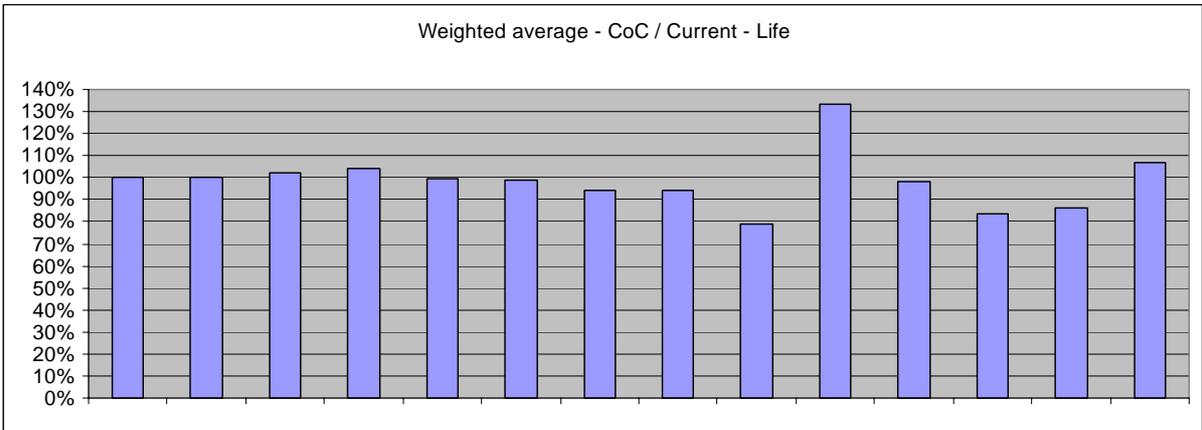
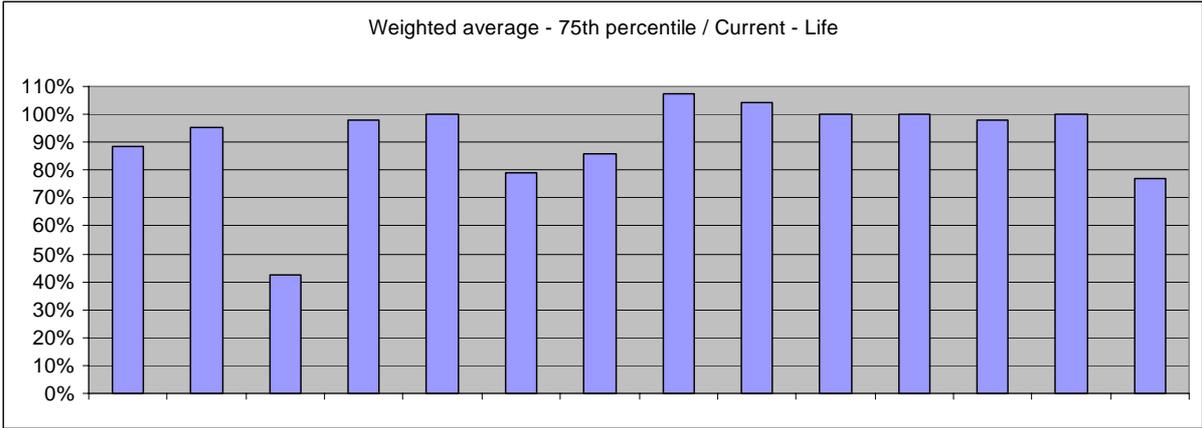
In non-life insurance, no uniform classification of risk factors seems to exist. Most participants took premium and reserve risk into account. Other risk factors mentioned are insurance risk, CAT risk, claims volatility, claim frequency, claim size, premium cycle, reserve deterioration, expense, inflation, closure to new business, operational risk.

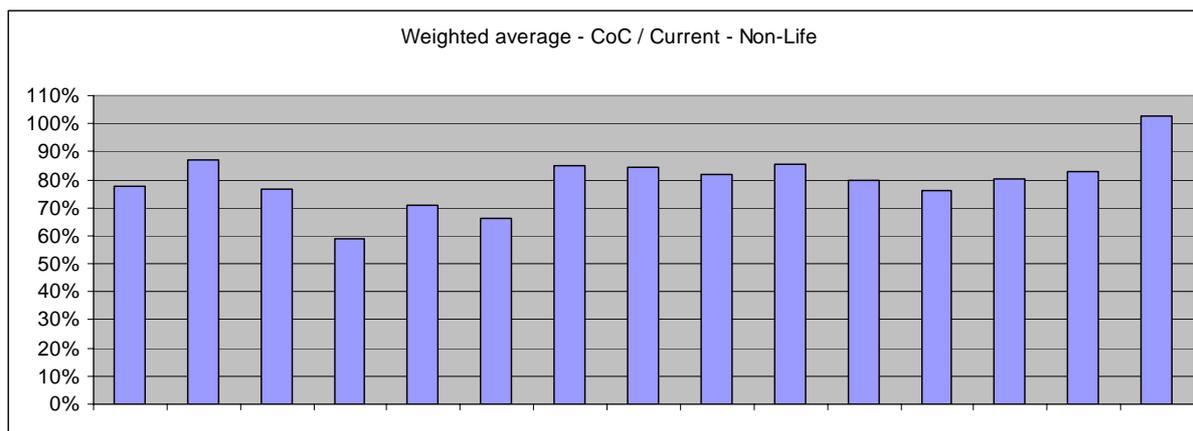
Usually, underwriting risks and operational risks were considered non-hedgeable, while market risks were regarded to be hedgeable. In some countries credit risk was also classified as hedgeable, though certain kinds of credit risk, for instance reinsurance credit risk, were excluded by some participants. Sporadically, inflation risk was considered to be hedgeable. One difficult issue that was raised concerns the potential interaction between hedgeable market risks and non-hedgeable demographic factors (such as persistency and option take-up rates).

22. Please describe any significant differences between QIS1 and QIS2 in the methodology and assumptions applied by undertakings for the calculation of the best estimate and 75th percentile provisions. How was the probability distribution and the volatility underlying the 75th percentile calculation derived? [From Question A.6 in the questionnaire and elsewhere]

Most participants reported no significant differences between the methodologies and assumptions applied for QIS1 and QIS2. The QIS1 summary report can be consulted for detailed information on the methodology.

In its current Consultation Paper No. 20, CEIOPS noted that the best estimate must be based on a reliable actuarial method. More work should be dedicated to define harmonized criteria in close co-operation with the Groupe Consultatif on level 3.





23. Please describe the approach taken by undertakings to the valuation of hedgeable financial options and guarantees in life insurance policies, including the means by which they assessed the appropriate take-up rates for these options. [From Question A.7 in the questionnaire]

As in QIS1, there is variation between different markets and undertakings in relation to the valuation of financial options and guarantees. In most countries, a market consistent valuation was applied. Some participants though were not able to determine the market values for technical reasons. In some countries, no separate market value of options and guarantees was calculated because the options were not regarded to be hedgeable. In these cases the take-up rates of the options were considered not to depend on market factors (e.g. interest rates) or at least not in a hedgeable manner.

In case of a market-consistent valuation, often a risk neutral arbitrage-free valuation model based on stochastic Monte-Carlo simulation was used. These models were calibrated to the relevant market data, and therefore an additional risk margin was typically not included.

In its current Consultation Paper No. 20, CEIOPS proposes to dedicate more level 3 work on the definition of hedgable risks in close cooperation with the other level 3 committees taking into account the evolving nature of capital markets.

24. Please describe the appropriate methods and assumptions applied by life insurance undertakings for the assessment and valuation of future bonuses. Did undertakings apply the option in paragraph 2.31 of the specification to restrict the valuation of technical provisions to guaranteed benefits? [From Questions A.8 and A.9 in the questionnaire]

Future bonuses were usually derived by stochastic cash flow projections. Bonus rates were projected taking into account the following input and restrictions:

- the current level of bonus rates;
- the assumed management actions;
- simulated investment returns of the asset portfolio; and
- national regulations and customary practices on bonus profit sharing.

In one country, the market value of future bonuses is determined as the positive difference between the first order reserve and the market value of guaranteed benefits. In another country, participants assumed that profit participation level should not have been lower than 85% of net profit rate.

Some participants were not able to evaluate future bonuses or to determine their separate value. Two supervisors noted that a best practice to the valuation of future bonuses has not evolved yet..

In five countries, participants applied the option to restrict the valuation to guaranteed benefits because discretionary bonuses can be used to cover general losses.

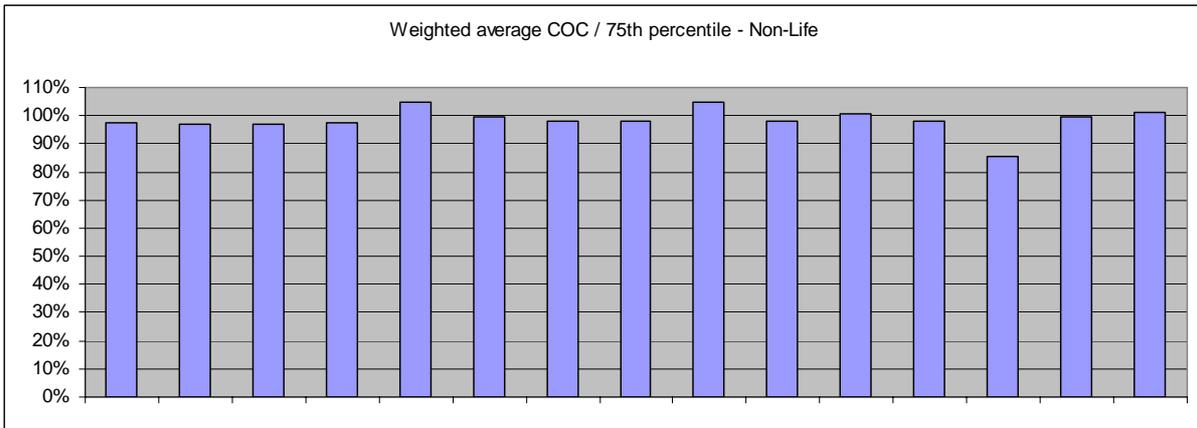
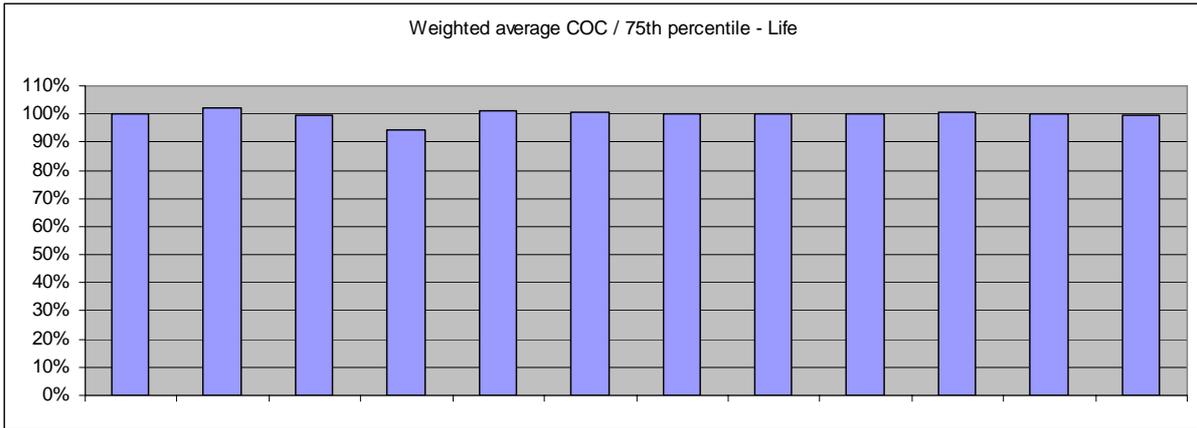
25. Did many undertakings allow for diversification between risk factors or between lines of business when assessing the provisions? If so, please describe briefly the approach taken and the estimated effect on the size of the provisions. [From Question A.14 in the questionnaire and elsewhere]

Some of the participants allowed for diversification between risk groups. They usually applied correlation techniques to quantify the diversification effect. The impact varied between marginal reductions and 28%. Not much information on the derivation of the correlation assumptions was provided. Some participants used the correlation matrix of the QIS2 reserve risk SCR. In one country correlations were based on research carried out by the supervisor, offices, consultants, and industry associations.

Information provided on diversification between risk factors was rare. In case of pre-specified stress tests, diversification effects were taken into account by specified correlations.

26. Is there any clear pattern discernible from a comparison of the size of the 75th percentile provisions to the SST cost of capital provisions for different undertakings and lines of business?

In most countries, the differences between the percentile provision and the cost of capital provision were not significant. In case significant differences were reported, some supervisors discerned no clear pattern. Other supervisors pointed out that cost of capital provisions were higher than percentile provisions for long-tailed non-life business, but this observation may also be caused by the preliminary calibration of the reserve risk module.



27. (a) Please summarise the approach taken by undertakings to the SST cost of capital calculations.

Little information on the projection of future SCRs were provided. Usually, participants assumed that the ratio of SCR and best estimate provisions remains constant during run-off or applied a simple duration formula to determine the margin. It seems that market risk was not included in the projected SCRs by most participants.

Several participants followed the CEA approach to the cost of capital margin. In this case, it remains unclear whether this implies that the lower cost of capital rate of 4% was applied, or whether only the simplifications for the projection of future SCRs as suggested by the CEA were used.

(b) Did undertakings comment on the practicability, resource implications, reliability, or suitability of this approach as compared to a 75th percentile calculation?

It may be difficult to derive reliable and representative conclusions from the answers provided since the sample may not be representative, but in most countries a majority of participants that expressed a view seems to prefer the cost of capital provision to the percentile provision because of its simplicity and economic interpretation. Also, the level of confidence of the percentile approach appeared to be arbitrary. One supervisor noted that mutual undertakings did not

share this view, another restricted this view to life insurers. In one country, most participants questioned the rationale of the cost of capital approach. In cases where a stress test for life percentile provisions was provided, the main concerns with regard to the practicability of the approach were met.

(c) Do you have views about the circumstances or types of business for which either a cost of capital approach or a 75th percentile calculation may be preferred?

[From Questions A.1 to A.4, and A.10 in the questionnaire, and elsewhere]

Only five supervisors provided a view on the suitability of the approaches. Three supervisors recommended the use of the cost of capital valuation for the same reasons as given above. One supervisor advocated a single methodological framework to ensure consistency, convergence of practice and comparability between undertakings.

In its current Consultation Paper No. 20, CEIOPS advises to use the cost of capital approach to calculate the risk margin for technical provisions.

28. Please describe briefly any alternative approaches to the cost of capital calculations that were suggested by undertakings, how many undertakings suggested the CEA or other alternative approach, and how the results compared with the SST approach. [From Question A.10 in the questionnaire and elsewhere]

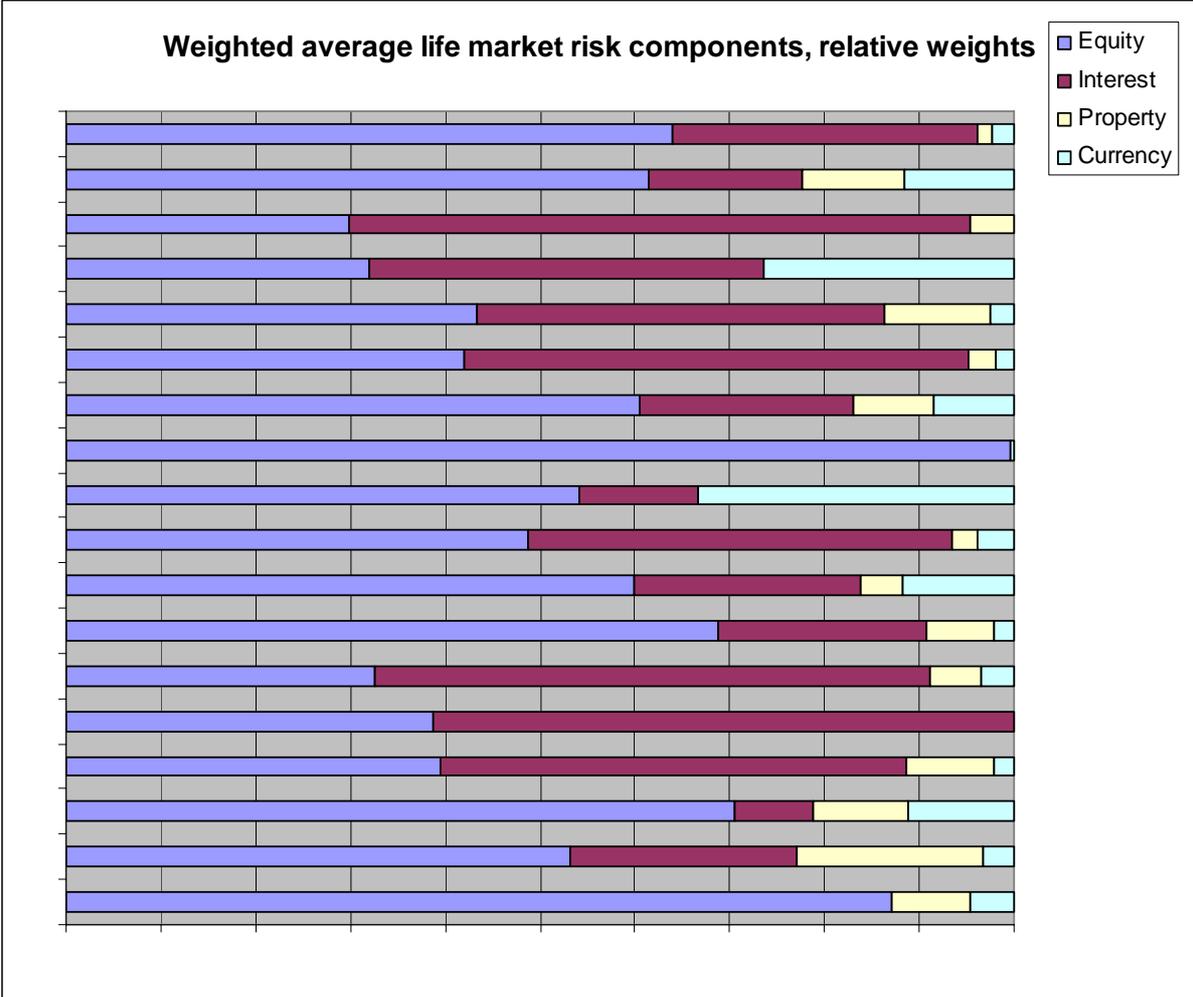
Participants applied modifications to the SST cost of capital approach including one or more of the following changes:

- capital was determined to a higher risk measure (e.g. VAR 99.95%);
- internal model assessment of capital was used;
- capital allowed allow for group diversification;
- diversification between lines of business was excluded;
- a lower cost of capital charge was applied (e.g. 4%);
- market interest rates instead of the CEIOPS term structure were used for discounting;
- the margin allowed for risk transfer (e.g. to the policyholder).

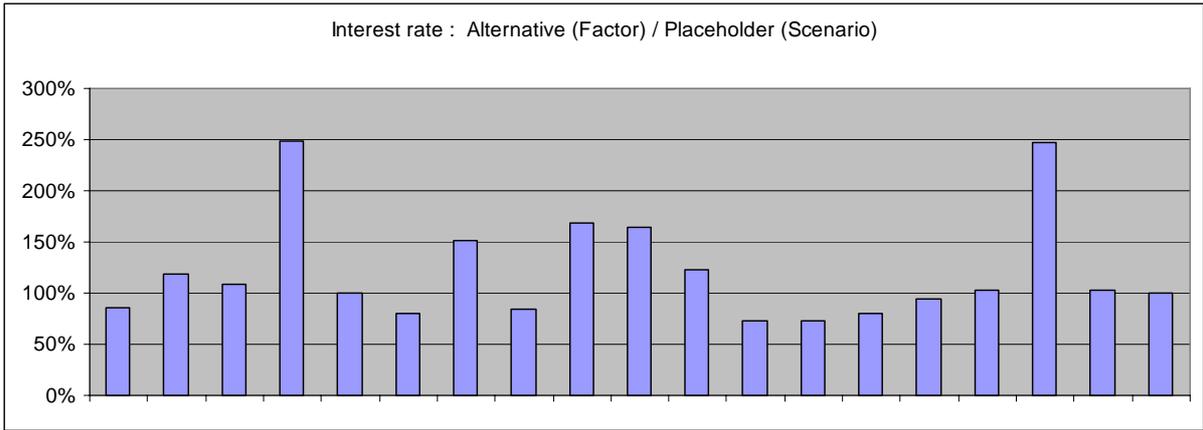
Several participants referred to the CEA approach.

6. Issues relating to the calculations of SCR and MCR, internal models and eligible capital

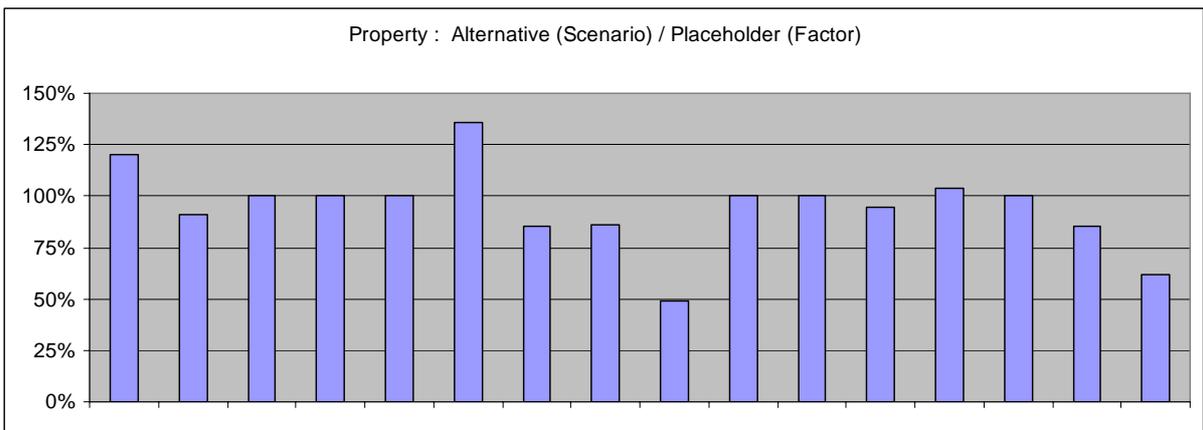
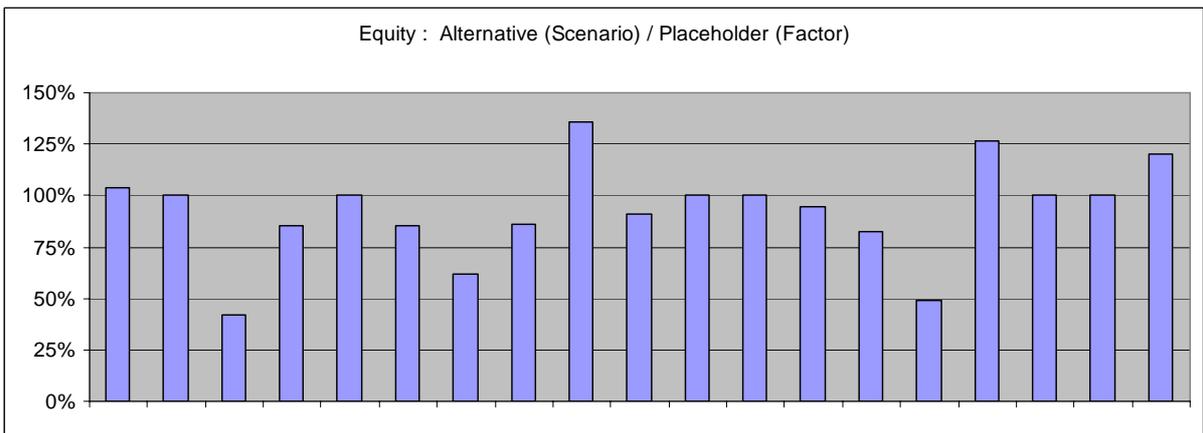
30. Please comment on whether you regard the methodology for placeholder SCR or the alternative approach for the SCR as being the more appropriate for each component of the SCR, and explain the reason for your views.

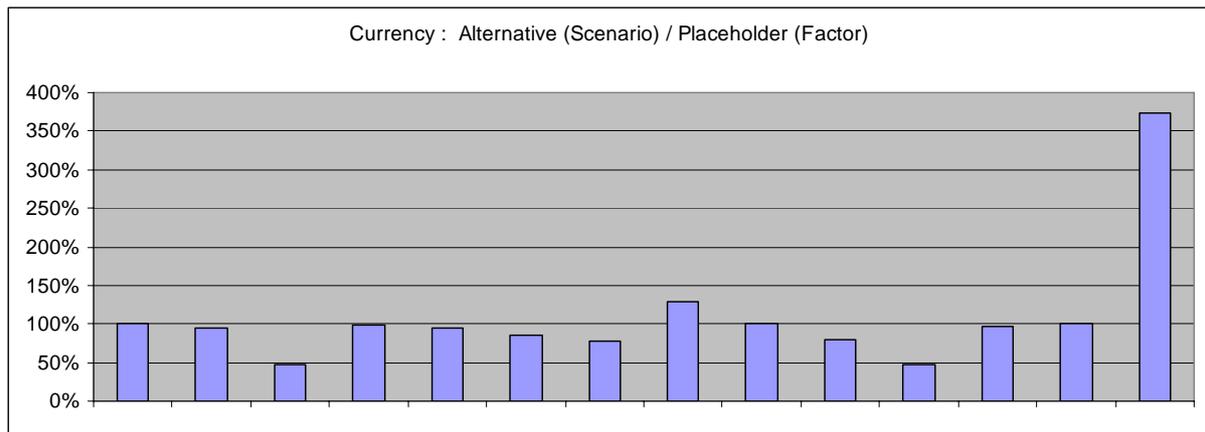


For interest rate risk, most countries expressing a view on the two approaches said that they had a preference for the scenario based approach, but one added that they thought that the factor based approach should be retained as an alternative, as it may be more practicable, in particular for small undertakings. The factor based approach was seen though by many undertakings as too time-consuming, and difficult to operate with duration buckets, while not producing additional valuable information. In addition, it was noted that the scenario approach can allow more easily for the effect of options in the assets and liabilities.



Some countries suggested that the scenario approach would be more suitable for other types of market risk as well, as it can take direct account of the effect of derivatives and other product specific features (e.g. when premiums depend on the level of interest rates for health insurance), and also it is more suitable for assessing the effect of changes in asset values on the cash flows in respect of linked business.





Other countries preferred the simplicity of the factor based approach for these other types of market risk. If a scenario approach were to be adopted, then it was suggested that the factor based approach should be retained as an option for those companies – e.g. small companies - which are not able to project their cash flows.

The results of the comparison of the alternative to placeholder SCR for life underwriting risk showed a dramatic and very substantial disparity between countries and across risk types, suggesting further work is needed not only on calibration, but also on methodology, particularly for the factor-based approach.

A number of countries commented that the factor-based approaches for life underwriting risk were not well matched to the underlying risk drivers for their undertakings. Indeed, there were mixed views about the relative practicability of the two approaches. In general, there seemed to be a slight preference for the alternative scenario based approach for many parts of this module. It was noted that the factor based approach did not allow for the potential interaction of demographic changes (e.g. mortality and persistency) with the matching of assets and liabilities, including the potential take-up of options by policyholders. However, the factor based approach was seen as more suitable for volatility risk since it can take account more easily of the size of the portfolio.

Most countries expressing a view on the assessment of non-life underwriting risk, thought it important that undertaking specific features (e.g. nature of business written, underwriting techniques, and reinsurance programme) are taken into account in the formula. One country commented that we may thereby avoid the need for different parameters for different markets. In addition, this would allow the size of the undertaking to be reflected in the formula in a more accurate way. However, it was also recognised that historical undertaking specific data might not always be sufficiently relevant and reliable. Accordingly, a number of countries added that the volatility factors should be calibrated with reference to the local market even if undertaking specific features are taken into account in the formula. In conclusion, it seems that some suitable blend between the use of market and undertaking specific data may need to be developed further.

Further discussion on these issues is contained in CP20, and this will be developed further in the selection of the methodology that will be proposed for testing in QIS3.

31. Please summarise briefly the approach taken by undertakings to assessing the correlation factors for combining the different risk components, the level of consistency in their approach, and any comments received about the suitability of the other correlation factors in the specification. [From Question A.14 in the questionnaire]

With the exception of the high-level correlations (in paragraph 5.33 of the QIS2 technical specification document) between market risk, credit risk, operational risk and underwriting risks, undertakings applied the standard correlation factors that were set out in the specification for combining the different risk components.

For the high-level correlation matrix in paragraph 5.33, a sizeable number of the participating undertakings appear to have applied figures very similar to those suggested in footnote 4 to the specification. In many cases, this choice may have been made for reasons of simplicity, or because companies did not think that they are in a position to give reliable estimates of the coefficients. It is also known that at least one supervisor provided a high-level correlation matrix to ensure comparability. Most of the other undertakings that did not adopt the standard matrix, applied rather lower correlations, but a few undertakings did apply some slightly higher correlation factors.

Concerns were expressed by undertakings in most countries about the high size of a number of the correlations within the market risk component, particularly those between equities and property, and between equities and interest rates. Also, it was commented that the level of the correlation between equity movements and interest rates may depend on the direction (i.e. upward or downward) in which interest rates are moving.

There were comments by individual undertakings about a number of the other individual correlations within each risk module. These are set out in more detail in the individual country reports. Some points that were noted in more than one country report are as follows:

- It was suggested that a lower and possibly negative level of correlation should be assumed between mortality and longevity.
- An assumption of perfect correlation between mortality volatility, uncertainty and catastrophe risks seems very conservative.
- The 50% assumed correlation between longevity and lapses seemed high.
- A 50% correlation between expenses and each other life underwriting risk component seems too high.
- Some correlation between lapse risk and interest rate risk may be appropriate.
- Correlations between market and credit risk seemed quite high.
- Some allowance could be made for the effect of concentration risk in the credit risk module.
- Correlations between operational risk and other risk could be lower.
- Some of the correlations between the non-life underwriting lines of business seem rather high.

- A number of undertakings requested that they should be allowed to determine their own assumptions for many of the correlation factors.

Most countries concluded that there needs to be a review of the calibration of the assumed correlation factors, particularly for the correlations between the market risk components, possibly through some appropriate market study.

32. Please describe how undertakings assessed the appropriate value of the k factor (see paragraphs 5.14-5.19 of the specification). Was there significant variation between undertakings for the same type of product? Do you have any views on the suitability of this approach and how it might be refined or developed? [From Question A.9 in the questionnaire and elsewhere]

In five countries, most of their undertakings applied the option in paragraph 2.31 of the QIS2 technical specification document, and only included the value of guaranteed benefits within the provisions. Accordingly, as required by paragraph 5.18 of the specification, they did not apply any k factor, as they had already excluded the value of all future discretionary bonuses.

In some other countries there is effectively little or no discretion on the level of future bonuses, and hence no k factor was applied.

In most other countries, it would appear that many undertakings were unclear about how they were intended to apply the methodology in paragraph 5.7 of the specification to derive an appropriate value for a k factor for the main type of with-profit business that they write. Accordingly, there were a variety of practices observed. In some countries, a number of undertakings did not apply any k factor as they were unclear how to proceed. Conversely, a number of other undertakings applied a k factor of 100% on the basis that all profit sharing is fully discretionary. Some other undertakings appear to have set k to an arbitrary level such as 50% or 75%.

In some countries, a number of undertakings applied a series of individual stress tests for each component of market risk (i.e. for equity risk, property risk etc as specified in QIS2), allowing for the corresponding changes in bonus rates that would be made. They then combined the resulting capital figures with the QIS2 correlation matrix, and could then backsolve to find the overall k factor. The resulting k factors ranged between 20% and 85%.

Several countries commented that the k factor applied should be sensitive to a number of variables such as the specific business written, asset mix, likely management actions, policyholder expectations, allocation of future bonuses across different groups of policyholders, and the legal form of a undertaking, as well as to current financial market conditions (e.g. the level of market interest rates). Therefore, it is not possible to determine a single standard k factor that can be applied to all products, segregated funds etc in all market conditions.

It was questioned by undertakings in some countries whether the application of the k factor should differ between interest rate risk and other market risks.

It was has pointed out that the use of a k factor may constitute a problem for undertakings where the value of technical provisions is sensitive to changes in the interest rate.

One country said that the current specification with the use of correlations and a k factor does not tie in with the nature of their with-profit contracts and their national legislation, which includes the use of a contribution principle to profit sharing.

In some countries a commonly expressed view among life undertakings was that the most appropriate way to assess the effect of profit sharing would be to model realistic management actions either in a range of adverse market risk scenarios, or through the use of simplified scenario techniques. This approach could then take account of the way in which the business is operated, including key factors such as:

- Policyholder expectations of bonuses in different scenarios
- Apportionment of profits (and bonuses) across different types of policy and between policyholders and shareholders
- The balance between annual and final bonuses
- Non-linear effects associated with the existence of options and guarantees, including multiple guarantees

Further discussion on this issue is contained in CP20, and this will be developed further in the selection of the methodology that will be proposed for testing in QIS3.

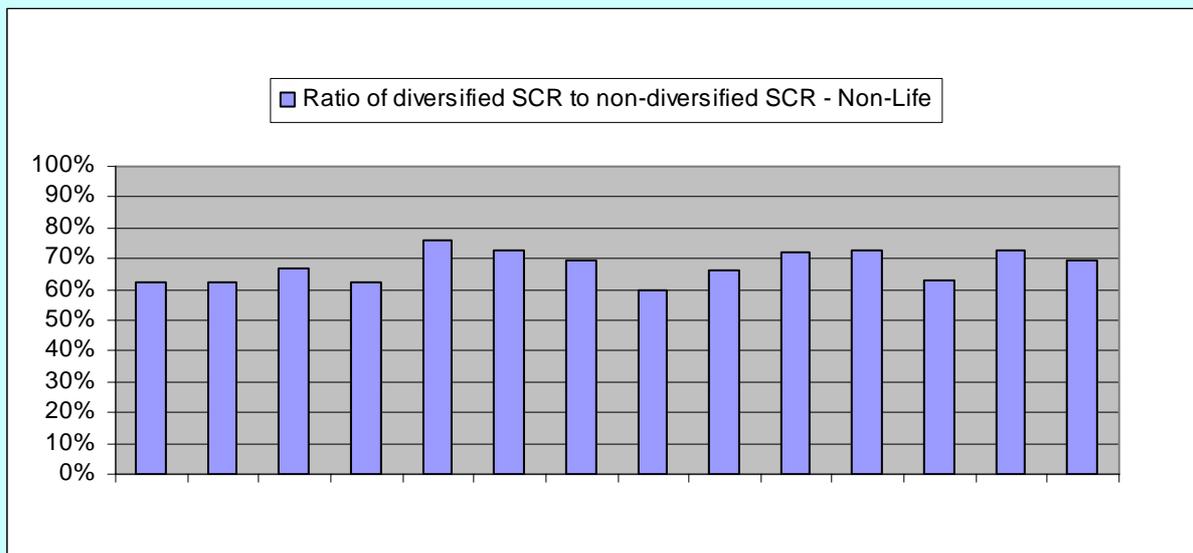
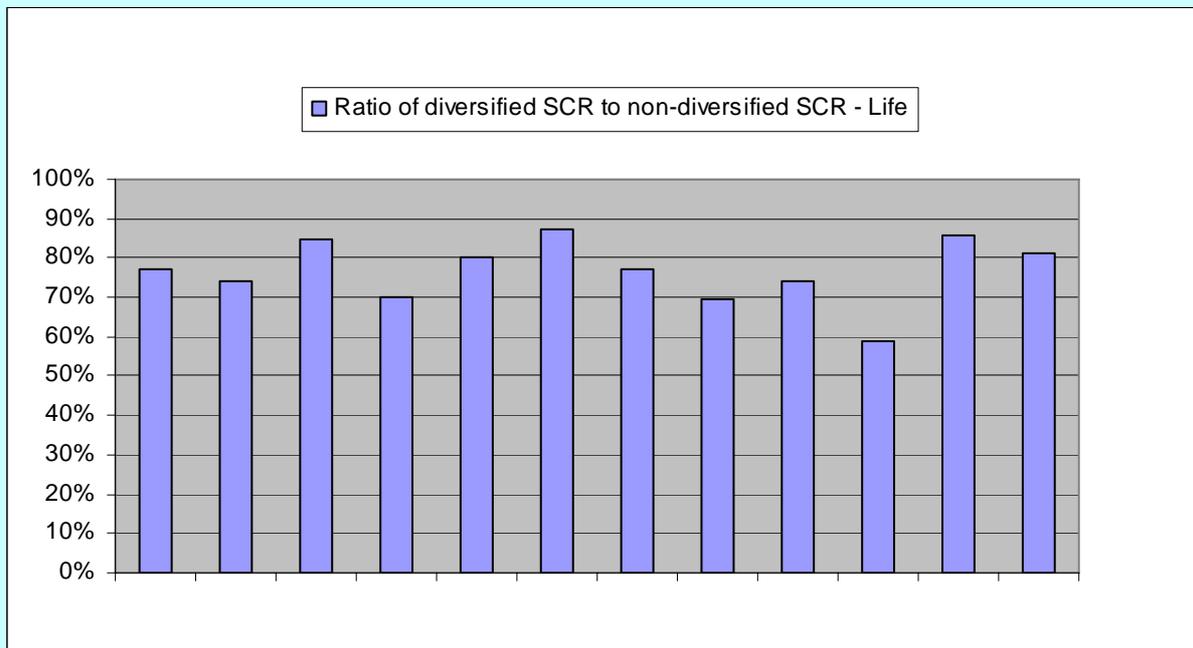
33. Please summarise the views expressed or information provided by undertakings (at Questions A.16 to A.18 of the questionnaire and elsewhere) on:

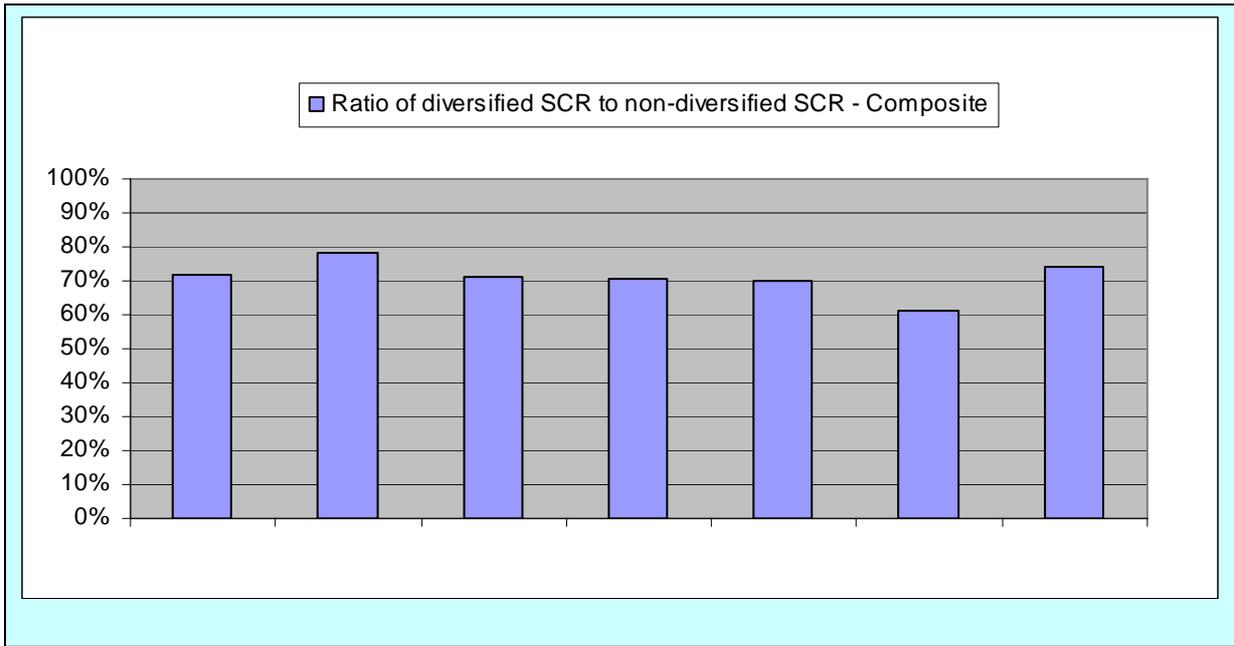
From risk drivers to the Basic SCR – the diversification effects

A top-down approach has been selected for the purpose of the QIS2. Within this framework, the overall risk before top level adjustment (the Basic SCR) is assessed by combining 4 main risk drivers: market risk, credit risk, underwriting risk and operational risk. The difference between the resulting overall risk and the sum of the main risk components represents the top level diversification effect. Some of these main risk drivers were subdivided between risk components. The market risk embeds the interest rate risk, the equity risk, the property risk and the currency risk. The underwriting risk embeds the life underwriting risk, the non-life underwriting risk and the health underwriting risk. These second level risk drivers are also combined with a correlation matrix, giving birth to a second level diversification effect. This approach of splitting risks and then mathematically combining in a way that allow for a diversification effect, has also been applied inside the underwriting risk modules.

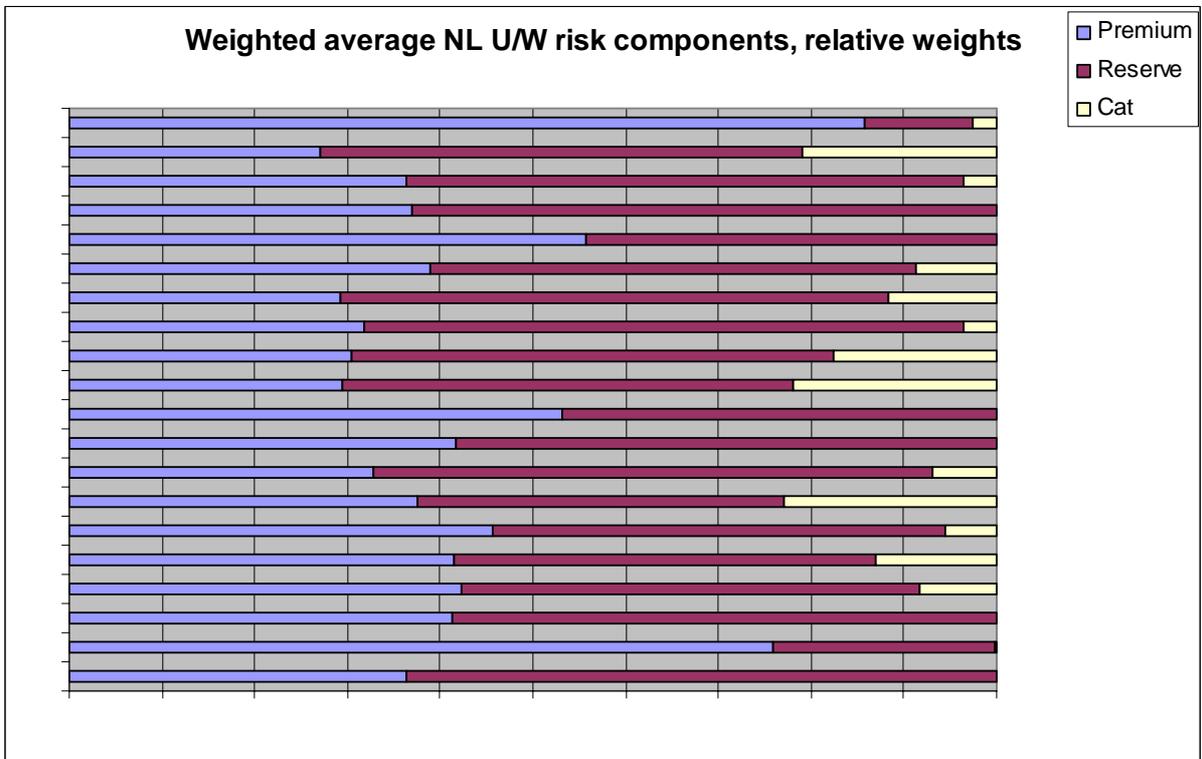
The global effect is that the Basic SCR is less than the sum of individual risks valuation. This difference can be substantial, as can be seen in the following

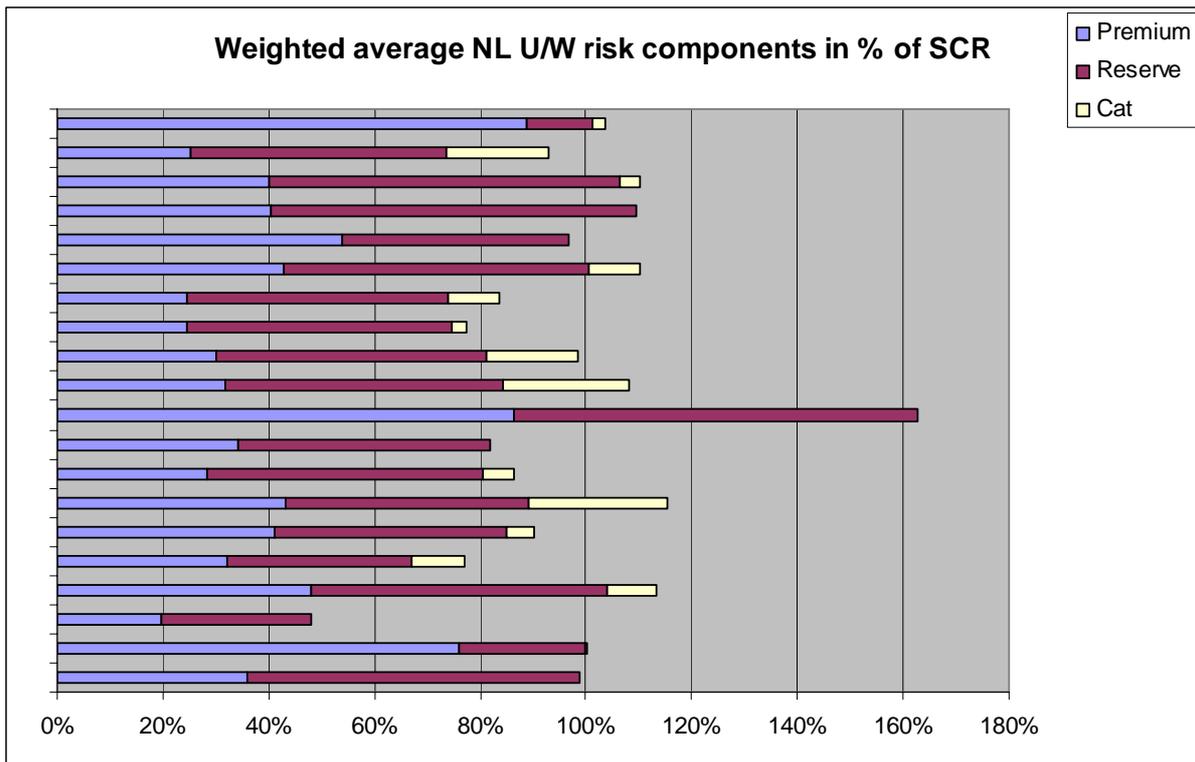
graphs that compare the weighted average placeholder Basic SCR with a Basic SCR without the top two levels of diversification (i.e. diversification effect shown is the ratio of diversified SCR to non-diversified SCR).





The following two graphs show the non life underwriting risk components. The first one display the relative weights of the premium, reserve and cat risks whereas the second one displays the same risk in proportion of the SCR. Due to the various diversification effects, the sum of these sub-risks can be above the overall SCR.





(a) suitability of both the premium and reserve risk formulae, and how they might be improved,

There were a wide range of views expressed which included the following points

- In many countries, there were undertakings which thought that some credibility should be given to undertaking-specific data for undertakings with less than 10 years data for the combined ratios (especially for property business). The current credibility factors were seen as being quite arbitrary.
- Undertakings in a number of countries were concerned that trends such as changes in profitability as a result of pricing changes and changes in risk appetite, or changes to terms and conditions, will increase measured volatility. The true underwriting risk could therefore not be measured directly as a simple proportion of this measured volatility.
- There were questions raised about the relevance and reliability of historical combined ratios as an indicator of likely future developments. In particular, they would not allow for changes in the mix of business. Some undertakings thought that 15 years may be too short to allow for low frequency, high severity events.
- Some undertakings suggested that capital should only be held for the volatility of the combined ratio around the central pricing estimate, with an addition for the possible movement of the pricing estimate in the current year.
- It was commented that the volatility in combined ratios is very dependent on how the provisions are assessed at the first year end. Ultimate combined ratios would be more meaningful, but they are difficult to assess reliably in early development years for long-tail lines of business. One country referred to their

approach of looking at observed ratios between claims costs and accumulated claims payments for several incurrence and development years.

- There were differences between national markets in both claim frequency and size (even for standard cover such as motor liability) so that it would be difficult to establish suitable EEA-wide factors.
- A claims frequency/severity approach was proposed by a number of undertakings as being more suitable for premium risk.
- Smaller undertakings often had difficulty in producing up to 15 years of historical combined ratios. Many also thought that the proposed market-wide factors were too high.
- The current methodology does not distinguish between IBNR and RBNP and does not include premium provision risk
- Heterogeneity of the business included within individual risk groups, and the application of different (non-proportional) reinsurance programmes were seen as further complications. Also, it was difficult to apportion multi-risk (direct or reinsurance) policies to appropriate risk groups.
- Many undertakings writing inwards reinsurance considered that this needs to be subdivided into different risk groups with more appropriate correlation factors.
- Reinsurers noted that the QIS2 underwriting risk modules are not suitable for their portfolio.
- Undertakings in one country thought the combined ratio should exclude the run-off result because the reserve risk is calculated separately.

(b) suitability of the proposed size factor in these formulae, for both large and small undertakings,

- Many smaller undertakings thought that the size factors were too high and had not been rationalised
- There was a request that that the size factor must be calibrated more openly and its data sources shown
- It was noted that the alternative approach for premium risk already includes an implicit size factor (and some undertakings said that this may be more suitably calibrated)
- A few undertakings suggested that they should also be allowed to apply an undertaking-specific approach to reserve risk which would then take implicit account of the size factor
- It was commented that the same size factor is used for the premium risk and the reserve risk while a higher volatility factor is used for the reserve risk than for the premium risk. Some undertakings then commented that the volatility factor used for the reserve risk seems too high.

- There was a suggestion from some undertakings that the threshold of 100M€ for the size factor should be differentiated according to the type of risk subscribed.

- A number of undertakings suggested that CEIOPS should use the number of policies as a criterion for the size factor, either on its own or in combination with premium volume.

(c) reliability of the estimate of the expected surplus or deficit from next year's premium, and how this estimate might be verified,

- Undertakings in a number of countries said that the specified method to make this estimate was fairly crude, and should sensibly take into account business plans drawn up by undertakings, trends in claims costs, availability and cost of reinsurance, and any pricing changes.

- Some countries suggested that the appropriate level of expected surplus/deficit to be assumed in the assessment of the capital requirement for each line of business might be set each year by national supervisors.

- In one country, some smaller mutuals commented that the SCR could be negative if the expected surplus is too high.

(d) suitability of the proposed volatility factors for premium risk and reserve risk,

- Many undertakings criticised the size of the present market-wide volatility factors as being too high, particularly for premium risk. Accordingly, many undertakings (and supervisors) believed that the standard premium risk and reserve risk SCR calculations in QIS2 led to disproportionate levels of required capital.

- It was commented in some countries that

- undertaking specific parameters could be very different from market-wide parameters (due to different product characteristics and in part to the use of different non-proportional reinsurance programmes),

- combined ratios for mutuals may be very different from non-mutuals,

- there are differences as well between national markets in their local characteristics e.g. claim frequency and size (as reflected also in the premium rates applied by reinsurers) and historical accounting policies,

- As a result, in a number of countries it was suggested that a suitable blend between an undertaking specific standard deviation and a market-wide standard deviation should be applied.

- It was noted that for some newer undertakings, or undertakings expanding rapidly or moving into new lines of business, there could be higher levels of volatility than the market average.
- In one country, some smaller undertakings said that simple approximations to calculate net volatilities without an internal model, based on gross volatilities, net and gross loss data, and a high-level description of the structure of the used reinsurance, would be useful.
- There were some particular specialised lines of business, e.g. construction liability and P&I marine, for which the market-wide volatility factors were seen as being too high. This was a particular concern for some monoline insurers.
- In one country, it was observed that for a number of smaller non-life undertakings specialising in only a few lines of business, such as the P&I Clubs, there was a substantial increase in the overall capital requirement (i.e. the SCR less the reduction in provisions). For those undertakings that had an internal model available to compare the results, this increase did appear to be higher than was necessary to meet the QIS2 standard.

(e) the approach taken to reflect the risk mitigation offered by the reinsurance programme, and whether this approach could be improved

- A general comment from all countries was that the standard approach could not allow effectively for the composition of different non-proportional reinsurance programmes. Some countries suggested that the only effective solution was likely to be either a scenario approach or the use of internal models.
- Some undertakings added that the use of entity-specific net combined ratios could help to reflect the risk mitigation properties of non-proportional reinsurance. A further suggestion by was to take XL reinsurance into account by including a cap, or maximum risk, related to each line of business. The issue was seen as being particularly relevant for smaller undertakings.
- In addition, it was noted that the standard approach did not allow for the effect of possible changes to the reinsurance programme.
- It was commented that there should be allowance for contingent credit risk on reinsurance following a large loss event

(f) assumed correlations between lines of business

- There was a request from some undertakings for an explanation of the rationale, and/or a deeper analysis of the assumed correlations between different lines of business.
- Most undertakings were broadly content with the assumed correlations between lines of business, though a number of specific correlations were questioned by some undertakings, mainly because they thought these should be lower.

- In particular, a number of undertakings writing inwards reinsurance business thought that the 50% assumed correlation between inwards reinsurance and certain lines of direct business should be reduced to reflect the increased level of diversification within the reinsurance class, both geographically and by inwards reinsurance product line.

(g) any relevant pool arrangements

- The only pool arrangements mentioned in country reports were those relating to the International Group of the P&I Clubs which operate in a number of countries, and also a pooled arrangement for catastrophe claims in three countries.

Some further discussion on this topic is contained in CP20, and consideration will be given to many of these useful comments in the development of the methodology that will be proposed for testing in QIS3.

34. Please summarise the information obtained from undertakings about their largest exposures to Nat-CAT events, and how these compare with the event(s) suggested to be considered for QIS2 by the national supervisor. Please also annex a copy of any guidance you may have provided to undertakings for this purpose of calculating the capital requirement in respect of Nat-CAT events. Did you face significant difficulties in producing this guidance, and do you have any suggestions about how to develop the methodology further for cat risk scenarios?[From Question A.19 in the questionnaire]

Most countries specified in guidance the particular scenarios that they would like their undertakings to consider. These were mainly European events and generally included a storm event and/or a flood event, and sometimes an earthquake event and a hail event. In some countries, a non-European event such as a Gulf hurricane was also included. Other events considered in one country were a credit event and a health epidemic. Some countries then specified the total market premiums, so that undertakings could apply the market share approach.

Some other countries invited undertakings to make an individual assessment of their own largest exposures, or of a 1 in 200 year event that would have a significant impact for them (based on a combination of historical data and expected trends, and knowledge of their own portfolios of business, and the nature and level of reinsurance cover). In one country, a scenario was selected by the local industry association.

Two countries set out a more detailed model for their undertakings to apply which took account of the aggregate exposure to different types of risk at each undertaking, and particulars of their reinsurance cover. This model also allowed a deduction (based on a 93.3% percentile) to take account of CAT risks already covered in the premium risk calculation.

There appear to be some significant differences in the sizes of the loss events suggested by national supervisors, which may in part reflect different national

market characteristics. Some further co-ordination of this guidance within CEIOPS may be appropriate for QIS3.

It was suggested that it would be worthwhile discussing suitable CAT scenarios with the reinsurance industry which has experience in this area.

Some undertakings said that geographical diversification of exposures should be taken into account.

It was commented that the QIS2 specification only considered natural catastrophes but that there could be man made catastrophes to consider as well, including the possibility of latent liability claims.

Some further discussion on this issue is contained in CP20, and this will be developed further in the selection of the methodology that will be proposed for testing in QIS3.

35. Please summarise the views expressed or information provided by undertakings about the suitability of the approach for health insurance risk, and how it might be improved; along with the reliability of the estimate of the result for health expense risk and how this estimate might be verified. [From Question A.15 in the questionnaire]

Most supervisors reported that the health underwriting risk module was not applied by their participants because health risks were covered by the life or non-life underwriting risk modules, or because health business was not written or not relevant.

In three countries, pure health insurers participated in QIS2. The following issues were raised by the insurers:

- The use of market wide factors was not considered to be suitable.
- The health underwriting risk module should be amended to allow insurers without a ten year time series to estimate the underwriting risk.
- As with non-life underwriting risk, the expected profit or loss should be calculated outside the underwriting risk module and should reduce the Basic SCR. This approach would be more consistent with the non-life underwriting risk module, and take account of the ability of underwriting profits to absorb investment losses or operational losses.
- The health underwriting risk module does not capture the risk equalisation system of one country. The national association of health insurers requests that more freedom is given in Solvency II to take account of national particularities.

Some further discussion on this topic is contained in CP20, and this will be developed further in the selection of the methodology that will be proposed for testing in QIS3.

36. Please explain whether there are any aspects of the calculation of the MCR, or the related data requirements, that would be difficult to fulfil in cases where interim MCR calculations were required by supervisors? [From Question A.24 in the questionnaire]

Most countries thought that interim MCR calculations would not lead to any particular difficulties for medium or large sized undertakings, once internal processes for data collection and treatment are in place, and especially if an approximate update is allowed, though there would of course be some resource implications.

In some countries, though, there were doubts about the feasibility of monthly reporting for life undertakings.

Smaller undertakings in some countries said that a monthly or quarterly calculation of the MCR would be very time consuming and cost intensive for smaller companies, as the SCR calculation would also need to be updated.

Further consideration will now be given by CEIOPS to this topic.

37. Please indicate how many undertakings provided figures derived from their internal models for some or all elements of the SCR calculations, and which parts of the SCR calculations were covered by these models.

There was a fairly wide dispersion noted in the number of medium and large sized, life and non-life, undertakings in each country that provided comparative figures from their internal models for part or all of the SCR calculation. However, very few smaller undertakings in any country provided figures from internal models.

In one group of countries, between 50-90% of the undertakings with internal models appear to be able to model most or all of their different risk components.

In another group of countries, most undertakings appear to have only developed internal models to cover particular risks, such as CAT risk for non-life business.

In two countries, some of these internal models included some risks not covered by the standard SCR, such as implied volatility on options, interest rate curve twists and inflections, business and transfer risk, and the interaction of persistency and option take-up rates with changes in financial market conditions.

38. Please comment on whether the results from these models differed from the standard formula or the scenario approaches in the specification for the SCR, and if so the likely reasons for such differences. Please indicate how the models were calibrated, and also comment on the plausibility and likely reliability of any results obtained from these models. [From Questions A.21 to A.23 in the questionnaire and elsewhere]

Most undertakings said that the objectives in Call for Advice (CfA) 10 are consistent with those underpinning their own internal model, but many of these models were based on VaR rather than TailVaR, and some had been calibrated to a higher level of confidence than 99.5% VaR.

It was observed by some undertakings that it is difficult to make this comparison, as it is not clear in which SCR parameters TailVaR of 99% was reflected for the QIS2 exercise.

There was a fairly wide dispersion in the results from these models when compared with the placeholder SCR, both for the individual risk components and the aggregate capital requirement. However, the following features were observed in most countries:

- the life underwriting risk charges measured by the internal models consistently exceeded the corresponding risk module of the SCR by a significant amount
- for non-life underwriting risk, the internal models generally gave lower outcomes than the placeholder SCR
- for credit risk, the internal models (based in one country on a commercial model applied by a number of banks) almost all gave higher values for credit risk than the SCR

For the majority of undertakings that modelled all their risks, it would appear that the internal model SCR results were lower than the placeholder SCR, but there were a number of exceptions. These different outcomes may be attributable in part to the features noted above for specific risk modules.

One country provided a description in their country report of the process by which the models were calibrated.

Another country included some detailed descriptions provided by their undertakings about how their internal models had been constructed, including time horizons, inclusion of new business, identification of distributions of key risk factors and risk drivers, use of economic scenario generators, assumed dependencies between risks, and aggregation of capital requirements across products and business units.

Some undertakings commented that a partial internal model could be valuable for certain specialised lines of business, such as credit insurance.

Some further discussion on the subject of the use of internal models is contained in CP20, and there will be a further opportunity to test out the proposed methodology and calibration for the SCR against the results from internal models during QIS3.

39. Please summarise any qualitative and quantitative information provided by undertakings regarding the extent to which the estimate of available capital suggested in the specification differs from their own assessment of available capital, and the reasons for such differences. [From Question A.11 in the questionnaire]

It was noted that no guidance was given in QIS2 on which elements other than asset-side or liability-side adjustments could be included as eligible elements under Solvency II, so that it is difficult to compare the levels of available capital between different undertakings.

Some particular difficulties identified were the treatment of subsidiaries, tax assets or liabilities, pension scheme assets or liabilities, intangible assets and goodwill, liabilities ranking lower than policyholders, group senior debt, hybrid capital instruments, and contingent or intangible liabilities.

A number of mutuals, including the International Group of P&I Clubs, noted that there was an issue with reference to the degree to which supplementary calls can be included as elements of capital.

These various issues are currently the subject of ongoing discussions, and will be considered further as part of the forthcoming QIS3 study.

40. If figures for individual entities were combined by some respondents, then please describe how this combination was made, for the assessment of both the provisions and the SCR. [From Question A.25 in the questionnaire]

Few groups provided figures for the combined group, since this was not explicitly requested for QIS2. However, it is proposed that QIS3 will test out some detailed proposals for the assessment of the capital requirements for groups.

Where figures from different entities within a group were combined, then most groups took the consolidated balance sheets as a starting point for the assessment of both provisions and the SCR.

Composite undertakings and groups generally allowed for diversification between life and non-life underwriting risks using the correlation matrix provided in the specification.

One group is believed to have applied factors for diversification across geographical (i.e. EEA and non-EEA) regions for each individual risk component, and then combined these risk components with the standard SCR correlation matrices.

41. Please summarise any information provided by undertakings (in response to Question A.26 of the questionnaire) about the sources, nature and size of any diversification benefits, or conversely any contagion effects, within a group. Please also include any information that has been provided about how internal models reflect such diversification benefits.

Participants generally specified the following sources of group diversification:

- within risk types;
- across risk types;
- across entities;
- across geographies or regulatory jurisdictions.

In addition, diversification across channels of distribution and capital investment structures were mentioned by some groups.

Conversely, it was noted that allowance may need to be made for restrictions on the mobility or transferability of funds or capital between different entities. However, mobility could take a variety of forms and may involve gaining economic value, for example through sale or securitisation, rather than extracting funds directly from the local regulated entity.

Accordingly, it was suggested that diversification benefits should be recognised where the risk factors are part of the risk decision making process, and where mobility does not impose barriers to the realisation of those benefits. In this context, it was added that they believed that the regulatory regime should not impose excessive restrictions on mobility of capital between entities.

In relation to sources of contagion effects, participants mentioned intra-group reinsurance, other intra-group transactions, shared infrastructure, reputational risk, transfer of losses, and concentration risk. In particular, contagion effects could be triggered by management failures or by natural disasters or pandemics. It was commented that some of these risks could be addressed through the operational risk component.

In internal models, dependencies are usually modelled by linear correlation, or in one case through the use of a Pearson correlation matrix. Another group was able to model market risk and non-life risk simultaneously through a stochastic process.

Some groups were also considering possible diversification effects between insurance and banking, but none of these groups indicated that they had an existing model.

The reported reductions of group risk capital – including diversification effects – show a wide range from around 5% (where there were significant restrictions on the transfer of moneys from some life insurance funds) up to 55%.

42. Are there any other significant issues or results not included above that you would like to report?

Several participants noted that the transparency of the Solvency II process could be improved by disclosing the rationale for the QIS calibration assumptions.

A number of participants expressed the view that they were opposed to the disclosure of the QIS2 results on the CEIOPS website, due to possible misinterpretation by external readers. CEIOPS hopes though that these results are set into proper context in this report in which it acknowledges the tentative

nature of both the methodology and calibration in QIS2, both of which are likely to be modified in many respects for QIS3.

In some cases, the data presented by the companies in the spreadsheets were extremely heterogeneous, due to different interpretations that each undertaking gave to the spreadsheet instructions and to the technical specification

It was suggested that if undertakings are given additional guidelines or consistent assumptions and simplifications regarding the shortfalls that emerged from QIS2, more realistic results and well-founded conclusions will be obtained from future exercises.

A further request was that:

- The technical specification should be more thorough in explaining the idea behind the model, the motivation for certain distributional assumptions, the data source for the initial correlations and variances etc.
- It should be made more clear *in the Excel spreadsheet* which information is needed for the actual SCR calculation and which information is for information purposes only. This would help the companies decide on what kind of computer systems they will need for future solvency calculations.
- The time period between the release of the QIS2 technical specification and Excel spreadsheet and the deadline was too short.

CEIOPS shall endeavour to take these comments into account in the design and operation of the forthcoming QIS3 study.