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CEIOPS' Report on its third Quantitative Impact Study (QIS3) for Solvency II

Public Report

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1 Executive Summary

The European Commission (EC) requested the Committee of European Insurance and Occupational Pensions Supervisors (CEIOPS) to advice on the development of a new risk oriented solvency system (Solvency II) to be applied to European insurance and reinsurance undertakings, both at solo and group level.

As part of this project, a series of quantitative impact studies (QIS) have been scheduled, QIS3 being the third of such studies, to test the implications and impact of the different alternatives under scrutiny.

QIS3 is a test, and it has to be approached in that context, as it is not a final proposal for the Solvency II framework nor does it intend to be.

QIS3 is running well from an administrative point of view. The QIS3 process and results form the basis for preparing the QIS4. Regarding the organisation of QIS4, the exercise will be run by the European Commission.

The goals of QIS3 were fourfold:

- First, to obtain further information about the practicability and suitability of the calculations involved, and the alternatives tested.

- Secondly, CEIOPS was looking for quantitative information about the possible impact on the balance sheets, and the amount of capital that might be needed, if the approach and the calibration set out in the QIS3 specification were to be adopted as the Solvency II standard.

- Thirdly, information about the suitability of the suggested calibrations for the calculation of the solvency capital requirement (SCR) and minimum capital requirement (MCR) was collected.

- Fourthly, the effect of applying the QIS3 specification to insurance groups was tested for the first time.

The report is structured in a comprehensive way that dedicates different chapters to the different areas under scrutiny.

- **Participation and adequacy of data:**

Participants were allowed to take part on a best efforts and approximate basis. They could focus on material issues, in order to stimulate participation. As a result a substantial number of European undertakings participated in QIS3.

Both the number of insurers and the number of participating countries increased in comparison to the preceding QIS: In total, 28 out of 30 EEA member states took part in the study. The total number of solo company respondents was 1027, i.e. an increase of almost exactly 100% over QIS2, which had 514 respondents.

Of these 1027 undertakings, 330 are in the life sector and 511 in the non-life sector. Only 28 entities are classified as pure reinsurers. 158 are respondents that provide data for both life and non-life business (composites).

With 422 small and 418 medium undertakings participating, there have been almost as many small undertakings (<100 million € in premiums in non-life, <1000 million € in provisions in life) as medium undertakings that responded to QIS3. 187 large undertakings (>1,000 million € in premiums for non-life, and >10,000 million in provisions for life) submitted their data.

Participation, with respect to market share, was almost equal in all three sectors (life, non-life and composites), and for most countries it covered more than 60 percent. These numbers in most cases strongly increased since the last study, which reflects the particular interest of the industry in the quantitative impact studies and eventually Solvency II, as well as a recognition of the importance of such exercises.

The data provided by participants provide a broad basis for discussion. Some areas received a lower or more controversial feedback (e.g. the treatment of concentration/counterparty risk, or the approach for equity risk based on the duration of liabilities), underlining the fact that challenges lie ahead for CEIOPS in future exercises, starting with QIS4.

- **Suitability, practicability and reliability:**

The Technical Specifications set out for QIS3 were generally well received, although a few participants noted that guidance was insufficient.

In general, it took participants between one and three person months to complete QIS3. While many participants considered their data to be fairly accurate and reliable, this view was not fully shared by some supervisors.

At a qualitative level, CEIOPS requested participants to give their feedback on the suitability of the different aspects of solvency calculation as laid out in the technical specifications. The answers revealed as a general pattern that the calculation of the SCR is in general the item that raises the highest priority expectations, followed by the MCR, the assessment of eligible capital and the technical provisions. Guidance is expected more than prescriptive rules. Expectations for simplifications in the underlying methodologies generally lie in between.

- **Architecture of the Solvency II system:**

Solvency II follows a total balance sheet approach, as it considers both the asset and the liability side, both of them being evaluated following a market

consistency principle. An insurance company's balance sheet can be presented in a stylised manner:

Table 1: Stylised balance sheet

Summary balance sheet			
Assets		**Liabilities**	
Reinsurance			Own funds
			Technical provisions (Risk margin element)
			Technical provisions (best estimate element)
Investments			
Other assets			Other liabilities
Total			**Total**

Whilst in the current regime, the solvency assessment is based on accounting figures that are generally based on the national accounting standards, which vary widely (from market value to book value) between Member States, the Solvency II directive proposal introduces a common valuation principle based on a market consistent valuation of assets and liabilities.

The solvency assessment in this model relies on a few simple steps:

- Technical provisions (best estimate element) represent the best estimate of the future cash flows that will be paid or received until all of the insurance commitments are fulfilled, discounted using a risk free yield curve.
- Technical provisions (risk margin element): as capital will indeed be required until all insurance commitments are fulfilled, the cost of ensuring that the capital needed for subsequent years will be available is computed and booked on the liability side as the risk margin element of the technical provisions.
- Solvency capital requirement (SCR): The various risks that can have a material impact on the undertaking's financial position are modelled and combined to calculate the required capital. Only those risks that have a probability of occurrence of more than 0.5% in the next 12 months are retained in this assessment. This gives the required capital for the coming year.
- If the total value of available assets is less than the sum of the technical provisions, the SCR required capital for the following year, the margin needed to ensure availability of capital in the subsequent years, and the value of the other liabilities, then the firm does not meet its solvency requirement. In the opposite situation, the firm is meeting is solvency requirement and the positive difference is called capital surplus.

The Solvency II system is based on two levels capital requirement, representing two levels of intervention. A solvency capital requirement (SCR) sets the required level of capital for a licensed entity, calibrated to cover at least a one in 200 year event (99.5% Value at Risk). A lower minimum capital requirement (MCR) serves as the threshold for ultimate supervisory intervention, including winding-up, thus making the ease, robustness and reliability of calculation of the MCR important features.

- **Financial impact:**

The QIS3 report includes a chapter on the financial impact for participating firms of the methodology proposed, including a comparison with the current solvency regime (Solvency I). There are in fact differences in the way Member States have implemented the current EU solvency regime, and the existing national standards that build on this regime.

We could summarize the impact of the proposed approach as follows:

- There is no significant overall change in terms of neither composition nor size of the balance sheet when comparing Solvency I with Solvency II at an European level, however there may be national variations.
- Technical provisions – best estimate plus risk margin – tend to decrease vis-à-vis the current technical provisions because the implicit prudence that exists in the current regime is removed, thereby increasing the available capital. The average ratio of Solvency II provisions compared to Solvency I provisions varies more between countries in the non-life sector (70%-100%, with significant variations in the different lines of business) than in the life sector (90%-102%).
- As for the MCR, the vast majority of firms (98%) would not need to raise additional capital to meet it.
- The QIS3 SCR solvency ratio, i.e. the ratio of the available capital (own funds) to the SCR capital requirement, is lower for most participating undertakings than the current solvency ratio. In the non life sector, most undertakings show a decrease in their solvency ratios based on the QIS3 calculations; in the life sector, the results are more ambiguous, with an increase or decrease of the solvency ratio, depending on the Member States. This is consistent with the general philosophy of Solvency II, which takes risks into account more explicitly than the current framework.
- The regime does not require extra capital in the European insurance market as a whole. However, there will be a redistribution process as a consequence of introducing a risk oriented system where capital requirements will be in line with the risks assumed by the undertaking and the way in which they are managed and controlled. In 30% of

undertakings, the available surplus (i.e. the excess of available capital over the SCR) would increase by more than 50%, whereas in 34% of undertakings the available surplus would decrease by more than 50%. In addition, 16% of undertakings would have to raise capital to meet their SCR.

- **Assessment of assets and liabilities:**

The asset side valuation principle proved less demanding: investments were generally valued at market value where available, or in accordance with IFRS. A number of approaches for valuing illiquid assets and other non-insurance liabilities were observed.

- **Assessment of technical provisions:**

Technical provisions are the statutory insurance liabilities with which undertakings will cover expected losses arising from its portfolio.

Solvency II introduces a split in technical provisions between two main components, a best estimate and a risk margin, in line with the outcome of the previous QIS, i.e. QIS2.

1. Best estimate:

The approach followed in the majority of countries was very similar to the one in QIS2.

A difficulty commonly reported for the evaluation of provisions and the extent to which adverse events would change the payment of future benefits, arose when policyholders have a right to surrender their contracts at any time, or other behaviour dependent options. Expected future policyholder behaviour has to be modelled twice: once under future normal conditions to assess the best estimate of technical provisions, and once under future highly stressed conditions. These two calculations were needed to draw up the reference balance sheet, along with the required capital to cover the modelled adverse events. This proved to be one of the main technical challenges reported.

- Life business:

In most countries, the assessment of best estimate provisions for life business (other than for options and guarantees) was made on a deterministic approach basis. In some countries, a number of firms valued life policy options and guarantees directly through the use of a stochastic model, and some firms also took account in these models of links between economic variables, crediting rates/bonuses and lapses. Other countries did not explain how their life firms had valued options and guarantees on life policies. It is not clear what assumptions

were generally made by firms about the take-up of options by life insurance policyholders.

Firms were asked in QIS3 to include the value of all future bonuses for with-profit policies, that are legally or contractually required to be paid, or that might reasonably be expected to be paid, under current market conditions, within the calculation of their technical provisions. There was little specific information given by firms about how they assessed rates of future bonuses for this purpose. Some firms said they assumed a constant rate of bonuses based on current bonus levels, while others said that bonus rates had been included in their stochastic model[1]. In some countries, the amounts of any 'surplus funds' that have not yet been made available for distribution to with-profit policyholders, and could be utilised to cover any future losses arising, were deducted from the provisions and were shown as part of the 'own funds' on the balance sheet.

- Linked business:

For unit-linked business, most firms took the unit liability as the starting point for assessing the provisions. Most firms then added the present value of their best estimate of the non-unit cash flows, which might include the non-invested element of future premiums, as well as anticipated management fees; and where relevant they also valued any options or guarantees on these policies. The best estimate value of these non-unit cash flows was often negative, and for many linked policies, the provision held was less than the current surrender value.

- Non-life business:

For non-life business, the assessment of claim provisions generally involved the application through expert judgement of some statistical or actuarial technique applied to either paid or incurred claims, and sometimes with adjustments for claims inflation.

Premium provisions were often calculated from the standard unearned premium reserves (UPR) calculation in the current balance sheet. Some participants were not able to calculate best estimate premium provisions. Instead they used proxies based on the current accounting, which were provided by the national supervisor. This option was appreciated by the participants.

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[1] When assessing the capital requirements, i.e. the SCR and MCR, firms were then permitted to take account of the potential changes in the level of future bonuses that might be made following adverse future events, e.g. a change in market interest rates, a reduction in equity values or an increase in mortality rates. In the case of an adverse event, the bonuses (which are non guaranteed benefits) given to policyholders could decrease. As these future bonuses are included in the technical provisions for their full "unstressed" amount, this must be compensated for in the calculation of a lower capital requirement.

- Health business:

For special health (similar to life) business, only a minority of participants applied simulation techniques to produce the best estimate. For many companies, one of the major practical difficulties for the assessment of provisions was the quantity of required data, especially for non-life business, along with the need for some quite sophisticated models.

2. Risk Margin:

CEIOPS provided participants with a helper tab that was broadly used for the assessment of the risk margin in the provisions. It did not avoid that for a number of entities, mainly small and medium, the methodology was still complicated and data demanding.

- **Assessment of the Minimum Capital Requirement (MCR):**

As stated in the directive proposal, the MCR corresponds to an amount of eligible basic own funds below which policyholders and beneficiaries are exposed to an unacceptable level of risk, and its breach will trigger ultimate supervisory action (withdrawal of licence).

A modular MCR was tested in QIS3, with two alternatives regarding the market risk module: a simple factor-based approach based on asset-side volume measures and a more sophisticated factor-based approach, also taking into account liabilities and durations. As additional quantitative information, the CEA compact approach (MCR=33% SCR, either according to the standard formula or to the internal model) was calculated in the spreadsheet. According to the QIS3 results only 2-3% of undertakings would have to raise capital to meet their MCR.

- Non-life MCR:

For non-life firms, the results for both MCR alternatives were just broadly consistent with the calibration target (80-90% Value at Risk over a one year time horizon).

- Life MCR:

For life and composite firms, the ratio of the MCR to the SCR shows a wide range of possible outcomes, including multiple instances of negative MCR/SCR ratios. The main driver for the problematic interaction with the SCR (and the negative ratios) for life and composite firms seems to be the methodology used to account for the loss absorbing capacity of future discretionary benefits.

- **Assessment of the Solvency Capital Requirement (SCR):**

The Solvency II directive proposal requires undertakings to hold eligible own funds to cover the SCR so that it covers unexpected losses derived from all

quantifiable risks that undertakings are exposed to, corresponding to the Value at Risk of the basic own funds of an undertaking, under a 99,5% confidence level over a one year period. The SCR will be calculated either by internal models or through a standard formula.

The QIS3 technical specifications laid out a modular approach for the SCR, combining the depicted risk types through correlation factors to a basic solvency capital requirement (BSCR).

The following risk modules (with submodules) were included in the SCR formula:

1. Market risk.
2. Life underwriting risk.
3. Non-life underwriting risk.
4. Health insurance underwriting risk.
5. Counterparty default risk.
6. Operational risk was taken into consideration at the top level.

Few comments were received on the overall modular approach for the SCR, which can be seen as an implicit approval of such an exercise where the participants mainly concentrate on the perceived flaws. Some countries even reported a general approval on the overall design.

In general, correlation coefficients as used in the SCR aggregation matrix were criticised only by a minority of participants, some indicating too prudent factors, others referring to the importance of tail correlations. The diversification benefits through correlation matrices were widely appreciated, however geographical diversification and the specific situation of niche operators were seen as areas for potential improvement.

Regarding the SCR composition for life firms, in most countries, market risk (before diversification) accounts for more than 70% of the Basic SCR (BSCR). Diversification effects of the overall aggregation of risk modules through the correlation matrix amounts to 20% on average.

For non-life firms, the respective underwriting risk composes the major part of BSCR in most countries, on average around 75%. Diversification effects are similar to those observed for life firms; however, variations in this figure are comparably smaller across countries.

For composite firms, diversification effects are largest, amounting to around 30%. In those undertakings, BSCR is mostly dominated by market risk.

Participants in several countries expressed their concerns with the methodology in QIS3 for the calculation of the adjustment for the risk mitigating effect (i.e. loss absorbency) of future profit sharing.

Liquidity risk in the insurance sector was seen as quite different from banking. A number of firms considered that principles related to liquidity risk should be a Pillar II issue only.

Many undertakings from several jurisdictions regretted the fact that for reasons of simplification, expected profit/loss in non-life business was no longer considered in the calculation as it was in QIS2, since this was considered to be an important contribution to the true economic valuation of non-life business. Inflation, liquidity, and credit risk for unearned commissions and other assets, were named as risks additionally to be taken account of in the SCR.

With respect to each risk module of the SCR standard formula:

1. Market risk:

The treatment of market risk was generally well received, and considered as a clear improvement over QIS2.

241 entities used the option to evaluate the effect of excluding free assets in the market risk module for their calculation of the SCR.

Concrete comments were made in relation to the different submodules that make up market risk.

- Currency risk submodule:

It was questioned whether a 'one size fits all' shock could be applied to currency risk, especially for currencies with fixed exchange rates. Nor was it deemed likely that all exchange rates move against the insurer with the same amount and in the same direction.

- Property risk submodule:

Main issues raised asked for an enhancement of granularity and some considered that the shock should differ in the different regions, while others considered this shock as being too high.

The alternative for property risk treatment based on the liability duration approach is controversial, with some countries strongly supporting it.

- Interest rate risk submodule:

This was seen by many participants as too simple for large undertakings and, at the same time, too complex for small ones.

- Equity risk submodule:

The equity risk submodule was altered considerably compared with QIS2: the equity shock was changed from a general 40% shock to a 32% shock for 'global' assets and 45% for 'other' assets, and the correlation with interest rate risk was

decreased from 0.75 to 0. This change in correlation yielded a reduction of market risk charge of on average 11% for life and 6% for non-life firms. Firms in some countries commented that they considered the revised factor and correlations too low in the context of observed market experience.

Some country reports noted that participants considered the equity risk module to be simplistic, for instance when compared with the interest rate risk module. It was suggested that the granularity for the equity risk module could be increased by increasing the number of indices, categorising them based on asset class, region and/or sector. Hedge funds were commented to be over penalised by being placed in the 'other' index, while the rationale to treat investments in participations similarly to other investments was questioned.

The alternative for equity risk treatment based on the liability duration approach is controversial, with some countries strongly supporting it and others not agreeing with the method.

- Spread risk submodule:

Participants from some countries requested that all credit risk (sub) modules be integrated into one module, as in QIS2. Also details of treatment for several asset classes were questioned. Treatment of government bonds, of unrated entities and considerations on the amount of the charge were raised by some participants.

- Concentration risk:

Some participants reflected on the idea of including geographical and sectoral concentrations within concentration risk. Simplification for the module was requested by other participants.

2. Life underwriting risk:

A scenario based approach was tested in the QIS3 for life underwriting risk, and subrisks were aggregated through a correlation matrix, in order to allow for the recognition of diversification effects.

Simplified approaches were also proposed for those entities not able to use the scenario based approach.

Catastrophe (CAT) risk in life was tested (risk of mass surrender of unit-linked contracts). The level of the factor used (75% of contract surrenders) was considered as too high by many participants.

3. Non-life underwriting risk:

Whilst for life a scenario based approach was followed, for non-life it was decided to follow factor based approaches.

CAT risk was included by aggregating scenario based CAT net costs, with some scenarios defined at a European level, and others left to local supervisors to define. Subjectivity of the selected scenarios under a 1 in 200 probability of occurrence (either by being more remote or more frequent) was raised by participants, who also reflected on potential overlaps or on the inappropriateness of the correlations used to combine CAT scenarios.

Removal of expected profit and loss (that were included in QIS2) was seen as a downside by many participants.

Non-life underwriting results were rated as excessive when compared to internal models results in a few countries, with some countries explaining it by a rise in the correlations that more than offset a decrease in assumed volatilities in the lines of business (LoB) since QIS2.

4. Health underwriting risk:

For health risk a separate module was tested that was applicable only to countries where the health system closely mimics the typical characteristics of life insurance. In addition, as compared to QIS2, the non-life line of business was split into three, in order to take into account e.g. of short term health insurance and workers compensation. The special health module appeared relevant for two countries: one country observed a general increase in the solvency ratio, another one reported that it either remains stable or increases.

Other countries classified the health business in the non-life underwriting risk module. For one country the non-life module did not adequately capture the risk mitigating effects of the national equalization system, thereby leading to overly severe solvency requirements.

5. Counterparty default risk (CDR):

In the counterparty default risk, the method of calculating the replacement cost was considered to be unclear. It was also questioned why the counterparty default risk module did not allow for recoveries after default. Participants of some countries requested a simplification in the CDR module.

6. Operational risk:

Operational risk in the QIS3 specifications was added to the BSCR as a separate module at the top level. The majority of undertakings seem to recognise operational risk as an area that requires special attention. However, many participants considered the operational risk module as tested under QIS3 as being too simplistic.

The comments by participants focussed on three points:

- First, participants opposed the 100% correlation between operational risk and other risk factors and demanded the recognition of diversification effects. This is a direct consequence of adding operational risk at the top level.

- Second, they criticised the module for not taking into account the quality of operational risk management within the insurance firm – in its current form, the formula would not give a sufficient incentive for the development of adequate risk management systems.

- As a third area of concern, participants mentioned the use of premiums and provisions instead of administrative costs – especially for unit-linked business the latter is seen as the more appropriate measure which would also be more in line with Basel II provisions.

CEIOPS also requested qualitative answers on the operational risk policy applied by participants. Risk management systems for operational risk differ significantly in their degree of sophistication. Large firms especially seem to have established strategies and procedures earlier than smaller firms.

- **Own funds classification:**

CEIOPS requested information on the type of capital (own funds) held by participants, classified following a three tier structure according to the fulfilment of a series of characteristics indicated in the Solvency II directive proposal (subordination, loss-absorbency, permanence, perpetuality, and absence of mandatory servicing costs). This approach is in line with the one used in banking, thus increasing cross-sectoral convergence.

Concerning the composition of the eligible capital elements covering the SCR, QIS3 took a principles-based approach, asking firms to classify their capital elements without providing concrete guidance. Consequently about 95 percent of capital was classified as Tier 1, including most subordinated debt instruments. For QIS4 purposes, this has been detected as an area that demands further concrete guidance to proceed.

In most countries, more than 50% of participating firms indicated having only Tier 1 capital, comprising primarily paid-up equity, retained earnings and valuation differences, and in some countries included the amounts of any ‘surplus funds’ that have not yet been made available for distribution to with-profit policyholders, and could be utilised to cover any future losses arising.

The average proportion of Tier 1 capital across the industry was over 94% for both life and non-life firms in almost every country. Tier 2 and Tier 3 capital comprised mainly subordinated liabilities, members’ calls and unpaid share capital. For those firms with at least some Tier 2 capital, the average proportion of Tier 2 capital was less than 25% in almost every country. For those firms with

at least some Tier 3 capital, the average proportion of Tier 3 capital was less than 20% for life firms, and less than 33% for non-life firms in almost every country.

Many firms commented that the interpretation of the requirements for categorising elements of capital and particularly for calculating eligible elements was not sufficiently detailed.

Where 'surplus funds' were included, this was often a substantial proportion of overall own funds. Adopting this approach in conjunction with the reduction for profit sharing imbedded in the SCR would have a material impact on firms' reported solvency ratios.

- **Internal models:**

As the directive allows for the calculation of the SCR through a standard formula or with either full or partial internal models, testing internal models implementation and use is of core importance for the design of the system.

For the first time in the QIS exercises, internal models results were requested in QIS3, yet 13% by number of the participants provided internal model results. This could be due to the lack of internal models, but also reluctance to share them, or being at an early implementation stage. This is work in progress and will demand additional testing in further QIS exercises.

Partial internal models are, in most of the cases, developed for the equity, interest rate and property risk sub modules. In some cases, also the spread and currency risk sub modules are considered. There is a wide dispersion in the reported ratios of the internal model calculations to the standard formula SCR.

The internal models generally produce higher partial SCR for credit risk module than the standard formula. The picture is less clear in operational risk. Overall, the internal models in non-life insurance produce significantly lower total SCR than the standard formula. The average reduction in total SCR is about 25 percent. The reduction seems to be largely due to the non-life underwriting risk capital component.

- **Insurance groups:**

The chapter on groups sets out the QIS3 results. It is the first quantitative impact study that lays particular emphasis on group solvency.

The main aim of this exercise was to gather figures and information in order to refine further the approach for groups under the Solvency II regime. In particular, the study aimed at having a first view on the impact of diversification at a group level when implementing the standard approach as specified in this QIS, and at

gathering some information on internal models, in particular to compare them to the standard formula both on a qualitative and quantitative perspective. The study aims also at gathering information on how groups currently deal with group specific risks and particularly operational risk.

The fact that group aspects of QIS3 needed first to have implemented the 'solo' specifications, and the very tight time schedule that was allocated to the QIS3, certainly explain, at least partially, that groups were not able to provide CEIOPS with comprehensive figures. In particular, only few groups answered the QIS3 part related to internal models.

Nevertheless, several lessons can be drawn from this study. First, taking as a reference the standard approach as specified in QIS3, the study confirms that diversification benefits within a group can vary both from their sources and their amount. The levels of diversification that were reported by groups can then widely vary from one group to another.

Regarding the amounts of surplus capital in groups within the framework of QIS3, no general trend can be foreseen at this stage. This issue is all the more delicate because the group available capital largely depends on the valuation of liabilities that is not yet stabilised at 'solo' level.

Under these conditions, the main findings of QIS3 are more qualitative than quantitative. Even if there is some room for improvement in the standard approach proposed in the QIS3 regarding the calculation of the 'diversified' group SCR, some questions raised did not receive conclusive answers. This is notably the case for transferability issues and group specific risks. At this stage, even if the participants globally recognise the existence of these issues, there are no readily available solutions that can be adopted as they are. Further reflections are necessary in the next steps towards the implementation of Solvency II.

- **Areas for further work: key lessons learned and challenges ahead**

QIS3 provided a wealth of information on a wide range of elements of the current Solvency II proposals. For some elements, multiple approaches were tested with the aim of being able to choose among the approaches after its completion. Below a number of areas are identified where political guidance would be helpful before embarking upon QIS4. These relate to the MCR, equity risk, groups and taxes.

1. MCR:

QIS3 tested multiple approaches for the MCR. The choice between these approaches has political as well as technical aspects. The Solvency II directive

proposal remains open on this issue. A choice needs to be made between the option of the MCR being a stand-alone capital requirement and the option of taking the MCR as a percentage of the SCR (the so-called Compact Approach). If the MCR retained is a stand-alone requirement, a choice has to be made as to its specific design that would satisfy the Directive Proposal's criteria (80-90% VaR, simplicity and auditability, safety net, absolute floor). In this context, QIS3 tested the so-called Modular approach. From this analysis it can be concluded that for the non-life business the Modular approach displays an interaction with the SCR that is acceptable from the perspective of having a robust supervisory ladder of intervention. For life undertakings, on the contrary, the interaction between the Modular MCR and SCR was highly erratic and too volatile to be practical, due to the calculation of reduction for profit-sharing. For QIS4 purposes an improved stand-alone approach will therefore be designed and tested.

2. Equity risk:

QIS3 also tested two alternative approaches for equity risk in the SCR. In response to QIS2 feedback, the default charge on equity risk was reduced in three ways: the headline shock was reduced from 40 to 32 percent, the assumed correlation between equity and interest rate risk was reduced from 0.75 to 0, and participants were given the option to exclude equity holdings from their solvency calculation insofar as they consisted of free assets (i.e. assets not covering technical provisions nor the SCR). According to the qualitative returns, these modifications were well-received. In quantitative terms QIS3 demonstrated that for life undertakings the three modifications to the default standard formula tested in QIS3 would jointly lead to a reduction of roughly one third in the overall SCR compared to the QIS2 specifications. The hypothecation of assets, to be designated as 'free assets', and the interaction of this adjustment with the 'surplus funds' approach, would need further consideration and guidance. In addition to that, an alternative "duration-based" proposal was tested where equity holdings were tagged to the liability structure of the undertaking with declining risk weights. Incoming comments on this duration approach were rather mixed. The duration approach resulted in capital charges that varied from 50 to 100 percent of the default approach for equity risk (which for the most strongly affected life undertakings would take off another 15-20 percent of the total SCR). A choice should now be made, informed by political guidance, as to the approach to be tested under QIS4.

3. Groups:

QIS3 also tested for group issues such as the likely size of diversification benefits. Unfortunately, the partial character of the returns did not allow CEIOPS to make meaningful inferences about the size of any such effects. To this extent a more

targeted effort will have to be undertaken under QIS4, and the industry associations involved have already expressed their full commitment to this exercise. A related question here concerns third-country diversification benefits. While the QIS3 exercise was focussed at diversification and consequent solvency effects within the EEA, many globally active insurance groups noted that significant diversification effects also stem from third country undertakings established outside the EEA. Subject to this benefits being realizable, this aspect should be taken into account when drafting QIS4 specifications. This would of course require negotiations with third countries on the preferred allocation of diversification benefits within and outside the EEA.

4. Taxation:

During QIS3, some raised the question as to how to deal with taxes under Solvency II as in practice this may strongly influence the comparability of results. It was argued by some that deferred taxes should be counted either as reducing technical provisions or as part of available capital, since under stressed conditions insurance and reinsurance undertakings would not need to pay taxes. QIS3 was neutral and agnostic with regard to any accounting or tax issues, but as this is an issue that exceeds its scope, a decision may need to be taken before going into QIS4.

2 Introduction

2.1 Disclaimer

This report sets out the results from the third quantitative impact study (QIS3) conducted by CEIOPS to underpin the advice given to the European Commission to support the development of a sound insurance solvency regime. This impact study was mainly designed to test the calibration and the main structure for groups exposed in previously published CEIOPS answers to Calls for Advice from the European Commission. As such, QIS3 is a test and not a proposal for the final Solvency II framework.

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.

CEIOPS took the experiences from QIS2 into account and endeavoured to keep the technical specifications as precise as possible and tried to minimise any misunderstandings by offering a Q&A process that allowed replies to QIS3 requests within the time frame of one week. Nevertheless, both undertakings and national supervisors may still have used different interpretations, eventually 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.

The report on groups sets out the results from the field study within QIS3. In the series of quantitative impact studies it is the first time that a particular emphasis is laid on group solvency. Comparisons with earlier studies are, thus, not possible.

In addition to reporting to national supervisors, the groups were asked to voluntarily report to a centralised database, which has been set up for extracting necessary quantitative and qualitative answers from group submissions, starting from the individual group level.

The quantitative analysis of the group results has been conducted at two different levels: (1) an analysis of insurance groups that directly submitted to the central database and (2) an analysis of the country reports as back up of the information retrieved from the database. The main difference between the levels of analysis concerns the extent of aggregation and the potential explanatory

power due to different depth of information available to CEIOPS. The separation into two different assessments was necessary because, for confidentiality reasons, several QIS3 participants and supervisors were not able to supply their detailed data.

For these particular reasons CEIOPS points out that there might be some caveats to keep in mind when interpreting the results. First, the number of participants and their allocation across Europe plays a central role, for instance, to detect cross-country commonalities or divergence. On the other hand, standardised responses to the qualitative questionnaire make an adequate assessment of undertaking-specific difficulties with the QIS3 approach rather difficult. Under these circumstances it may become difficult to attribute certain challenges to a particular type or category of insurance group.

Furthermore, conclusions very much depend on the quality and clarity of submissions. Testing three different methods for determining a group capital requirement requires the use of comparable input parameters, in particular a comparable scope of consolidation, to allow for valid results. CEIOPS is aware that the group spreadsheet heavily depends on the availability of solo results of each subsidiary and hence cannot be completed in parallel.

In order to refine the analysis of the impact of the new solvency regime, a fourth quantitative impact study has been scheduled to take place in Spring 2008.

2.2 Structure of the report

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, including groups of such undertakings. For this purpose, CEIOPS has been requested by the EC to acquire insight into the possible quantitative impact of this new solvency regime through a series of quantitative impact studies (QIS). The results of QIS form a key input in the general impact assessment carried out by the EC.

CEIOPS launched a first QIS (QIS1) in Autumn 2005, the results of which were received in February 2006. The exercise focused on testing the level of prudence in technical provisions under several hypotheses. In the summer of 2006 CEIOPS conducted a more comprehensive second impact study (QIS2), which covered both technical provisions and the calculation of the solvency capital requirement (SCR) and minimum capital requirement (MCR). QIS2 focused on the

methodology of the solvency requirements; the calibration of the parameters was to be tested in a next study.

Taking into account the results of the previous QIS, CEIOPS has developed a new exercise (QIS3) that was launched in April 2007. The results of QIS3 are being reported in the document at hand.

The goals of QIS3 were fourfold. Firstly, QIS3 aimed at collecting further information about the practicability and suitability of the calculations involved. Secondly, QIS3 aimed at receiving quantitative information about the possible impact on the balance sheets, and the amount of capital that might be needed, if the approach and the calibration set out in the QIS3 specification were to be adopted as the Solvency II standard. Thirdly, QIS3 aimed at obtaining information about the suitability of the suggested calibrations for the calculation of the SCR and MCR. Fourthly, QIS3 studied the impact of these new proposals for insurance groups.

In addition to further improving the design and calibration of the standard formula, QIS3 included the assessment of the eligible elements of capital, based on the innovative proposal by the EC at the time of launching the exercise.

Finally, since the publication in July this year of the Solvency II Proposal for a Directive[2], the results of QIS3 will be of particular importance in the negotiation of the Framework Directive.

In principle, the structure of this report follows the structure of the country reports filled in by the national supervisors. Additionally, the report essentially consists of two parts, i.e. the report on solo entities and the report on insurance groups. The report is also characterised by the integration of data collected in the central database with the data received trough the national supervisors in their single group report. Chapter 3 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. The subsequent chapter treats general comments on practicability and reliability. It covers both the necessary investments of undertakings participating in QIS3 and the reliability of data provided. Chapter 5 discusses the potential financial impact on each type of insurance undertaking; the following section depicts the assessment of technical provisions. Chapters 7 and 8 analyse the MCR and the SCR in detail, followed by a short section on own funds. Operational risk, which was, after QIS2, separated from the Basic SCR is then analysed in the following chapter 10. Chapter 11 summarises the results provided and the arguments raised on the internal model approach. The following section treats two special issues which are of particular

[2] Proposal for a Directive on the taking up and pursuit of the business of insurance and reinsurance, COM 2007/361.

importance but cannot be treated solely in one of the former sections: First the suitability of QIS3 specifications for small insurance firms is evaluated; the second sub-section reports on the health insurance in form of life insurance. Chapter 13 extensively treats the results on insurance groups and their results. Finally, chapter 14 points out the areas of further work based on the preceding information.

2.3 Methodology

The Quantitative Impact Study essentially serves two purposes: It is intended to provide the best possible overview of European insurance undertakings and their risk exposure under the framework of the QIS3 Technical Specifications, while supervisors commit themselves to presenting a balanced view, including the necessary local information that needs to be taken account of for interpreting certain results while maintaining the highest level of confidentiality and professional secrecy, as stipulated in the legal background of their work, such that no participating entity needs to fear any disadvantages.

These to some extent opposing objectives are ascertained by a three step approach to the analysis:

1. Assessment of individual entity results by the national supervisor. The submissions are also checked for potential errors and misunderstandings before the procession to next step of analysis.
2. Building of ratios and basic statistics regarding the distribution of the sample (percentiles, weighted average, standard deviation and number of entities included).
3. Final assessment and aggregation into a European report by CEIOPS.

In a first step, supervisors analysed the participants' QIS3 submissions and checked them for potential errors and misunderstandings.

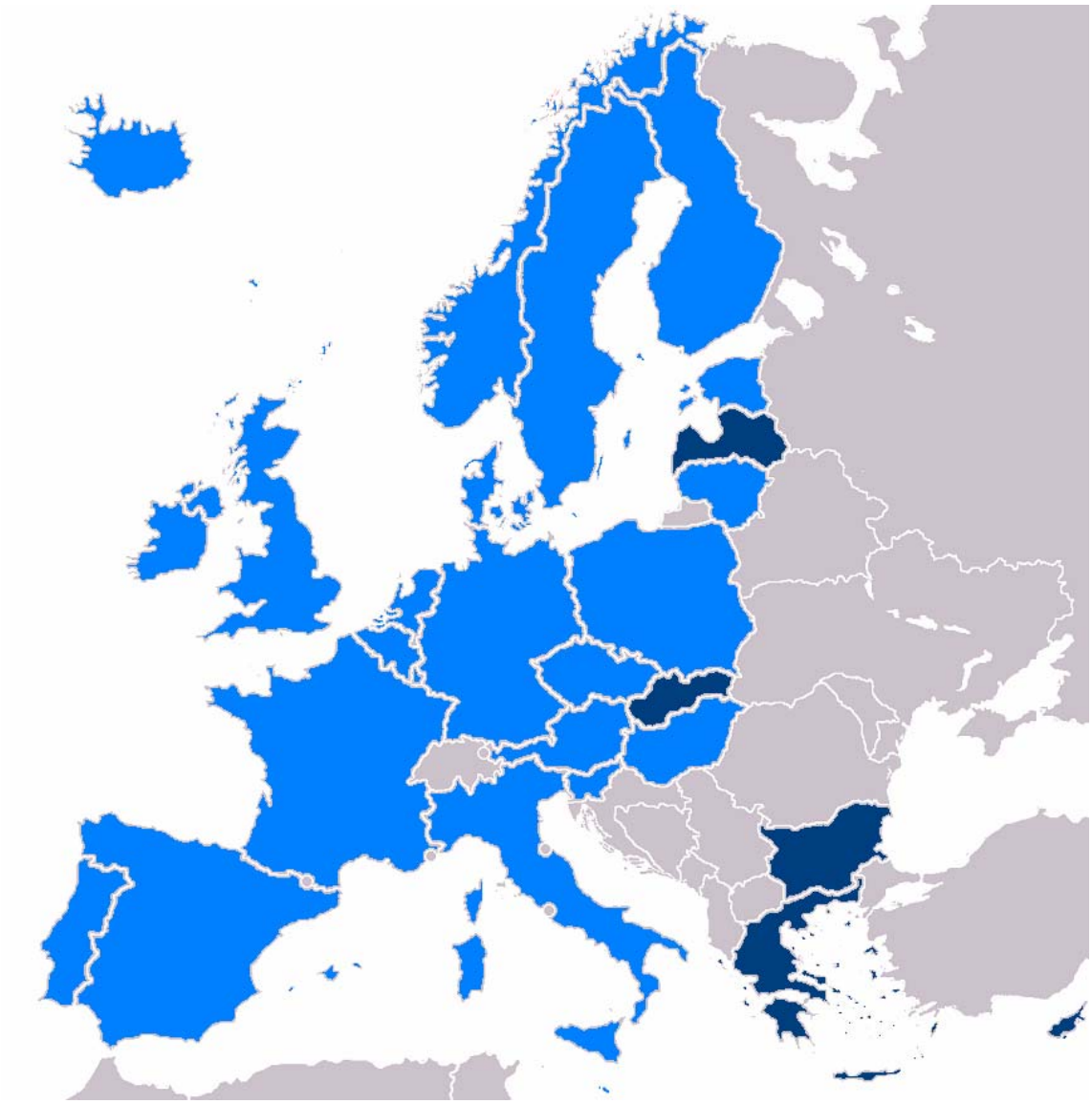
Then, an IT tool extracted structured information from the national databases, containing all data from the individual spreadsheets. These databases served as the basis for the analytical tables which were generated for the country reports. Further, the databases are used to run additional analyses on the data obtained in QIS3: Complementing the IT tool, analytical macros were applied to the national datasets to be used for additional analysis. These macros do not reveal any confidential information but produce only the aggregated results needed.

The national results, as provided by the respective supervisors, were finally compiled by CEIOPS and analysed for similarities, differences and potential anomalies. Together with the qualitative remarks by the participants the various aspects of the study were then combined to the present single document.

For the group report, the assessment was approached in a slightly different manner, but in principle using the same methodology: The national reports remained, however, the groups, on a voluntary basis, were also encouraged to submit to a central database because their business is in most cases not restricted to one single country. The assessment is essentially the same but the central database was assumed to bear several advantages over the national reports, inter alia: (1) more companies in the sample and therefore fewer confidentiality problems, (2) possibility to compare similar groups from different jurisdictions, (3) facilitated assessment of inter-group commonalities and divergences.

3 Participation and adequacy of data provided

Figure 1: Country reports for solo companies



3.1 QIS3 participation

A substantial number of European undertakings participated in the third quantitative impact study. Both the number of insurers and the number of participating countries increased in comparison to the preceding QIS[3]. These countries include Bulgaria, Cyprus, Latvia, Slovakia and Greece[4]. In total, 28 out of 30 EEA member countries took part in the study.

Table 2 below summarises the results and Table 3 shows the relative change in participants in comparison to QIS2 and with respect to size class.

Non-life insurers are classified according to the following table:

size class	gross written premiums (million €)
large	> 1 000
medium	100 – 1 000
small	< 100

Life insurers are classified according to the following table:

size class	gross technical provisions (million €)
large	> 10 000
medium	1 000 – 10 000
small	< 1 000

Apart from non-life insurers and life insurers for which the classification above can be applied directly, there are reinsurers and composite direct insurers which write both non-life business and life business. For those entities, the size class was assigned on a discretionary basis in line with the set classification of non-life insurers and life insurers described above. For instance,

- a composite insurer who conducts medium non-life business and small life business was classified at least medium;
- a composite insurer who conducts medium non-life business and medium life business was classified medium or large.

[3] Light blue countries on the map are those that already participated in QIS2. The new participants are marked in dark blue.

[4] For Greece a branch of a non-EEA insurance group took part in QIS3.

Table 2: Number of respondents

Type of undertaking	Small	Medium	Large	Total
Life undertakings	116	135	79	330
Non-life undertakings	254	194	63	511
Pure reinsurers	12	10	6	28
Composites	40	79	39	158
All respondents	**422**	**418**	**187**	**1027**
Mutuals thereof	118	99	34	251
Health undertakings thereof	16	30	10	56

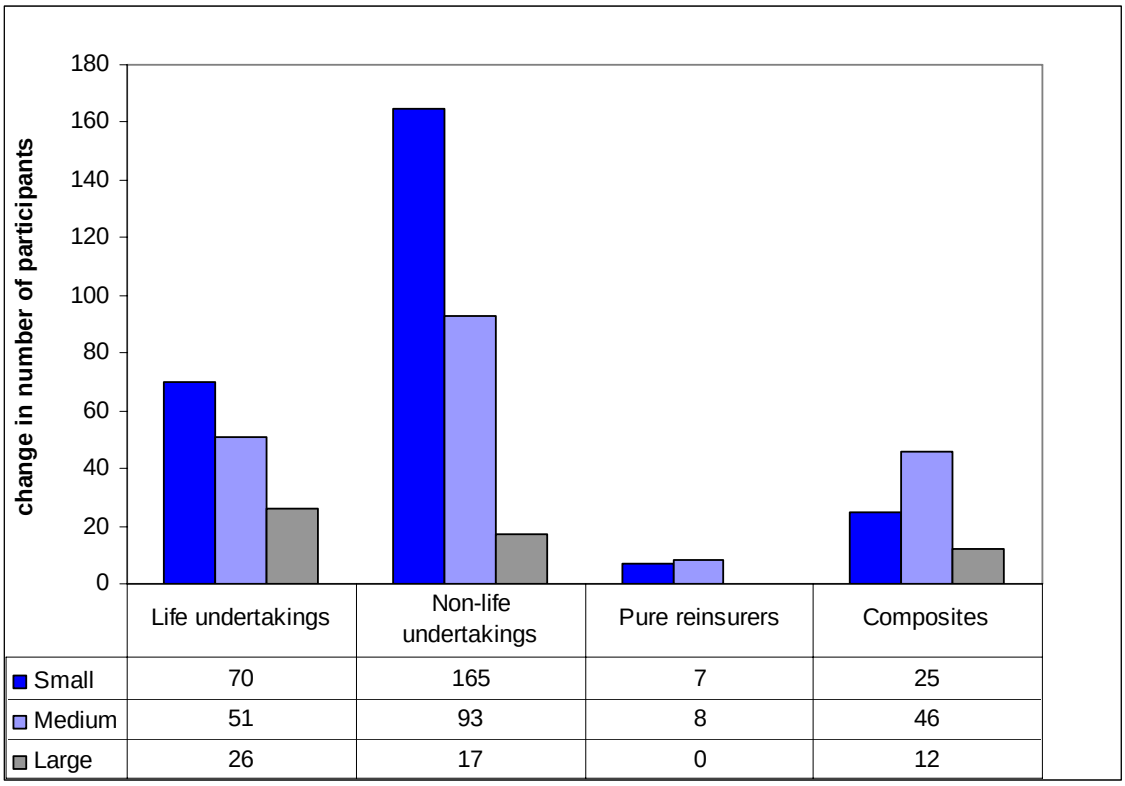
Table 3: Relative growth in participation

Type of undertaking	Small	Medium	Large	Total
Life undertakings	152%	61%	49%	80%
Non-life undertakings	185%	92%	37%	117%
Pure reinsurers	140%	400%	0%	115%
Composites	167%	139%	44%	111%
All respondents	**172%**	**90%**	**42%**	**100%**
Mutuals thereof	203%	94%	113%	137%
Health undertakings thereof	100%	173%	233%	150%

The total number of solo company respondents is 1027, i.e. an increase of almost exactly 100% over QIS2, which had 514 respondents. All 24 countries which participated in QIS2 reported rising number of participants in QIS3. Of these 1027 undertakings 330 are in the life sector and 511 in the non-life segment. Only 28 entities are classified as pure reinsurers. 158 are respondents that provide data for both life and non-life business (composites). With 422 and 418 respectively there have been almost as many small undertakings as medium undertakings that responded to QIS3. There are 187 large undertakings that submitted their data. Among all respondents there have been 251 mutuals and 56 health undertakings, whereby it has to be mentioned that responses from undertakings performing health business according to 'life' principles were limited to five countries (AT, BG, DE, LU and NL).

In addition to the solo company submission, 51 groups submitted group calculations to national supervisors. For detailed information see chapter 13.1. 29 groups, which need not necessarily be included in the number of 51 stated before, submitted to the central database.

Figure 2: Growth in absolute numbers of respondents[5]



	Life undertakings	Non-life undertakings	Pure reinsurers	Composites
Small	70	165	7	25
Medium	51	93	8	46
Large	26	17	0	12

From QIS2 to QIS3 the number of small undertakings that took part in the study increased considerably. With a surge of 172 percent, the participation far more than doubled. In absolute numbers, this was a change of 267 respondents. An increase of 90 percent for medium size undertakings shows that there have been almost twice as many participants in this category. In comparison to the other size classes the increase in the participation of large undertakings is rather modest. Nevertheless, it has to be mentioned that in many EEA countries insurers of this size do not exist or already took part in QIS2. With respect to the sector (not taking account of health), the number of non-life undertakings increased the most. There are more than twice as many participants as in QIS2. An increase of 117 percent means an additional 275 respondents. Composites and pure reinsurers showed a similar relative surge, however from a much smaller basis. The number of life insurers increased by 80 percent or 146 enterprises.

[5] Mind that for QIS2 not all figures added up correctly because for some undertakings the size classification was unknown. As a result the total of QIS2 to respondents plus the sum of all changes is slightly higher than 1027, i.e. the number of QIS3 participants.

Table 4: Participation by country

Country	Life	Non-Life	Rein-surance	Composite	**Total**	Mutuals thereof	Health thereof
Austria	6	10	0	11	**27**	3	7
Belgium	1	6	0	8	**15**	0	0
Bulgaria	2	4	0	0	**6**	0	1
Cyprus	3	2	0	0	**5**	0	0
Czech Republic	1	3	0	8	**12**	0	0
Denmark	31	38	0	0	**69**	16	0
Estonia	4	3	0	0	**7**	0	0
Finland	8	11	0	0	**19**	7	0
France	41	52	2	59	**154**	77	0
Germany	60	110	9	0	**179**	41	23
Greece	1	0	0	0	**1**	0	0
Hungary	4	3	0	6	**13**	1	0
Iceland	2	5	0	0	**7**	0	0
Ireland	16	16	7	0	**39**	0	0
Italy	29	26	0	18	**73**	2	0
Latvia	1	1	0	0	**2**	0	0
Lithuania	3	8	0	0	**11**	0	0
Luxembourg	6	7	3	0	**16**	2	2
Malta	2	2	0	1	**5**	0	0
Netherlands	14	44	0	0	**58**	14	23
Norway	3	16	0	0	**19**	5	0
Poland	9	15	0	0	**24**	2	0
Portugal	14	14	0	5	**33**	1	0
Slovakia	3	0	0	2	**5**	0	0
Slovenia	2	2	2	5	**11**	1	0
Spain	15	57	2	34	**108**	38	0
Sweden	14	13	0	0	**27**	22	0
United Kingdom	35	43	3	1	**82**	19	0
Total	**330**	**511**	**28**	**158**	**1027**	**251**	**56**

As shown in Table 5, a substantial market share – in terms of gross provisions for life and health and gross premiums for non-life – is covered in all three sectors. These numbers in most cases fortunately strongly increased since the last inquiry, which reflects the particular interest of the industry in the quantitative impact studies and eventually Solvency II. This argument is also supported by the fact that not only those countries that had a comparably lower rate of participation increased their rates but also those that were already well represented. Participation, with respect to market share, is almost equal in all

three sectors, and for most countries it covers more than 60 percent[6]. For the health business the participation rate is particularly high, although it has to be kept in mind that only five countries were concerned[7].

Table 5: Market share (%)

Country	Life	Non-Life	Health
Austria	88.6	69.9	100.0
Belgium	68.0	55.0	
Bulgaria	44.0	24.0	59.0
Cyprus	56.0	13.0	
Czech Republic	84.7	90.9	
Denmark	75.0	76.3	
Estonia	87.0	31.0	
Finland	95.0	89.0	
France	80.8	56.4	
Germany	84.0	77.0	84.0
Greece	12.0	0.0	
Hungary	86.0	86.0	
Iceland	72.0	100.0	
Ireland	47.0	37.0	
Italy	71.3	82.4	
Latvia	41.0	10.0	
Lithuania	41.9	74.7	
Luxembourg	9.0	60.0	89.0
Malta	92.0	17.5	
Netherlands	68.0	57.0	68.0
Norway	62.6	88.5	
Poland	74.0	80.9	
Portugal	98.7	93.7	
Slovakia	50.1	47.6	
Slovenia	97.0	88.0	
Spain	76.2	77.8	
Sweden	61.0	65.0	
United Kingdom	65.8	73.5	

[6] The average coverage is 69, 63, and 79 percent respectively. However, these numbers do not take into account the respective market concentration in each country.

[7] Mind that the health insurance business is not a separate sector in most European countries.

3.2 Data provided

The tables below indicate the number of respondents able to fill in various parts of the QIS spreadsheet. They list the number of respondents providing data for the various calculations of the technical provisions, the two MCR alternatives, the risks covered by the SCR, the application of the KC value and alternative approaches for certain sub-risk modules. The analysis is separated between the life and the non-life business. Health (similar to life) was subsumed under the life business. It is to be emphasised that due to data constraints in many countries the denominator is always the number of all respondents. Thus, the delta between 100 percent and the actual share of respondents does not distinguish between non-respondents and those that do not hold a particular risk (e.g. property risk). Only a minority of supervisors calculated adapted percentages with varying denominators, i.e. taking account of the factual number of respondents that have an exposure to a particular risk.

As the tables indicate, none of the items listed here were provided by 100 percent of all respondents. This fact may have several causes: (1) the particular risk was non-existent, (2) the company did not agree with the methodology, or (3) the undertaking was unable to provide the relevant information. For these reasons, undertakings were asked to provide qualitative responses on the practicability and suitability of the methodology of the various modules in QIS3[8].

Table 6: Life technical provisions

Respondents with life business	Best estimate provisions		CoC provisions		Internal model
	No.	%	No.	%	No.
Total gross provisions	436	89%			
Total net of reinsurance provisions	460	94%	364	74%	25

Table 6 shows that the number of respondents does not coincide with the results in Table 2. This is due to the fact that composites have to be included. Furthermore, the categorisation of individual companies is in some cases not straightforward. The percentages in the rows do not add up to 100 because respondents are encouraged to provide data using both techniques.

There is a majority of participants (89% for total gross provisions and 94% for total net of reinsurance provisions) that provided data for the best estimate of

[8] For more details on these issues refer to the subsequent sections.

technical provisions. For total net of reinsurance provisions, it was 74% or 364 entities. Additionally, capital requirement derived from internal models were used to estimate the CoC margin in 25 cases. The overall application of internal models can be seen in Table 7.

Table 7: Number of internal model submissions

	Life undertakings	Non-life undertakings	Composite undertakings
Number of full internal models on SCR total (in brackets: full and partial internal models)	54 (55)	56 (65)	15 (15)

As immediately observable in Table 8, the number of responses is relatively high. In most cases, the modules were filled out by more than 70 percent. Considering the fact that the non-respondents also include those companies that do not carry a particular risk, e.g. equity, property, currency and concentration risk, these numbers are even more astonishing. Nevertheless, one can also immediately observe the potential challenges for the subsequent QISs in the areas of low feedback, e.g. for concentration/counterparty risk, the KC approach, the duration approaches, etc. The numbers for the health underwriting risk have to be taken with caution: However, there are only a few countries where this risk is applicable.

Table 8: Life MCR and SCR

		No.	%
MCR calculation	market risk alternative 1	454	93%
	market risk alternative 2	424	89%
SCR calculation	operational risk	477	95%
	interest rate risk	448	88%
	equity risk	439	82%
	property risk	355	66%
	currency risk	213	49%
	credit spread risk	448	85%
	concentration risk	225	46%
	counterparty risk	294	57%
	life mortality risk	399	84%
	life longevity risk	373	57%
	life disability risk	250	53%

	life lapse risk	346	73%
	life expense risk	405	82%
	life catastrophe risk	405	82%
	health u/w risk	29	4%
	Application of KC factor in SCR calculation	295	53%
	Additional calculation of SCR using liability duration approach for equity risk	132	12%
	Additional calculation of SCR using liability duration approach for property risk	117	10%

As the table on non-life technical provisions shows, the results are almost equal to those on life technical provisions. The same is true for the responses on non-life MCR and SCR (Table 10).

Table 9: Non-life technical provisions

Respondents with non-life business	Best estimate provisions		CoC provisions		Internal model
	No.	%	No.	%	No.
Total gross provisions	565	90%			
Total net of reinsurance provisions	598	95%	437	70%	26

Table 10: Non-life MCR and SCR

		No.	%
MCR calculation	market risk alternative 1	603	94%
	market risk alternative 2	570	90%
SCR calculation	operational risk	629	98%
	interest rate risk	590	88%
	equity risk	537	77%
	property risk	437	60%
	currency risk	240	45%
	credit spread risk	578	82%
	counterparty risk	494	77%
	concentration risk	332	57%

	life revision	75	12%
	health u/w risk	30	8%
	non-life premium / reserve risk	634	98%
	non-life catastrophe risk	456	73%
	non-life premium risk with undertaking specific factors	285	34%
	Additional calculation of SCR using liability duration approach for equity risk	156	13%
	Additional calculation of SCR using liability duration approach for property risk	101	7%

4 General comments on suitability, practicability and reliability

4.1 Suitability – A participants' feedback analysis

The fifth question in the QIS3 solo qualitative questionnaire asked participating firms to give an input on their expectations regarding CEIOPS future work. Concretely, participants were asked to state on a scale of 1 to 5 (1 for less and 5 for more) whether they deem appropriate more or less prescriptive rules, guidance for calculation, or simplifications to the methodology proposed in the QIS3 Technical Specifications[9].

4.1.1 Average results

The simple average of the results submitted by the European countries[10] to the CEIOPS QIS Task Force is presented below:

Table 11: Average country grades

Average country grade	**Technical provisions**	**Value of assets**	**Assessment of eligible capital**	**Calculation of SCR**	**Calculation of MCR**
Prescriptive rules	3.1	3.0	3.3	3.2	3.3
Guidance for calculation	3.8	3.4	3.7	3.8	3.7
Simplification for methodology	3.5	3.1	3.2	3.5	3.5

For no item, the balance fell toward 'less' (that is under 3). But it is doubtful that CEIOPS has enough resources to work on every item at the same time with the specified timeframe until QIS4. Some prioritisation to concentrate on the most relevant topics seems inevitable.

[9] While in this chapter results are presented for all participating firms, a further analysis differentiating by the undertakings' size classes can be found in chapter 12.1.4.

[10] Missing EEA countries: Greece, Liechtenstein and Romania.

In the next table the ranks of these simple average are presented, where the top five averages are flagged with a light background (high priority expectations toward CEIOPS regarding future work), the bottom five are flagged with a dark background (lower priority expectations toward CEIOPS). Average replies ranked from 6 to 10 are presented with a white background (medium priority expectations).

Table 12: Global ranks (simple averages)

Global ranks	**Technical provisions**	**Value of assets**	**Assessment of eligible capital**	**Calculation of SCR**	**Calculation of MCR**
Prescriptive rules	**14**	**15**	**9**	**12**	**11**
Guidance for calculation	**1**	**7**	**3**	**2**	**4**
Simplification for methodology	**8**	**13**	**10**	**5**	**6**

4.1.2 Country bias

In order to address the issue that some countries may display a different level of overall satisfaction regarding the whole Solvency II process, which would distort the simple average results presented above, a second step of analysis has been performed:

1) In each country report, notes given by participants have been ranked following the methodology exposed in step 1. This replaces the country average reported with an order of importance (from 1: highest country participants' priority, to 15: lowest country participants' priority).
2) When two or more country items were given the same priority rank by participants, this was adjusted accordingly in order not to bias the results[11].

[11] Two 10th rank results were replaced with two 10.5 ranks. Three 10th rank result were replaced with three 11th rank, …. The general adjustment formula was: adding (number of identically ranked – 1) / 2 to each rank.

Table 13: Global ranks (average priority ranks)

Global ranks	Technical provisions	Value of assets	Assessment of eligible capital	Calculation of SCR	Calculation of MCR
Prescriptive rules	**14**	**15**	**9**	**12**	**11**
Guidance for calculation	**1**	**7**	**3**	**2**	**4**
Simplification for methodology	**8**	**13**	**10**	**6**	**6**

This rank analysis presents no marked differences with the simple average presented in the previous section.

Some general patterns seem to emerge:

- The calculation of the SCR is in general the item that raises the highest priority expectations (average rank 6.7), followed by the MCR (7.0), the assessment of eligible capital (7.3) and the technical provisions (7.7). Valuation of assets is, on average, well behind (average priority: 11.7).
- Guidance (average priority 3.4) is more expected than prescriptive rules (average 12.2). Expectations for simplifications in the underlying methodologies generally lie in between (average 8.6).

4.1.3 Country diversity

In order to assess the diversity in the prioritisation of items between countries, a standard error of the ranking has been computed, and then these standard errors were ranked from 1 (lowest diversity between countries in the market participants based prioritisation) to 15 (highest).

In the following table, the items with the lowest country diversity in the ranking are flagged with a dark background. Those with the highest are flagged with a light background.

The lowest average country diversity is found for the calculation of the SCR (average rank 5.0), and the highest for the calculation of the MCR (10.0) and the assessment of eligible capital (9.7). The other average country diversities range from 6.7 to 8.7.

Table 14: Standard error of ranks

StdErr ranks	Technical provisions	Value of assets	Assessment of eligible capital	Calculation of SCR	Calculation of MCR
Prescriptive rules	**11**	**10**	**13**	**5**	**3**
Guidance for calculation	**1**	**8**	**7**	**6**	**12**
Simplification for methodology	**14**	**2**	**9**	**4**	**15**

4.1.4 Overall EEA results

The following table presents the results by decreasing priority, according to the analysis above, and next to them the information on the country diversity.

Table 15: Priorities according to participants

	Impor-tance	Country Diversity
Guidance for calculation of technical provisions	High (1)	Low (1)
Guidance for calculation of SCR	High (2)	Medium (6)
Guidance for calculation for assessment of eligible capital	High (3)	Medium (7)
Guidance for calculation of MCR	High (4)	High (12)
Simplification of methodology for calculation of SCR	Medium (6)	Low (4)
Simplification of methodology for calculation of MCR	Medium (6)	High (15)
Guidance for calculation of value of assets	Medium (7)	Medium (8)
Simplification of methodology for technical provisions	Medium (8)	High (14)
Prescriptive rules for assessment of eligible capital	Medium (9)	High (13)
Simplification of methodology for assessment of eligible capital	Medium (10)	Medium (9)
Prescriptive rules for calculation of MCR	Low (11)	Low (3)
Prescriptive rules for calculation of SCR	Low (12)	Low (5)
Simplification of methodology for value of assets	Low (13)	Low (2)
Prescriptive rules for technical provisions	Low (14)	High (11)
Prescriptive rules for value of assets	Low (15)	Medium (10)

4.1.5 Conclusion

Based on the feedback provided by the subset of participants that provided a view on their priorities, some conclusions can be drawn. Supervisors' views on the adequate prioritisation may differ.

1) More guidance for the calculation of provisions, the calculation of the SCR, the assessment of eligible capital and seeking simplifications for the SCR seem to be non-controversial top priority items for the subset of market participants that responded.
2) Seeking simplified methodologies, or more prescriptive rules, for the valuation of assets and more prescriptive rules for the calculation of the SCR and MCR seem to be non-controversial low priority items.
3) Guidance for the calculation of the MCR or a simplified methodology appear in the first half of the priority sorted list of expectations, but with a high diversity between countries. Further thoughts on these matters are urgently needed to properly rank them in the list of CEIOPS priorities.
4) Guidance for the valuation of assets and simplification of the methodology to assess the available capital are at the same time medium priority items, with medium diversity within country reports.
5) Simplification of the methodology for technical provisions, prescriptive rules for the assessment of eligible capital and prescriptive rules for the technical provisions receive on average a medium to low priority mark, but with a high level of diversity between countries.

4.2 Resources needed for participating in QIS3

In general, it took participants between one and three person months to complete QIS3. In many cases small firms indicated a slightly higher amount. Also large firms with a higher degree of complexity needed somewhat longer.

In most countries, the reported time span varied largely. Seven countries reported of participants for whom it took ten person months and more to perform the calculations. In one country the supervisor pointed out that some firms, mainly small participants, entirely or partly outsourced the task to external consultants, or their mother company carried out the calculations instead of them.

To build up Solvency II compliant systems, estimations by participants were also widely spread: A couple of countries reported average time spans between six and 18 person months, although outliers (between one and 100 person months)

were common. The yearly valuations could be performed within one to three person months on average.

4.3 Accuracy and reliability of QIS3 calculations

For QIS3 calculations company accounts were used as a source of inputs, usually complemented by supervisory reporting and actuarial models for valuing technical provisions. The QIS3 spreadsheet provided for a choice to use 2006 or 2005 data. 89% of submissions were based on 2006, the rest on 2005 figures.

While many participants considered their data to be fairly accurate and reliable, this view was not fully shared by some supervisors. One supervisor expressed strong doubts about the reliability after having identified significant errors in the participants' calculations and due to the omission of essential input data. Another supervisor asked participants whether their results would meet the quality requirements of an annual statement of accounts – about half of the participating non-life insurers answered this question in the negative or had reservations regarding parts of their portfolios. In general, accuracy and reliability are considered to be higher for larger insurance firms and 'QIS veterans' with dedicated actuarial and financial staff.

A high degree of accuracy can be assumed for the valuation of marketable assets. Less accuracy is seen in the valuation of provisions due to unclear definitions in the Technical Specifications – this made the use of approximations and simplifications necessary for participants in several countries.

Among the problem areas identified by participants and supervisors, mostly the following were reported:

- Matching of own business lines to those prescribed by CEIOPS,
- Calculation of historic net loss ratios,
- Calculation of the best estimate ,
- Calculation of loss absorbing capacity of discretionary benefits (KC),
- Classification of mutual funds, look-through,
- Valuation of illiquid assets,
- Valuation of embedded options,
- Distinction between hedgeable and non-hedgeable risks.

In these cases, simplifications and approximations were used by participants, which varied largely and make interpretation of the results more difficult. One supervisor urged for a prompt harmonisation of best estimate and loss

absorbency capacity of future profits provisions calculations – currently results are viewed as not being comparable from one respondent to another.

4.4 Operational issues

Participants in many countries mentioned the short timeframe of the exercise as being of concern.

The Technical Specifications were generally well received, although a few participants criticised some of the definitions as being too vague. A glossary of terms was suggested by participants in some countries. Exemplary calculations would have been considered helpful by several firms.

The spreadsheets were criticised for being not overly intuitive. Some participants expressed their wish to have one single input sheet instead of having to go through all sheets. Further, the issuing of new versions of the spreadsheet during the exercise was criticised by participants in a number of countries. Some participants and also one supervisor asked for automatic consistency checks within the spreadsheet. Finally, some participants deemed the password protection of the spreadsheets to be unnecessarily burdensome.

It has to be noted that the translation of the relevant documents by some supervisors caused some delay in the actual delivery of the packages to the participants, but this additional time constraint was seen to have paid off in terms of participation rates.

The early consultation of the QIS4 specifications should help to overcome much of the criticism above as it allows participants to get familiar with the techniques early and to anticipate the data requirements in their year-end reporting.

5 Financial impact

This chapter discusses the high level conclusions to be drawn on the financial impact of the proposed methodology. It aims to find any general trends in the impact on specific types of insurers.

5.1 Balance sheet impact

The tested Solvency II principles relate to a stylised insurance company balance sheet in the following ways: Solvency II follows the total balance sheet approach, such that it puts scrutiny on the asset side held as well as on the liability side.

Table 16: Stylised balance sheet

Summary balance sheet			
Assets		**Liabilities**	
Reinsurance Investments Other assets			Own funds Risk margin Technical Provisions Other liabilities
Total			**Total**

The subsequent figures show the composition of insurance balance sheets with respect to Solvency I and II grouped by insurance sector. The results are based on the weighted averages of each participating country.

Obviously, the Solvency I composition does not considerably deviate from Solvency II composition. This is true for the life, the non-life and the composite sector.

Figure 3: Composition of Solvency I balance sheet (life)

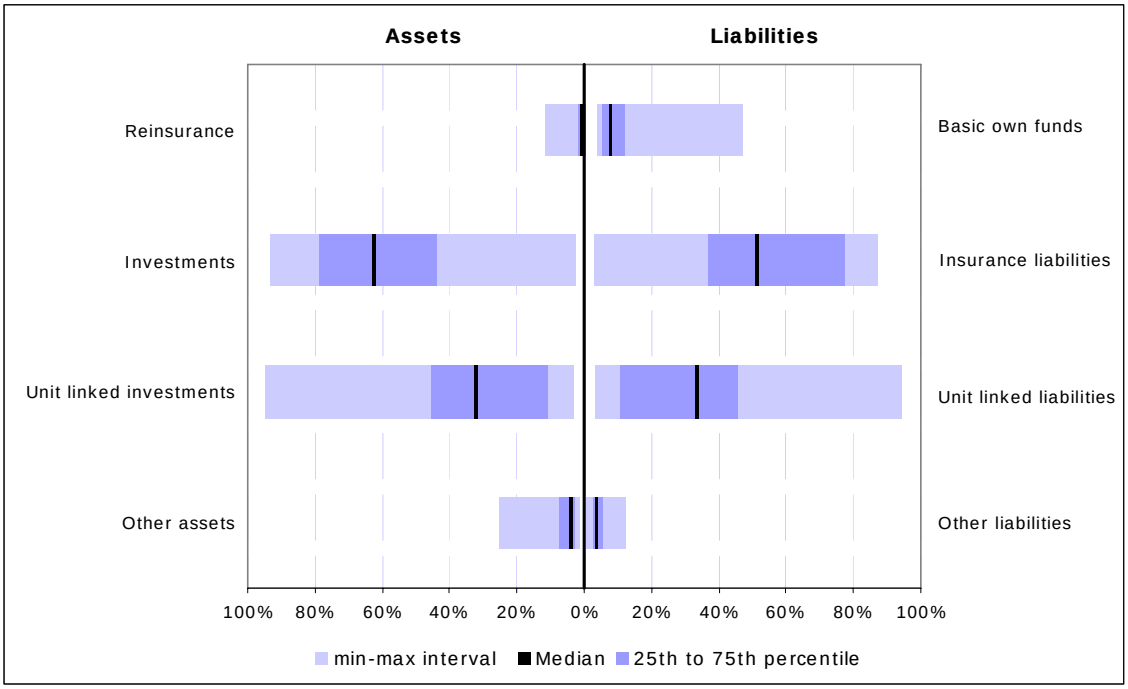


Figure 4: Composition of Solvency II balance sheet (life)

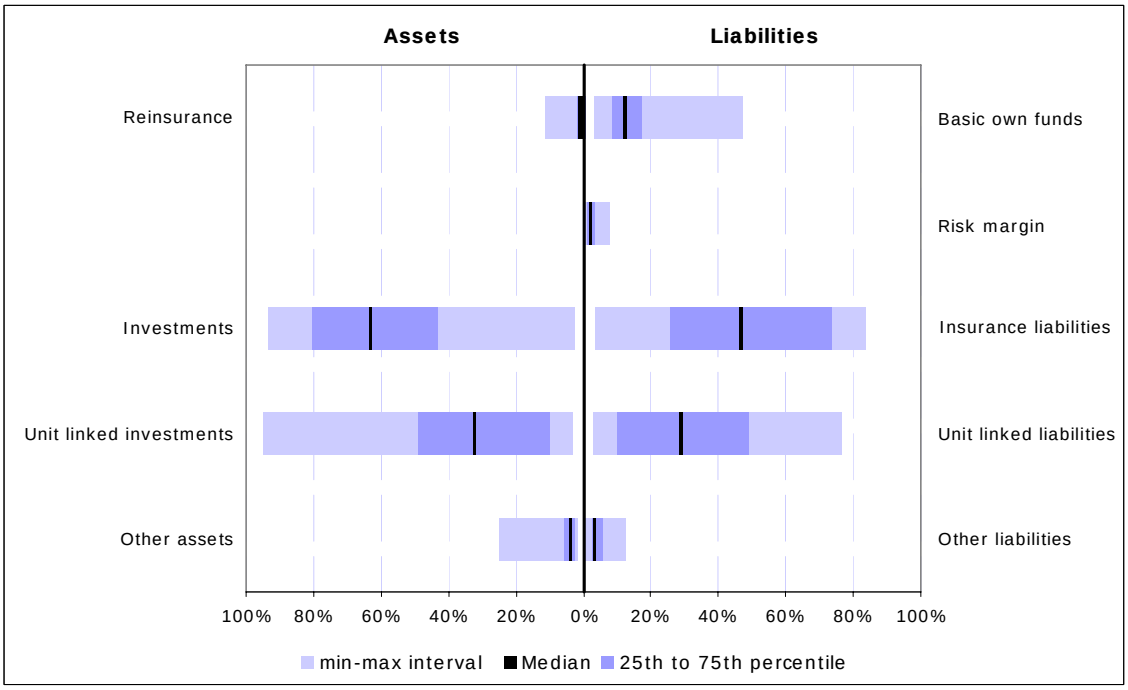


Figure 5: Composition of Solvency I balance sheet (non-life)

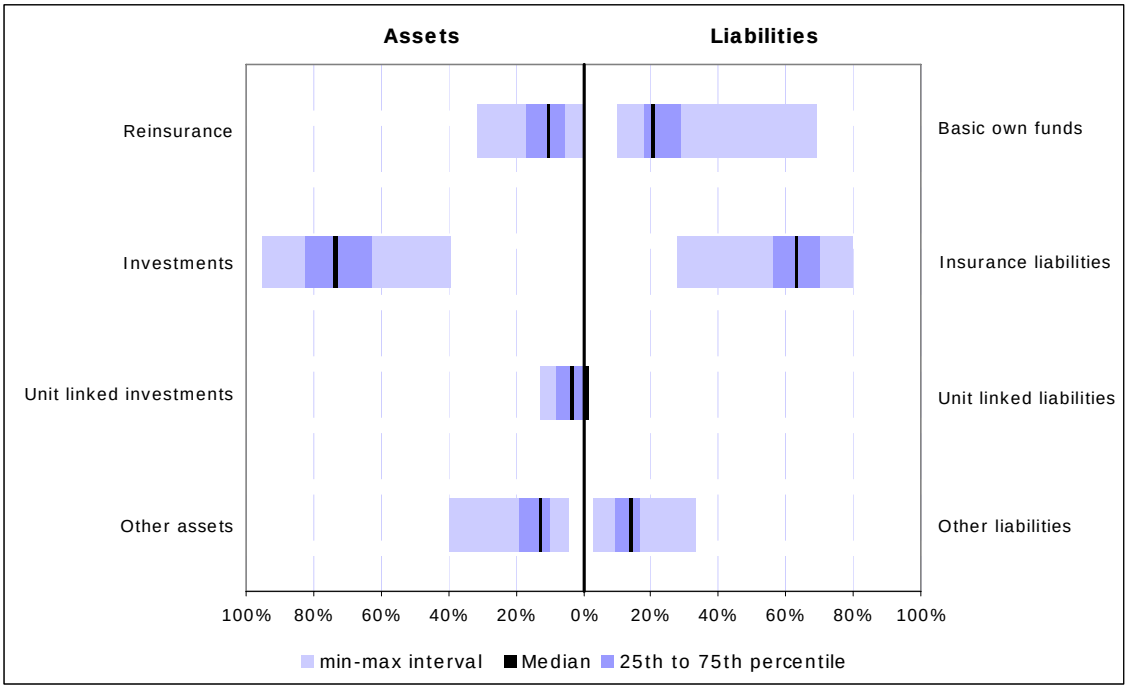


Figure 6: Composition of Solvency II balance sheet (non-life)

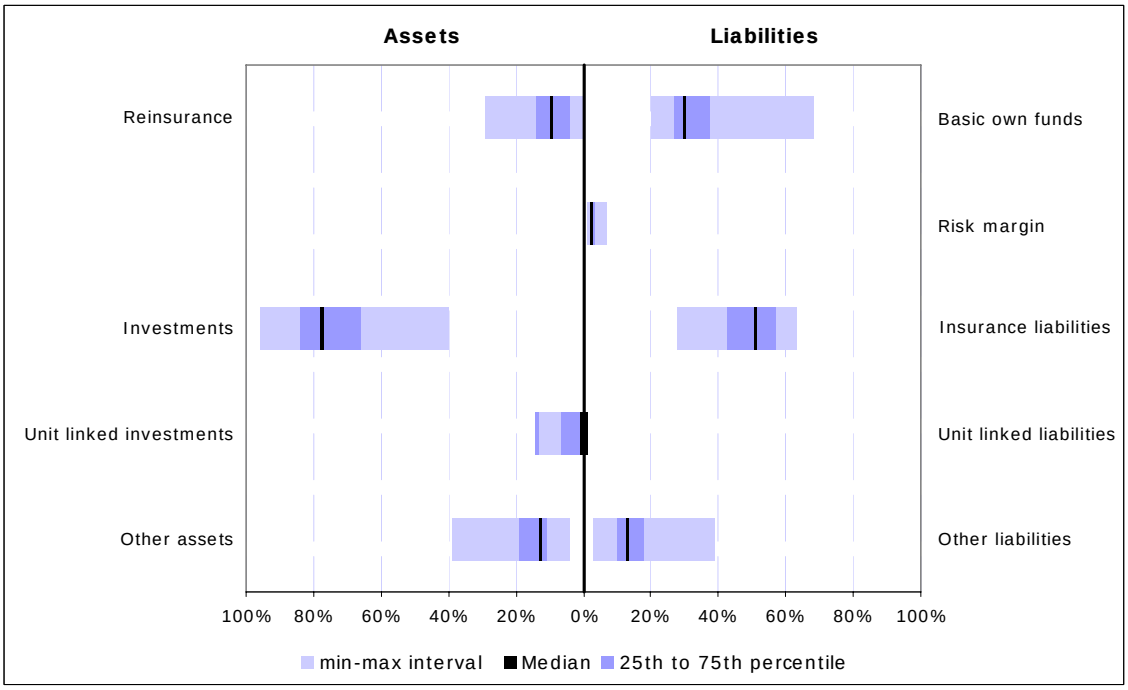


Figure 7: Composition of Solvency I balance sheet (composite)

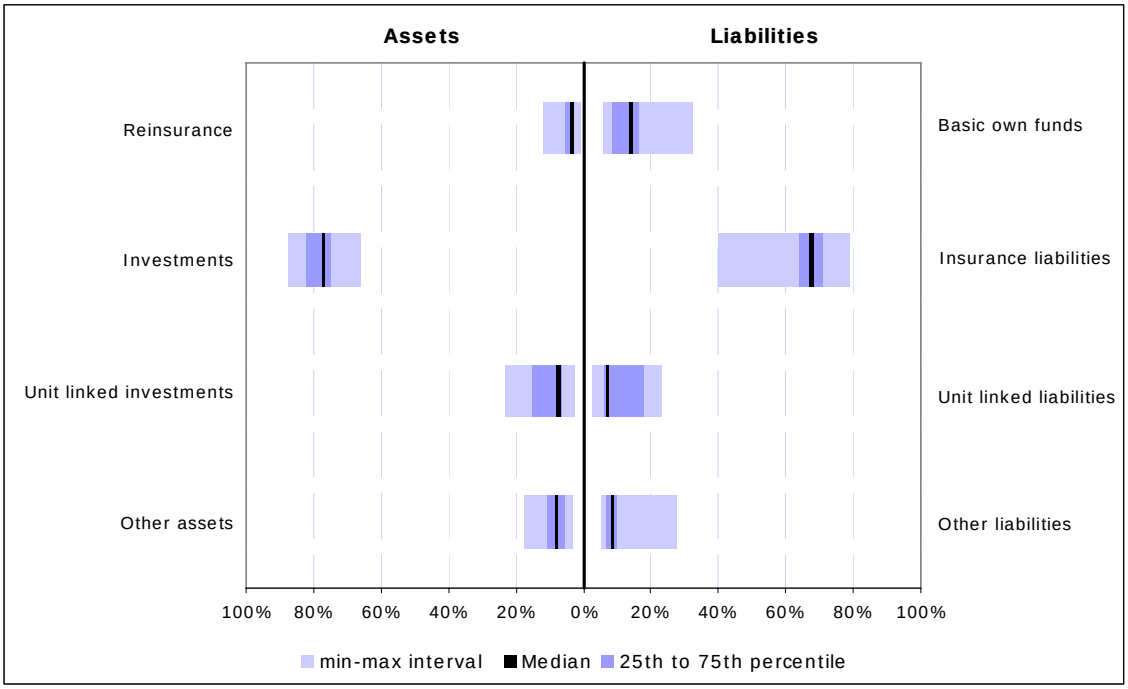
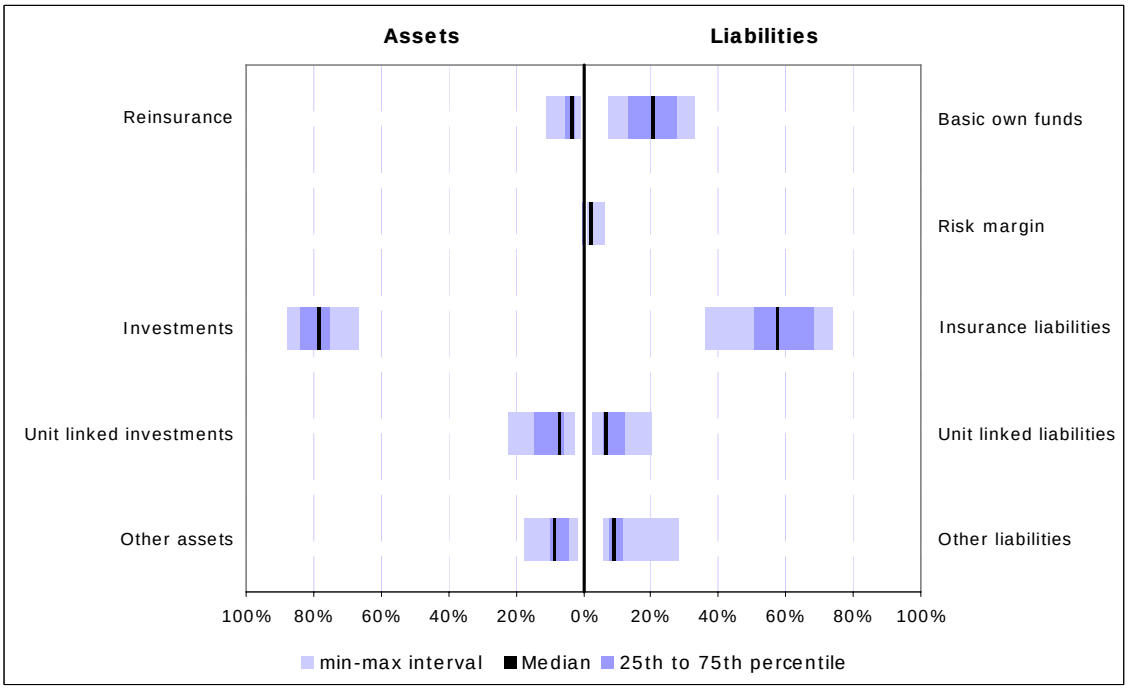


Figure 8: Composition of Solvency II balance sheet (composite)



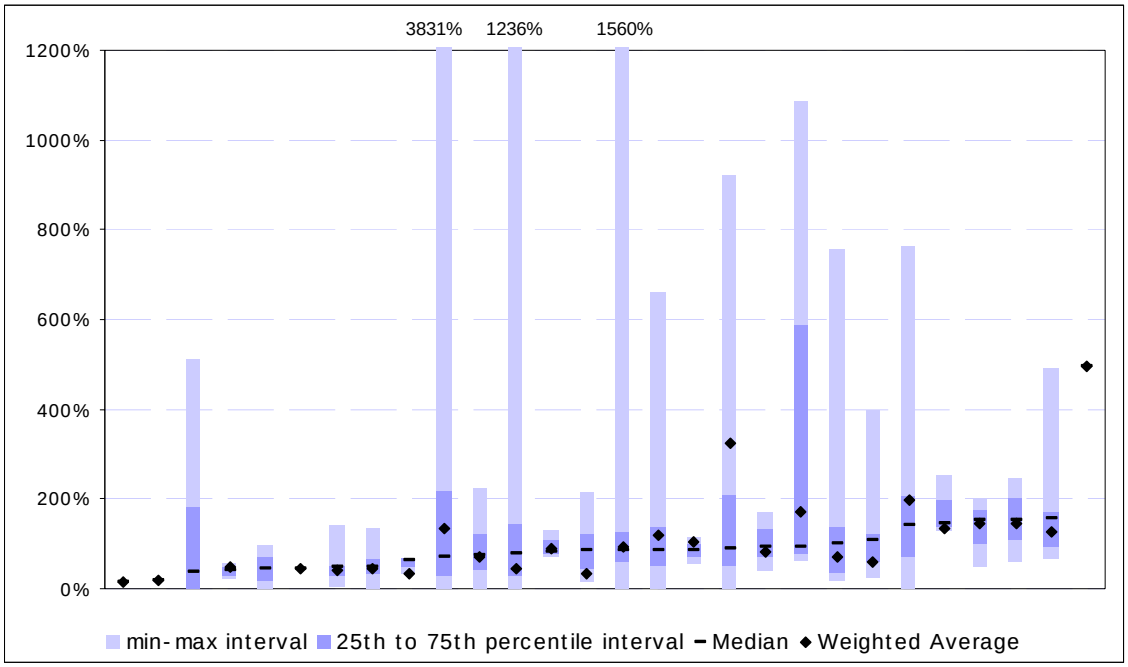
5.2 Potential impact on solvency ratios

5.2.1 Broad description

In general, the calculated QIS3 solvency ratio for most participating undertakings is lower than the Solvency I solvency ratio. The technical provisions tend to decrease vis-à-vis the provisions on current bases as the implicit prudence is removed. The capital requirements on the other hand tend to increase.

The financial impact of Solvency II cannot be estimated by simply comparing the calculated SCR with the Solvency I capital requirement. This is because not only the capital requirement but also the calculated technical provisions may change. Therefore, to make a reasonable estimate of the financial impact of the QIS3 calculation, the SCR is compared with the so-called 'effective' Solvency I capital requirement. This latter figure is defined as the Solvency I capital requirement plus the difference between the Solvency I provisions and the QIS3 provisions. The graphs below give the results for life, non-life and composite undertakings, respectively. For a better comprehensibility the bars are capped in some cases so that extreme outliers are excluded from the presentation.[12]

Figure 9: Ratio of SCR to the effective Solvency I capital requirement (life)



[12] Note that negative ratios are possible if the calculated technical provisions substantially increase or decrease.

Figure 10: Ratio of SCR to the effective Solvency I capital requirement (non-life)

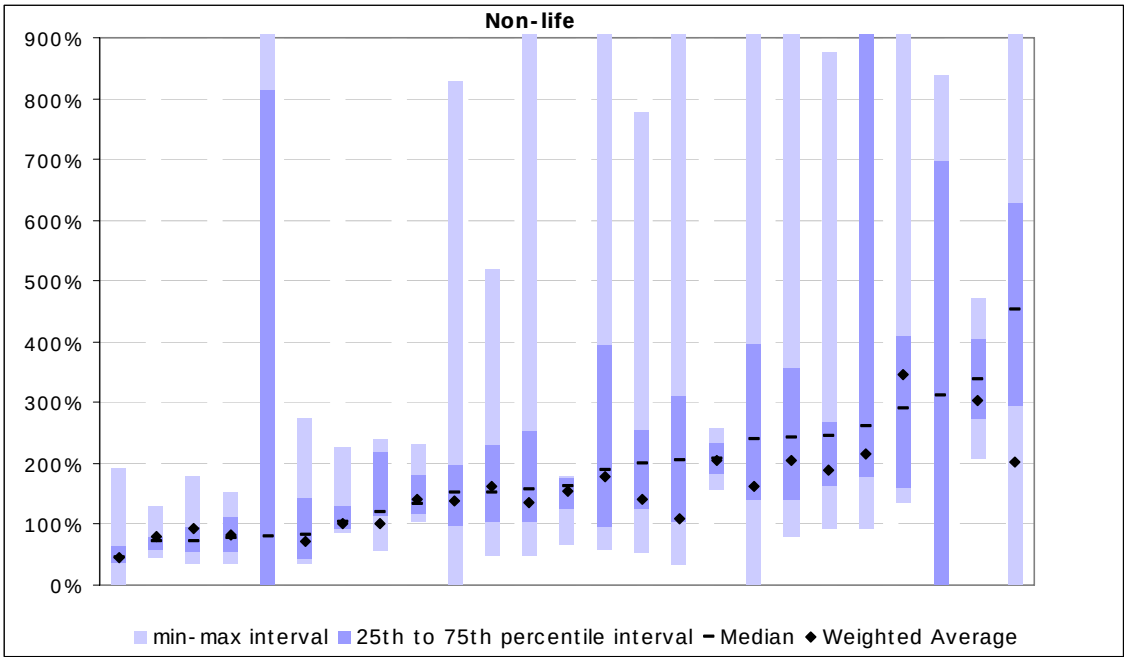
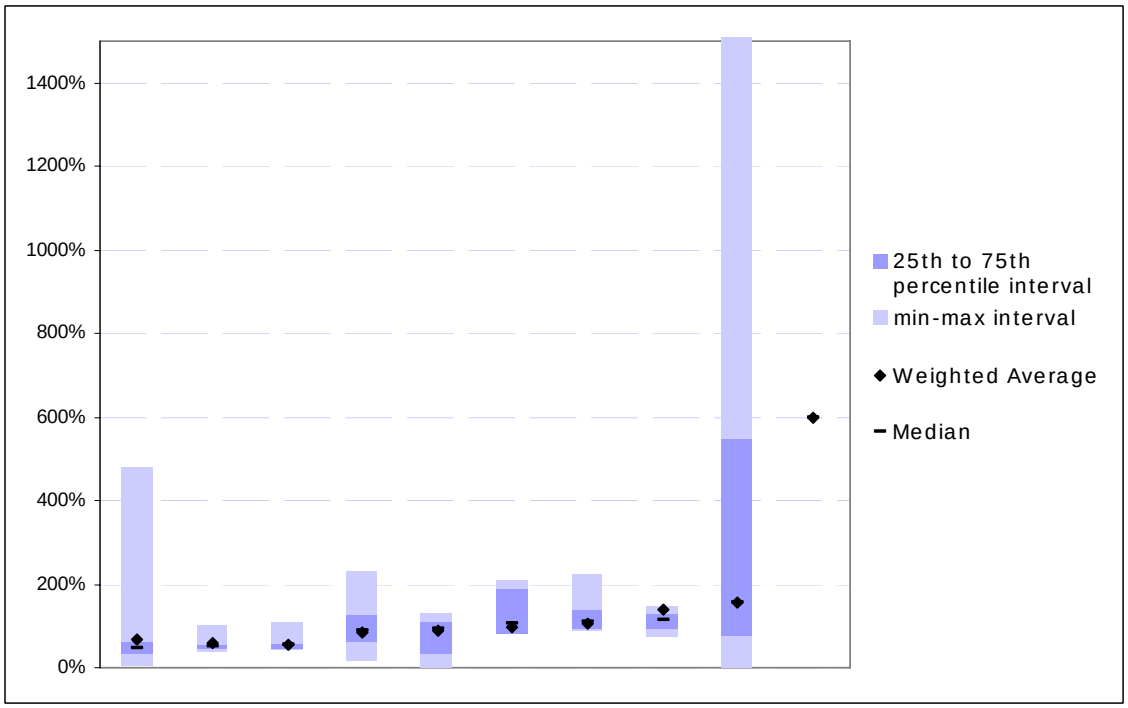


Figure 11: Ratio of SCR to the effective Solvency I capital requirement (composite)



5.2.2 Life

On the whole, most life participants across all participating jurisdictions have calculated a QIS3 solvency ratio in excess of 100%. However, participating life insurers generally show a decrease in their solvency ratios in several jurisdictions, though in some countries the results are more ambiguous or there is an increase in solvency. The latter seems to be the case especially for life undertakings writing substantial with profit business. In the case of with profit business, negative MCRs are occasionally observed. One supervisor commented that they considered this to be the main problem in the methodology for with profit undertakings.

5.2.3 Non-life

As for life undertakings, most non-life undertakings show a decrease in their solvency ratios based on the QIS3 calculations, though here too there are countries with more ambiguous results. However, compared with life participants, there seem to be more non-life undertakings with a calculated solvency ratio of less than 100%. One of the supervisors had some concerns over the non-life capital charges measured by the standard module, which might lead to severe capital adequacy issues.

5.2.4 Health

Only some country reports mentioned health insurance as a separate category. Of these, one supervisor stated that the solvency ratio generally increases, a second that it either remains stable or increases, and a third that the solvency ratio significantly decreases to a level of less than 100% in most instances. The latter supervisor pointed to the apparent inability of the health module to deal with the risk mitigating particularities of its health market.

5.2.5 Composites

Some of the national supervisors discussed the financial impact of the QIS3 calculations on composite insurers active within their jurisdictions. One describes the impact as modest, but notes that the impact of future profit sharing significantly affects the outcome. Another three find that the solvency ratio generally decreases.

5.2.6 Reinsurers

Very few country reports discussed the financial impact on participating reinsurers. Of these, one states that the solvency ratios significantly decrease to

what it feels is a more realistic outcome. Another mentions that the impact on reinsurance is comparable to the impact on non-life insurers.

5.2.7 Specific types of undertaking significantly affected

Supervisors were asked to identify types of undertaking that would be required to raise new capital to meet the calculated MCR or SCR. Some supervisors thought that smaller insurers might be more likely to be required to raise new capital; especially smaller monoline non-life undertakings were mentioned. One supervisor felt that all non-life undertakings active in its jurisdiction might face a requirement to raise new capital. Another two identified some of their participating composites as needing to raise new capital. One supervisor noted that a substantial number of the health insurance undertakings active within its jurisdiction might be required to raise new capital. Lastly, one national supervisor identified annuity providers and firms writing unit-linked business.

Supervisors were asked to identify types of undertaking showing an increase in the excess of available capital over the SCR of over 50%. Six supervisors said that this was the case for a substantial number of life undertakings, three for non-life undertakings and one for health undertakings. In one country about half of the life companies used all bonus provisions as risk mitigation the other half using none – causing high volatility in the QIS3 results.

Supervisors were also asked to identify types of undertaking showing a decrease in the excess of available capital over the SCR of over 50%. Five supervisors said that this was the case for a substantial number of life undertakings, sixteen for non-life undertakings and one for health undertakings. Further, one supervisor identified small and medium-sized composites as being affected, another made out certain mutuals with non-life activities severely affected, a third identified reinsurance undertakings and a fourth observed workers compensation undertakings as being affected. One of these supervisors stressed the fact that since the tested methodology is more risk-based than the Solvency I system, such decreases are to be expected.

5.3 Impact by category of undertaking

Several supervisors felt that the sample in their national jurisdiction was of insufficient size to be able to relate the impact of the SCR and/or MCR to any specific characteristics of the undertaking. Others were able to relate the impact to the type of undertaking. We will look at four possible categories: size (small, medium or large), organisational structure (independent or group), legal structure (mutual or proprietary) and specialisation (specialising in particular types of business, composites).

5.3.1 Impact by size

A number of supervisors stated that all or nearly all of their participants fell in one size category and therefore could not provide an analysis of the impact of the size. Some supervisors did either not see any dependence of the QIS3 financial position of the participants on their size or were able to explain it as an effect of other characteristics of the participants. Others did see a larger impact on smaller undertakings, though in at least one case the supervisor was unable to ascertain whether the impact followed from the size of the undertaking or not. Another supervisor noted that smaller and larger undertakings felt a greater impact from the SCR and MCR compared with medium-sized undertakings, but it was unable to explain this. One supervisor identified a greater volatility in the financial impact for smaller undertakings.

5.3.2 Impact by organisational structure

One supervisor states that in its sample the participating undertakings that are part of a group see a smaller rise in required capital compared with solo undertakings. Another supervisor could not draw any specific conclusions, but did state that its independent undertakings are usually more highly capitalised. Finally, two supervisors indicated that they did not see any significant differences between independent undertakings and those that are part of a group.

5.3.3 Impact by legal structure

One supervisor noted that participating mutual friendly societies had much lower solvency levels in QIS3 than under Solvency I, due to differences in the methodology for assessing provisions for future bonuses, though according to this supervisor none of these societies appeared to need more capital in current market conditions. Another supervisor drew attention to non-life mutuals as well pointing out that under QIS3 severe fall was detected in their financial position and this might be an insolvable issue because of the limited possibilities these firms have in raising own funds. Two other supervisors had similar findings, but noted that most of the participating mutual undertakings were small monoline non-life undertakings, so the outcome was suspected to be driven by the other characteristics of these mutuals rather than by their mutual structure. Two supervisors could not draw any specific conclusions, but did state that mutual undertakings are usually more highly capitalised.

5.3.4 Impact by specialisation

Undertakings specialising in one line of business have less potential for diversification. However, for some specialised undertakings, the impact may be greater than expected.

One supervisor noted that for participants writing unit-linked business, the MCR was higher than the SCR. Another supervisor notes that the specificities of its burial insurance undertakings had to use the 'miscellaneous' line of business, the parameters of which are not suitable for this type of business, leading to an unduly high cost of capital (CoC henceforth) risk margin. One supervisor notes that life undertakings writing linked business generally see an improvement in their financial position. According to the supervisor in one country, health insurers operating in its jurisdiction are unable to benefit fully from the mandatory national risk mitigation system offered by their health insurance system (and guaranteed by the state). This then leads to an overestimation of the insurance risks faced by this type of insurer and in some cases might require them to raise additional capital.

Two supervisors note that undertakings active in credit and suretyship receive capital charges that are much lower than considered to be appropriate. One of these supervisors feels that treating the credit risks inherent in credit insurance as underwriting risks could potentially lead to regulatory arbitrage between credit insurers and banks. One supervisor identified the following types of firm as showing a significant impact of the QIS3 results: annuity providers, firms writing unit-linked business, motor insurance (specialist) firms, niche operators and friendly societies. In one country the capital charge was particularly hard on niche companies specialising in workers compensation.

5.4 Summary

The tables below summarise the financial impact of the QIS3 specifications on the participating firms, presenting the percentages of firms which would have to raise additional capital to meet their minimum or solvency capital requirement.

Meeting the MCR is no problem for the vast majority of insurance undertakings. Only 2% of firms would have to raise additional capital to meet the MCR alternative 1, some more (3%) miss the hurdle set under the alternative 2 approach – the percentage among non-life firms was observed to be slightly higher. Also small undertakings had a somewhat higher chance than large firms not to meet the MCR.

Table 17: Percentage of firms with additional capital needs to meet MCR1

	Life	Non-life	Composite	Total
Large	5.1	0.0	0.0	1.9
Medium	0.9	3.2	0.0	1.9
Small	1.0	3.9	0.0	2.6
Total	1.9	3.1	0.0	2.2

Table 18: Percentage of firms with additional capital needs to meet MCR2

	Life	Non-life	Composite	Total
Large	5.1	0.0	0.0	2.0
Medium	1.8	3.8	3.2	3.1
Small	3.1	4.0	0.0	3.3
Total	3.0	3.4	1.6	3.0

16% of firms experienced a negative SCR surplus under QIS3. Again, non-life firms (20%) are more prone to have additional capital needs than life firms (13%). Large firms (18%) showed on average a higher probability to be in need of additional capital, composite firms being an exception.

Table 19: Percentage of firms with additional capital needs to meet SCR

	Life	Non-life	Composite	Total
Large	18.3	23.7	7.3	17.5
Medium	12.4	20.0	7.1	15.3
Small	10.9	18.0	13.2	15.4
Total	13.1	19.5	8.7	15.7

One third of participants saw their surplus decrease by more than 50%; the opposite was true for 30% of the firms. The remaining third reported an available surplus which did not deviate more than 50% from their Solvency I surplus. Especially in the life business, significantly higher surpluses were observed in nearly every other undertaking: 46% reported a surplus which is more than 50% higher than under Solvency I while it decreased by the same amount only in 27% of the participating companies.

Table 20: Percentage of firms whose available surplus decreased by more than 50%

	Life	Non-life	Composite	Total
Large	30.0	44.1	24.4	33.8
Medium	25.0	37.9	26.8	31.9
Small	28.3	40.2	21.6	34.9
Total	27.3	39.7	24.8	33.4

Table 21: Percentage of firms whose available surplus increased by more than 50%

	Life	Non-life	Composite	Total
Large	45.0	18.6	24.4	30.0
Medium	53.6	22.6	42.3	35.7
Small	37.4	18.3	29.7	24.8
Total	45.8	20.1	34.2	30.3

6 Assessment of provisions

6.1 Size of provisions relative to Solvency I

For life insurance firms, the average ratio in each country of the size of QIS3 provisions relative to Solvency I provisions generally ranged between 90 and 102%. Lower ratios were though observed for the life-general class which often comprised mainly of protection policies.

The average ratio of the risk margins to best estimate provisions for life insurance firms varied considerably between countries, and ranged between 1% and 13%. For life-general business and life-reinsurance business, the variation in risk margins between firms was much wider.

For non-life insurance firms, the average ratio in each country of the size of QIS3 provisions relative to Solvency I provisions generally ranged between 70 and 100%. There was considerable variation in this ratio between individual lines of business.

The average ratio of the risk margins to best estimate provisions for non-life insurance firms varied considerably between countries, and ranged between 3% and 15%. As expected, the size of the risk margin was greater for long-tail business than for short-tail business.

6.2 Best estimate provisions

In almost all countries, the methods applied by firms for calculating the best estimate of the provisions were essentially the same as for QIS2. However, one country said that deterministic approaches for non-life business were now more frequently seen in QIS3 than in QIS2, since the starting point was the best estimate, and there was no longer a requirement to assess percentiles for the provisions. Another country reported that their companies were more prepared for QIS3 and used more entity specific risk factors and less rough proxies for the SCR calculation. They added that the market also seems to apply for QIS3 purposes more comprehensive and market consistent assumptions than were applied during QIS2.

Harmonisation with IFRS was seen as a desirable objective by a number of firms for both life and non-life business.

6.3 Segmentation

Most firms applied the segmentation proposed by CEIOPS in the QIS3 specification, and a number of firms subdivided these segments into more granular risk groups. However, difficulties in applying the CEIOPS segmentation were noted in a number of countries for non-life firms that adopted a rather different internal classification; and in some countries, difficulties were also experienced by life firms.

Some firms were concerned about the lack of granularity of the classification of non-proportional reinsurance business. Some firms had difficulty with the classification of facultative reinsurance business, and with the classification of some health risk benefits, particularly when these were attached as riders to other contracts.

6.4 Hedgeable and non-hedgeable risks

There was very little qualitative information provided about which liabilities were regarded by firms as hedgeable or otherwise, (and this information was not needed in order to calculate the best estimate provisions in accordance with the QIS3 specification). One firm commented though that it might be questioned whether any insurance business could be regarded as fully hedgeable in view of the lapse risk for life business and the uncertainty in the timing of payments for non-life business.

Only a few life firms completed the spreadsheet to show the proportion of the liability which they regarded as hedgeable. For linked business, most of these firms considered that 100% of the liabilities were hedgeable.

However, for with-profit business, there were significant differences observed between countries. In one country, almost all the firms completing this part of the spreadsheet considered that 100% of these liabilities were hedgeable, but in another country, almost all firms completing this part of the spreadsheet considered that 0% of these liabilities were hedgeable.

6.5 Assessment of best estimate provisions – Life business

For life business, most firms applied their own best estimates for the relevant parameters for mortality, disability, lapses, and expenses, and then discounted the expected cash flows at the rates of interest proposed in the specification.

An alternative approach for some life firms was to take the current balance sheet provisions less the embedded value (EV) of the portfolio, which for some firms included allowance for the value of options and guarantees.

Some firms applied model points for the calculation of best estimate provisions, rather than assessing provisions on a policy by policy basis.

In most countries, the assessment of provisions (other than for options and guarantees) was made on a deterministic approach.

In one country, it was commented that stochastic modelling was seen as being primarily justified where deterministic modelling would not capture the time value of some option granted to policyholders, or where there was some link between market conditions and demographic assumptions (e.g. interest rates and lapses), or to capture any dependence upon other variables due to policyholder actions in using that option (e.g. longevity and interest rates for a guaranteed annuity option).

6.5.1 Best estimate parameters – Life business

Mortality tables used were either tables based on industry experience (adjusted in some cases to take account of firms' own experience), or legal tables, or entity-specific tables based on firms' own experience. In disability, undertakings used standard market tables or their own experience-based tables.

Estimates of future longevity for annuities needed careful judgement, and some supervisors were apprehensive about some of the assumptions made by firms.

There appear to be a wide range of practices for the way that lapses are taken into account by undertakings. Most of the best estimate calculations include a percentage of lapses, either constant or depending on economic data, or on own experience and/or the profile of the policy owner. Where 'behaviour functions' are utilised, these are generally based on a differential between the rate of return of the policy and market interest rates. A difficulty is that these assumptions can usually not be supported by historical or market data.

Some entities however do not take lapses into account and consider lapse rates equal to zero in their calculations.

6.5.2 Options and guarantees

In some countries, a number of firms valued life policy options and guarantees directly through the use of a stochastic model, and some firms also took account in these models of links between economic variables, crediting rates/bonuses and lapses. These models generally then included simulations for market risks as produced by an economic scenario generator, but other variables were often considered deterministically (e.g. mortality and sometimes lapses).

In one country undertakings (and especially the small-sized ones) applied a model developed by the academic field that enabled them to reduce the complexity inherent in the estimate of the cost of options and guarantees of participating contracts.

Other countries did not say how their life firms had valued options and guarantees on life policies.

It is not clear what assumptions were made by firms about the take-up of options by life insurance policyholders.

A few firms and supervisors referred to the anticipation of management actions by some life firms (as envisaged by paragraphs I.1.84 – I.1.86 of the specification) when valuing options and guarantees.

6.5.3 Linked business

For linked business, most firms took the unit liability as the starting point for assessing the provisions, and considered that this was a hedgeable liability. Most firms then added the present value of their best estimate of the non-unit cash flows, which might include the non-invested element of future premiums; and where relevant also valued any options or guarantees on these policies. However, some firms assumed that the best estimate provision was equal to the unit liability and did not value separately the non-unit cash flows.

6.5.4 Future discretionary benefits

Firms were asked in QIS3 to include the value of all future bonuses for with-profit policies, that are legally or contractually required to be paid, or that might reasonably be expected to be paid, under current market conditions, within the calculation of their technical provisions. There was little specific information given by firms about how they assessed rates of future bonuses for this purpose. Some firms said they assumed a constant rate of bonuses based on current bonus levels, while others said that bonus rates had been included in their stochastic

model[13]. In some countries, the amounts of any 'surplus funds' that have not yet been made available for distribution to with-profit policyholders, and could be utilised to cover any future losses arising, were deducted from the provisions and were shown as part of the 'own funds' on the balance sheet.

In one country, a general lack of consistency was observed in life businesses with mixed interpretations and implementations of the value ascribed to future discretionary benefits. This led to a concern that insufficient guidance on this topic could hinder new solvency rules from creating a common playing-field among life insurers.

One national supervisor provided its own guidance for life firms, recommending an approach based on best estimate and current balance sheet data.

6.5.5 Future premiums

It sometimes appeared unclear to the undertakings whether future premiums should or not be taken into account in best estimate calculation. This question was raised for instance in relation to term insurance policies providing death benefits, where taking account of future premiums may lead to negative best estimates; and in relation to linked policies where the best estimate provision may be less than the current unit liability.

The question of taking account of new business has also been raised for 'quasi-periodic premium guarantees' (employee benefit plans for instance).

6.6 Assessment of best estimate provisions – Non-Life business

For non-life business, the assessment of claim provisions generally involved the application through expert judgement of some statistical or actuarial technique, principally the Chain ladder or Bornhuetter Ferguson methods, applied to either paid or incurred claims, and sometimes with adjustments for claims inflation. Some firms said that they then estimated the discounted provisions by applying their own estimates for average duration, or some average industry duration as suggested by the CEA.

[13] As explained further below, when assessing the capital requirements, i.e. the SCR and MCR, firms were then permitted to take account of the potential changes in the level of future bonuses that might be made following adverse future events, e.g. a change in market interest rates or a reduction in equity values

Some firms assessed the provisions for large claims separately, usually following a case-by case approach. Reserving for asbestos claims was also given special treatment by some firms. An addition for claims expenses was mentioned by a few firms.

Premium provisions were often calculated from the standard unearned premium reserve (UPR) calculation in the current balance sheet. It is not always clear whether this UPR was then adjusted by an estimated loss ratio, though a number of firms did refer to application of the liability adequacy test. In addition, a number of firms included, or were guided by their supervisor, to include an unexpired risk reserve (URR) from their current balance sheet for lines of business where the loss ratio was expected to be higher than 100%.

A number of firms queried the relevance of a liability adequacy test if the provisions were indeed assessed on a best estimate basis. Moreover, they considered that any such test should be based on an assessment of prospective experience, and not just through some mechanical application based on historical data.

For some small lines of business, some life and non-life firms did not recalculate their provisions for QIS3, and took the current provisions from their balance sheet.

Clearer guidance on the assessment of best estimate provisions was sought by a number of firms and supervisors, and in particular on premium provisions, and on the (non-proportional) reinsurance share of provisions.

6.7 Assessment of provisions – Health business

Some participants were not able to calculate best estimate provisions. Instead they used proxies based on the current accounting, which were provided by the national supervisor. This option was appreciated by the participants.

Only two out of 23 participants in one country applied simulation techniques to produce the best estimate[14]. All other health insurers in that country applied deterministic approaches for the following reasons:

- The deterministic approach is more practical than a simulation approach. Most insurers have IT systems at their disposal that can perform the necessary calculations.
- The results under the deterministic approach are more comparable than simulation results.

[14] These calculations were partly based on deterministic assumptions, though.

- The deterministic approach is more transparent than a simulation approach and its results are more likely to be comprehensible.

Many participants argued that the stochastic simulation techniques may not be suitable for the valuation of health insurance liabilities. Pursuant to the premium adjustment clause, the insurer has to raise the premiums in line with claims inflation. As inflation risk is efficiently minimised by this mechanism, even simplified deterministic approaches (cf. to paragraph I.1.100 of the QIS3 Technical Specifications) appear to be suitable.

In one country, the results of QIS1 and QIS2 demonstrated that a minimum comparability of the projected cash flows can only be ensured if harmonised assumptions (e.g. claims inflation, mortality etc.) are used. These assumptions were specified by the supervisor.

6.8 Practical issues

There was a general concern by many firms, and particularly smaller firms, that the calculations (i.e. specification, spreadsheets and instructions) were often difficult to understand and then to apply in practice. The number of revisions to the spreadsheets also caused problems for firms and supervisors. Firms frequently requested clear and consistent guidance, along with some worked examples, to help with completion of the spreadsheet.

For many companies, one of the major practical difficulties for the assessment of provisions was the quantity of required data, especially for non-life business, along with the need for some quite sophisticated models (e.g. to value policy-holder options on life insurance policies).

Another significant difficulty that was mentioned by firms was the difference between the QIS3 specification and the approach adopted for their accounts. This included in particular differences in the segmentation of the business, and the need to unbundle some life contracts.

Several companies pointed to the fact that the specifications are imprecise, which means interpretation is necessary to complete the calculations. This leads to the possibility of each company making different interpretations of the specifications. Also it is rather difficult to translate the principles laid out to local national valuation principles and ways of doing business. Guidance from the national authorities taking national factors into account would be valuable, although this would demand a non-negligible effort from the authorities.

Difficulties were also encountered by some firms with

- Determining best estimate parameters for life business

- Assessment of the reinsurance share of provisions
- Assessment of premium provisions for non-life business
- Valuation of life insurance policy benefits arising from future profit sharing
- Discounting of cash flows with an interest rate varying by term
- Finding suitable risk-free interest rates for some non-EEA countries
- Valuation of a portfolio policy-by-policy (or treaty by treaty for reinsurers)
- Estimation and allocation between lines of business of future expenses
- Allowance to be made for deferred taxation

Many respondents said they would have liked more detailed instructions and clearer guidance, in particular for the assessment of technical provisions.

6.9 Smaller firms

In general, smaller undertakings were confronted with the same problems as the other participants, but the severity of the problems (e.g. availability of data and resources) appears to have been higher.

In particular, smaller firms in a number of countries experienced practical difficulties with the assessment of best estimate provisions, and with the proposed segmentation for non-life business, partly because of the small amount of claims data for some lines of business. Any requirement for a stochastic value of provisions (for options and guarantees) was seen as particularly burdensome.

One supervisor expressed a particular concern that the resource implications will be disproportionate for smaller companies, and for companies in smaller territories, where expert assistance may be scarce. In their view, much more consideration needs to be given to either simplifying the methodology generally, or enabling a simplified methodology to be adopted by smaller companies.

Some firms commented that the ability to share data would be crucial for smaller undertakings. The data to be collected for this purpose could be harmonised to some extent. However, one supervisor said that they do not believe that it is the function of a supervisor to require sharing of data, especially where that data may be (effectively) proprietary information. However, if market participants choose to share data voluntarily (perhaps through professional bodies), it is only reasonable that undertakings should have the ability to make appropriate use of such data. Another supervisor referred to possible legal problems over the sharing of data.

It was suggested that for non material parts of business, proxies could be used in respect of the calculation of the technical provisions. It was suggested by some

firms and supervisors that more guidance like market-wide parameters (e.g. run-off triangles or assumptions on lapses) could be provided which could make the calculations more feasible and more reliable and consistent throughout the market.

Two supervisors provided some run-off patterns, based on market statistics that they collected, to assist firms with the assessment of best estimate provisions and the corresponding risk margins.

A number of firms commented that the 'simplified approach' proposed by CEIOPS in Annex B of the specification, was not in their view a simplified approach, while some other firms welcomed this approach.

One supervisor commented that they would not in general support the concept of simplified approaches. There were concerns from two other supervisors that a European benchmark per se cannot be appropriate for all markets.

Two supervisors believe that there is a clear minimum expectation of expertise and capability to assess insurance liabilities and related risks that must be expected of every undertaking of any size. One of these supervisors added that, allowing such alternative approaches may present undertakings with an option to choose whichever approach results in a lower capital requirement, which would be undesirable in terms of what the new solvency requirements are trying to achieve.

In one country, some firms did not have the systems capability to discount cash flows other than at a single rate of interest (i.e. assuming a flat yield curve).

Some firms had difficulty in applying the liability adequacy test by line of business, and could only apply this to the portfolio as a whole.

In one country, the assumption of entity specific expenses with no allowance for future economies of scale was perceived as being unfair to new smaller firms, which considered that they should be allowed to anticipate the effect on marginal costs of growth in their portfolios.

6.10 Risk Margins

The risk margin in the provisions was generally assessed through the use of the Helper Tab that had been provided by CEIOPS. Problems were encountered by some firms with the suggested proxies for this calculation, and it was suggested by some firms that there should be discretion for firms to choose the appropriate proxies subject to usual supervisory review.

In one country, a number of life firms adopted their own spreadsheet calculation for individual product types, combining the different underwriting risks relating to

each product as suggested in paragraphs I.1.57 - 58 of the specification. They considered that this approach was more practicable, and also this approach would then allow for the diversification between risks for each product type (that was understood by them to be envisaged by the specification).

In another country, the supervisor provided guidance on three (life) or four (non-life) alternative approaches, based on different levels of complexity, for projecting the SCR, in order to calculate the risk margin. Most participants in this country chose to apply the most sophisticated of these available approaches.

A number of small and middle sized insurers said that the CEIOPS proposed methodology for the risk margins is quite complicated and data demanding and some said they would therefore prefer the CEA methodology suggested for QIS2.

It was suggested by some firms that a proxy would be more cost effective than a complex sophisticated method which leads all in all to a minor addition over the liabilities.

In non-life business, some small companies used the proxies suggested in the Technical Specifications (namely 5%, 10% or 20% of the best estimate) to calculate their risk margin.

Some firms expressed doubt regarding 6% being used as the cost of capital factor, and said that this appears quite high and that no justification had been provided for this value. Furthermore since the cost of capital rate is a market cost of capital it should be specified that the rate is variable. One suggestion could be that CEIOPS publishes the CoC-rate once a year.

A large number of firms were of the view that it is not appropriate to hold any risk margin in respect of market risk, as this margin is already included in the market-consistent assumptions. Therefore, if market risk were included in the cost-of-capital calculation, then this would double count the cost of capital. Similar views were expressed by some firms about the inclusion of counterparty credit default risk over the duration of the projected run-off.

However, some other firms said that market risk should be taken into account, though a number of these thought this should be for part of the first 12 months only, while others thought that market risk should be considered beyond year 2.

A number of non-life firms said that it was inappropriate to include premium risk in the calculation of the risk margin on provisions for existing business. Conversely, some firms thought that premium risk should be projected beyond 1 year for policies with an exposure period of longer than 1 year. One firm suggested that premium risk should only be included in relation to unearned premium provisions and should be excluded from claim provisions.

There was some confusion by firms over whether linked liabilities should be regarded as hedgeable or not and hence how the risk margins should be

determined for linked business. There were also doubts of how existing discounting of reserves should be treated when calculating the cost of capital.

A number of firms said that they should be allowed to use their internal models to calculate the risk margin when they had a validated internal model.

Most firms said that they did not consider that any alternative to the cost-of-capital margin was needed for long-tail non-life business. However, some firms commented that they are exploring alternative methods of calculating a margin for this business to take account of how risk (i.e. underwriting risk, reinsurance counterparty risk and operational risk) varies as the portfolio is run off, or would like to explore this further given more time. A few firms either calculated, or expressed a preference for, a percentile approach (e.g. 75^{th}) to be applied for long-tail non-life business.

In four countries, some firms provided figures for the risk margins allowing for diversification between lines of business, and these were generally between 5 - 35% lower than the standard risk margin. In some countries, a number of firms requested that diversification benefits should be allowed between lines of business, as this would in their view reflect the cost of transferring a portfolio of business to another insurer.

In the subsequent tables the best estimate plus risk margin (CoC) provisions are contrasted with the current provisions net of reinsurance (Solvency I). The subsequent graphs below give the results for life, non-life and composite undertakings, respectively. For a better comprehensibility the bars are capped in some cases so that extreme outliers are excluded from the presentation.

Obviously, the results vary much from company to company. Therefore, in many countries the range between minimum and maximum percentages can be very large. However, we also see that weighted averages and medians are far less variable and are mostly in the range between 80 and 100 percent, implying that the change with respect to Solvency I is rather modest.

Figure 12: Best estimate + risk margin provisions to current provisions, net of reinsurance (life)

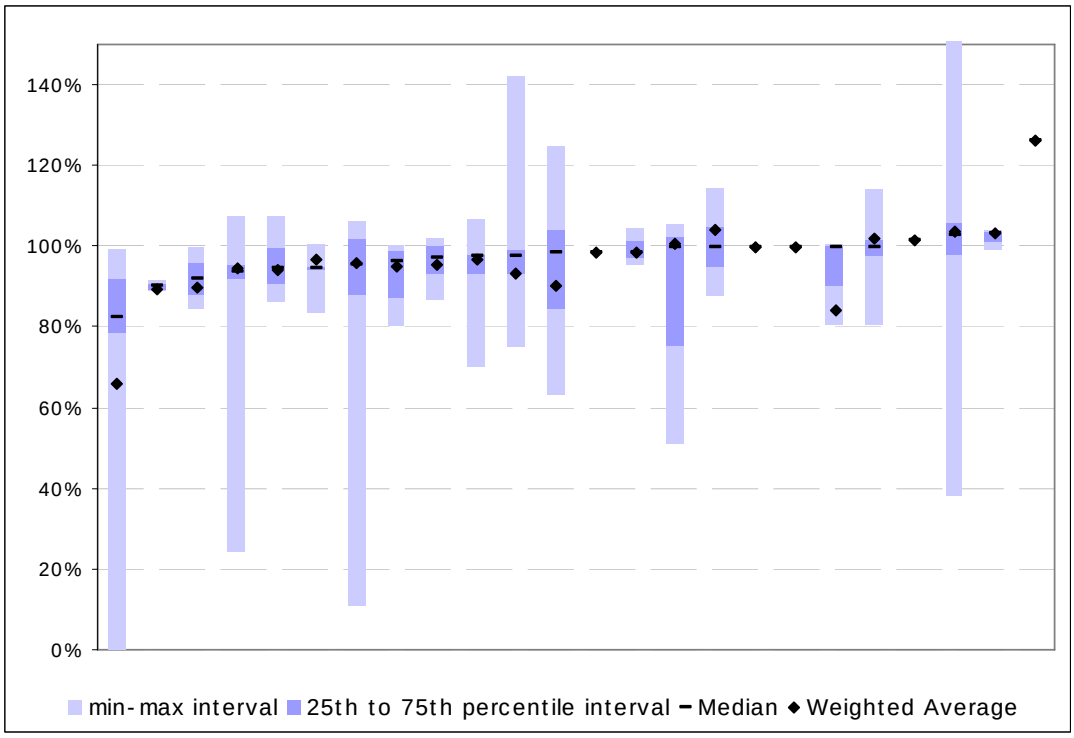


Figure 13: Best estimate + risk margin provisions to current provisions, net of reinsurance (non-life)

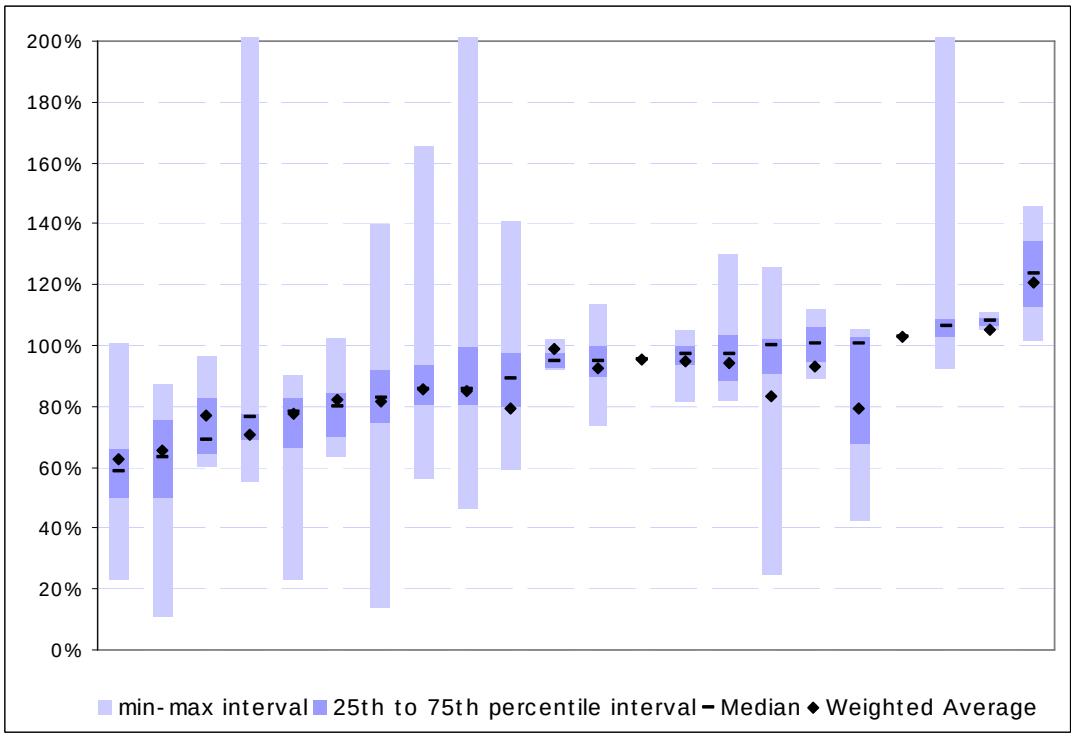
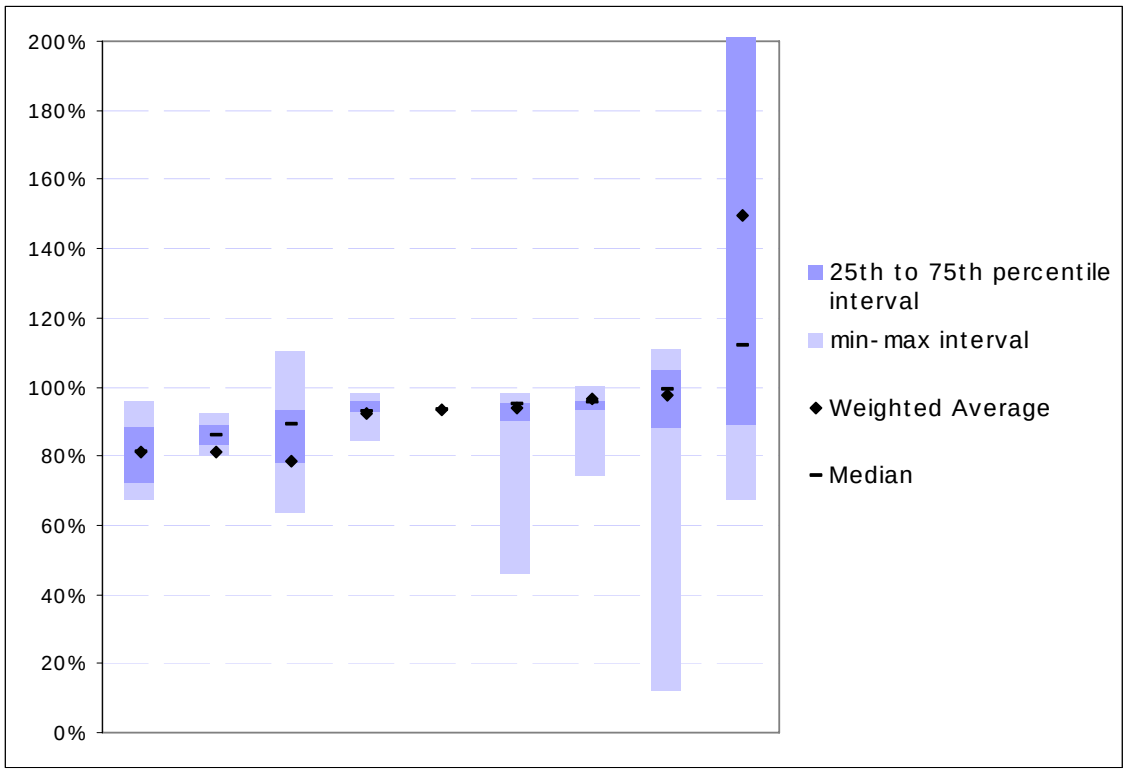


Figure 14: Best estimate + risk margin provisions to current provisions, net of reinsurance (composite)



6.11 Value of assets and other liabilities

Investments were generally all valued in accordance with IFRS at market value, but the following exceptions for illiquid assets were noted.

- Property was generally valued either by applying the latest valuation made by an independent professional surveyor, or by local accounting rules, or by some discounted cash flow approach.
- The value of private equity investments was taken at book value, or at 'equity value', or was assessed by reference to recent trades, or in accordance with external guidelines, e.g. by taking a multiple of maintainable earnings, less the nominal value of higher ranking debt, and less a 10 - 30% marketability discount factor.
- Strategic investments and other illiquid investments were often valued at book value.
- Other techniques mentioned for illiquid investments were the use of recent arm's length transactions, reference to the market value of other assets that are substantially the same, discounted cash flow analysis, a mark to

model approach for mortgages, the value quoted for OTC options by the counterparty, and option pricing models.

- Intangible assets, and some other fixed assets (e.g. furniture, IT equipment) were given nil value in some countries.
- Participations were often valued by firms as in the local accounts or in line with IFRS, or for some firms by a discounted cash flow approach; but in some countries a number of firms valued their subsidiaries on a look-through approach similar to that envisaged by the Insurance Groups Directive, i.e. as the net value of assets less liabilities (assessed in accordance with QIS3) less the SCR in respect of that subsidiary.

A question was raised on how to value intra-group loans e.g. a loan to a parent company (whose principal asset might be its shares in the insurer making the loan).

Assets other than those described above (and other than the reinsurance share of technical provisions), and liabilities (other than technical provisions), were generally valued in accordance with local accounting rules, or in line with the relevant IFRS.

Some firms considered that intangible assets should be valued in accordance with IFRS, and that a capital charge should then only be applied to these assets if they were deemed to be covering technical provisions or the SCR.

It was requested that more detailed guidance should be provided regarding the valuation of assets where a market value is either not readily available, or not reliable.

The differences in the value of assets between QIS3 and Solvency I then varied considerably between countries, depending on the accounting approach that is currently adopted in each country. For those countries currently using approaches other than market value, e.g. book values, some significant increases in value were observed in the balance sheet; while for those countries already applying market values to most of their assets for solvency purposes, the observed differences in the value of assets between QIS3 and Solvency I were much smaller.

6.12 Securitisation technique

There were few comments on this issue, except to record that most firms did not apply these securitisation techniques, but IFRS principles were mentioned as having been applied by some firms.

In two countries, the technique described in QIS3 was regarded as over-elaborate for a standard approach. In addition, there were concerns that the technique takes no account of leverage issues (or market beta), and hence could result in firms being able to establish lower capital requirements (than under the standard SCR) through the application of such techniques to different assets (e.g. as might occur through the creation of virtual CDOs). Accordingly, it was suggested that this securitisation technique should only be applied through a (partial) internal model, and therefore would then be subject to supervisory approval.

Similarly, in another country, it was commented that CDOs and other instruments with an expected high rate of return should have a high capital requirement corresponding to their underlying level of risk. Another firm commented that the capital loans, and loans for real estate companies, are assumed to behave like unrated bonds.

6.13 Risk mitigation

Some countries referred to the detailed responses that they had provided to the Financial Requirements expert group.

In some countries, firms did not take account, or only occasionally took account of risk mitigation from financial instruments.

In other countries, many firms said that risk management and mitigation are fundamental aspects of insurance operations so every effort should be made in order to reflect risk mitigation techniques in the main reference points of the Solvency II framework.

Overall, many firms were supportive of the key principles, using language such as ‘sensible’ and ‘appropriate’, and that they are fundamental to the operation of insurance firms, but some firms were unsure as to what exactly was meant by risk mitigation instruments (e.g. do these include reinsurance arrangements?). In one country, all the non-life firms said that expected profits on new business should be regarded as an effective risk mitigant.

One firm commented that they understood the scope to include currency matching instruments. They allowed full credit for such instruments in the SCR, even though these were mainly liquid short-term derivatives that were rolled forward during the year.

On a general point, it was observed that if the credit risk associated with risk mitigation instruments might be captured in the MCR and standard formula SCR, then the protection provided by such instruments should also be taken into account.

There were a number of detailed points raised by firms about how these principles might apply to their own situation. As a more general point, some firms said that 'given that the value of risk mitigation techniques depends on the underlying asset, it is not possible to have a stable value over time, (but at least the hedged position can have a more or less stable value)'.

One (non-life) firm said that it was difficult to see how these principles might be applied in the context of a factor based approach to the SCR.

A number of firms were concerned that these principles were too complex and might not be well suited to every situation if set too prescriptively, and suggested therefore that these principles, and in particular those related to liquidity risk, should be a Pillar II issue only.

Two firms were concerned that a standard SCR might impose an unreasonable capital charge on instruments held as risk mitigants.

6.14 Liquidity

As noted above, a number of firms considered that principles related to liquidity risk should be a Pillar II issue only.

Several firms commented that their appetite for liquidity risk is very low, and also that liquidity risk in the insurance sector is quite different from banking.

One firm said that, in setting liquidity requirements, CEIOPS should note that many insurers will hold mitigating instruments until maturity, that better matching hedges are usually more tailored and hence less liquid, and that the size of the positions makes rapid liquidation of entire positions very difficult. Another firm suggested that requirements in respect of long term hedging instruments should allow for an orderly close out over a reasonable period, and that valuation should reflect realisation in normal market sizes rather than a complete sale of the asset.

Two firms commented that there should be a defined floor limit for the liquidity requirements. One of these firms suggested that this floor should be based on possible cash flows over the next five years.

6.15 General comments by supervisors on risk mitigation principles

Some countries said that they considered the principles to be broadly appropriate, and one country regarded these as essential to ensure harmonisation, and

comparability with other financial sectors. It was suggested that economic substance was at least as important as legal form.

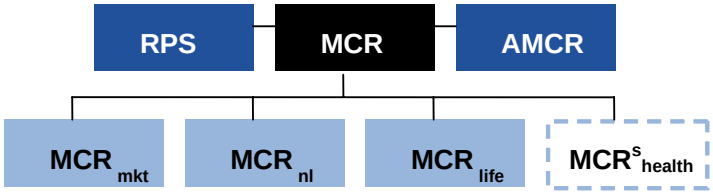
One country said that it is essential to take new risks acquired as a by-product of financial risk mitigating techniques into account for standard SCR purposes, and added the following comments:

- On the principle of legal certainty, effectiveness and enforceability (principle 2), they consider proper and complete documentation to be a major issue when allowing a risk mitigating technique to reduce the SCR.
- On the principle of liquidity, ascertainability and stability of value (principle 3), they consider that guidelines about liquidity requirements should be set by supervisors.
- On the principle of credit quality of the provider of the risk mitigation instrument (principle 4), they think that, even if the insurer applies an approved internal model and quantifies the capital charge associated to a low-rated provider, further restrictions should be given, even if the risk seems to be correctly quantified (threshold for protections rated less than BBB, …).

Another country expressed its view that the issue of scope could be very substantial. Most conventional risk mitigation instruments, used widely by insurers (e.g. reinsurance, cat bonds) do have clauses which reduce the potential effectiveness of the instrument – exclusions, warranties, conditions, reinstatement premiums etc. Where unilateral cancellation is restricted to specific circumstances or where the increase in the cost of protection still leaves a firm with a valuable protection, they believe that the protection provided by the instrument should be recognised, albeit potentially with an appropriate reduction in the credit permitted for the instrument.

7 Assessment of the MCR

QIS3 participants were asked to calculate the MCR as the aggregation of capital charges covering market risk and underwriting risk, then adjusted by deducting a reduction for profit sharing (RPS). The two modular MCR approaches tested in the QIS3 shared a common base for the life and non-life underwriting components, both based on factor-based techniques, with only a top level adjustment to capture the risk mitigating properties of the carried technical provisions, similar to the approach tested for the SCR in the second QIS.



For market risk, two alternatives were tested under QIS3:

- Alternative 1: a simple factor-based approach based on asset-side volume measures;
- Alternative 2: a more sophisticated factor-based approach, taking also into account liabilities and durations.
- As additional quantitative information, the CEA compact approach (MCR=33% SCR, either according to the standard formula or to the internal model) was calculated in the spreadsheet.

The Directive proposal gives a series of criteria to assess the MCR[15]. The two MCR alternatives tested in QIS3 should be assessed accordingly:

- Simple and auditable: The MCR should be performed in a clear and simple manner; as breaching the MCR leads to withdrawal of the licence, there must be legal certainty attached to the calculation.
- Safety net: The MCR is a safety net that provides for adequate capital to protect policyholders and beneficiaries against an unacceptable level of risk. This safety net function has the consequence that the MCR overrides the SCR when the latter is too low.
- Calibration: The calibration indicated (80% - 90% Value at Risk over a one-year time horizon) should ensure a proper interplay with the SCR in

[15] Article 126 Proposal for a Directive on the taking up and pursuit of the business of insurance and reinsurance, COM 2007/361

the majority of cases and also a certain risk-sensitivity. A 90% VaR over a 1-year time horizon, corresponds roughly to 40% - 50% of the SCR, or somewhat lower because some risks have been omitted from the MCR.

In the following, the two alternatives tested under QIS3 are being assessed according to the above criteria, based on the answers from participants.[16]

7.1 Qualitative comments on the appropriateness of the modular MCR

Several respondents noted that the modular approach in non-life was considered as suitable and practicable. In life, the reduction for profit-sharing leads to low or even negative MCR which made the approach unsuitable.

7.1.1 Simplicity and auditability

Respondents in several countries commented that the modular MCR calculation is unduly complex for a second intervention point; in particular, smaller firms reported difficulties in applying the 'alternative approach 2' for market risk. There was also some uncertainty on how to interpret the adjustment for profit sharing. For life undertakings the adjustment for future profit sharing is regarded as the most problematic feature in many countries and in need of improvement. One solution offered was to treat it as an element of available capital rather than as a reduction in the capital charge, though another stakeholder did not see this as a solution to the problem.

There were also some difficulties experienced with the classification of claims under workers compensation business, for which it was not clear whether these should be regarded as covered by the life or non-life modules.

Some participants also noted that the MCR uses different inputs than the SCR, which in their view complicates its calculation.

Some respondents noted the importance of the auditability of the MCR.

[16] While this report focuses on the quantitative results and qualitative feedback of the impact study, in a parallel note CEIOPS is to provide an assessment of the pros and cons of different approaches (including some that have not been tested in QIS3) according to these criteria.

7.1.2 Safety net function

In non-life, there were no comments on the safety net function. In life insurance, participants from several countries noted that the very low or even negative results observed in life business after the reduction for profit sharing would not provide for an adequate safety net.

7.1.3 Calibration ensuring a proper interplay with the SCR

Most of the qualitative comments by participants concentrated on the issue of the interplay and/or calibration.

A large number of participants commented that the modular MCR design would not move consistently with the SCR and hence would not provide a sensible ladder of intervention. Participants were concerned that there would be no adequate gap between the MCR and the SCR, which in their view would inhibit good risk management and capital planning.

There were many responses noting that the treatment of reduction for profit sharing was inconsistent with the SCR, leading to a wide range of outcomes, including some negative MCR results. Therefore participants questioned the suitability of the methodology of this component.

Respondents in several countries also identified the market risk component as a problem area. Many respondents noted that the first alternative did not reflect asset-liability matching, therefore they viewed it as insufficiently risk sensitive and inconsistent with the SCR. In some respondents' view, the second alternative was not sufficiently consistent with the SCR either. They noted that there might be instances in which the worst case for the MCR calculation is an interest rate decrease and simultaneously for the SCR calculation it is an increase. The calibration of both market risk alternatives and, in particular, the charge on bonds in the first alternative, were criticised by some participants for being too high.

The lack of recognition of hedging instruments was mentioned as a shortcoming by a number of participants. The calibration of the non-life underwriting risk module was criticised in one country as being too high.

The underwriting risk modules generally drew less negative critique.

The calibration of the life underwriting risk module was criticised in one country as being too high for unit-linked business.

In one country with a significant market for health (similar to life) the differences between the MCR health model and the MCR non-life health model were judged excessive. The contribution of the MCR health module being marginal, it was stressed that the so called rho-factor of 5 ranges in fact from 2.1 to 7.6 in the

reference market, and that a better approach than simply taking the mean should be chosen.

Undertakings in one country argued that the parameters for non-life underwriting risk should be reviewed, as for a number of non-life firms, the size of the MCR is too close to the SCR derived from the use of entity specific factors for premium risk, or from an internal model calculation for the SCR, or after allowing for group diversification benefits for SCR.

The following possible causes for a poor interplay between the MCR and the SCR can be identified:

- MCR or SCR were miscalculated,
- the MCR overestimates the risk,
- the SCR underestimates the risk.

Some participants and supervisors feel that at least one of the tested MCR alternatives is adequate. Other participants and supervisors noticed that the problem of interplay between modular MCR and SCR occurred mainly with life and composite insurers. The tested alternatives seem to be regarded as more adequate for non-life than for life undertakings.

7.2 Qualitative comments on the compact (percentage of the SCR) approach

Several participants and some supervisors feel that neither of the two modular MCR alternatives provides a sensible ladder for potential supervisory action. These participants and supervisors generally propose two alternative methodologies to the two modular approaches tested: a compact approach (setting the MCR equal to a fixed percentage of the SCR) and a margin over liabilities approach (setting the MCR equal to a percentage of the technical provisions).

Therefore, an alternative approach, also suggested by the CEA and calculating the MCR as one-third of the SCR was included in the testing.

Most of the participants who commented on this approach expressed support for the CEA proposal. In several countries, most respondents preferred this approach over the modular approach. In these respondents' view, the advantage of this approach is that it would provide a proper supervisory ladder.

However, several participants and supervisors referred to shortcomings of the alternative methodologies: they questioned the simplicity and auditability of the compact approach, or felt that the margin over liabilities approach would not be sufficiently risk sensitive.

In one country, smaller firms did not support this approach and preferred the modular approach in non-life.

7.3 Assessment of quantitative results

The behaviour of the ratio of the modular MCR to the SCR, and of the ratio of corresponding MCR and SCR risk modules, is shown in the graphs below. A module-by-module comparison will also help identify problem areas.

The minimum, 25th percentile, median, 75th percentile, maximum values of the MCR to SCR ratio for each country are plotted on the graphs, together with the weighted averages (weighted by the SCR results) – in some cases far outliers have not been included in the graph to improve readability, in those cases the bars are capped. Nevertheless the numbers of minima and maxima are included in these cases in order to give the reader an approximate impression of what the distribution looks like. The SCR referred to here is the SCR calculated by the standard formula (given that availability and comparability of internal model results is much more limited).

7.3.1 Total MCR

For non-life firms, the results for both MCR alternatives were broadly consistent with the calibration target and indicated an adequate interplay with the SCR. For MCR alternative 1, the MCR nowhere exceeded 70% of the SCR. Somewhat larger deviations and more outliers were observed under MCR alternative 2, including some cases where the MCR was higher than the SCR.

For life and composite firms, the ratio of the MCR to the SCR shows a wide range of possible outcomes and it is difficult to find a trend in the data. Both MCR alternatives showed poor interplay with the SCR in some countries, and wide differences between countries, and between individual insurers. In those countries where reductions for profit sharing were used, there were multiple instances of negative MCR results (i.e. before applying the Absolute Minimum Capital Requirement – if this built-in floor was applied, the ratios would remain positive[17]). In the case of life firms, the results under MCR alternative 2 were somewhat more stable than under alternative 1, but even so they did not show a proper interplay with the SCR in all countries.

[17] In its draft Solvency II Directive, the European Commission proposed that the AMCR would equal €1 million for non-life and reinsurance undertakings and €2 million for life undertakings.

It will further be analysed below which modules caused the poor interplay in the life case. It will be shown that the inconsistency between the treatment of reduction for profit sharing (RPS) in the MCR and its SCR counterpart (the KC reduction) was one key reason behind these results, as the graphs further below illustrate. Moreover, the fact that – unlike for non-life firms – the SCR standard formula for life insurers relied on scenario-based calculations in all dominant risk modules, difficult to match by simple factor-based proxies like those in the modular MCR; and the complexity of life insurer market risk profiles were also complicating factors on the life side.

Also included below are the graphs for composite firms, although it is difficult to draw conclusions from these data, which apparently show a mixture of the non-life and life results.

Figure 15: Ratio of MCR1 to SCR (non-life)

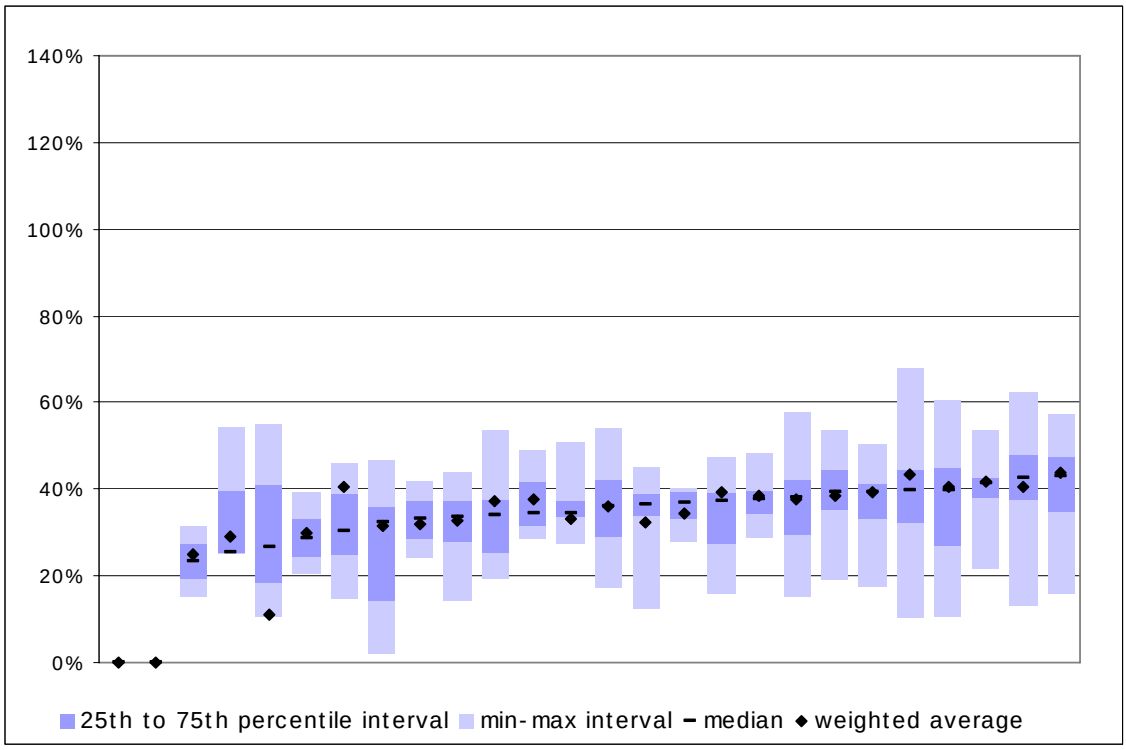


Figure 16: Ratio of MCR2 to SCR (non-life)

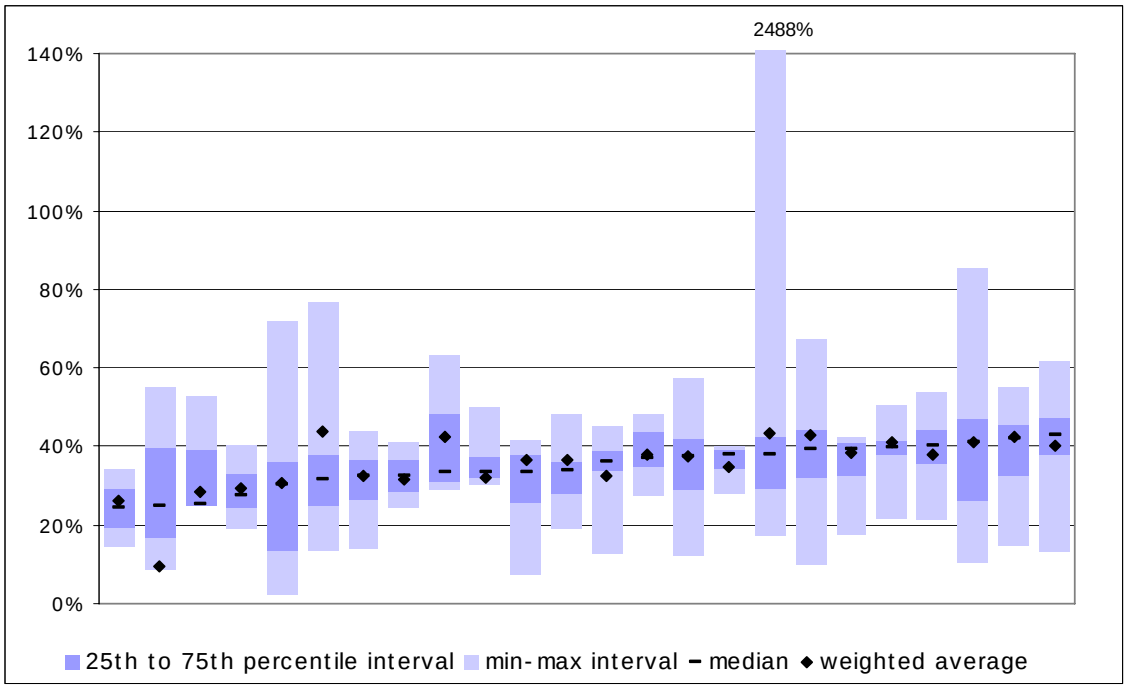


Figure 17: Ratio of MCR1 to SCR (life)

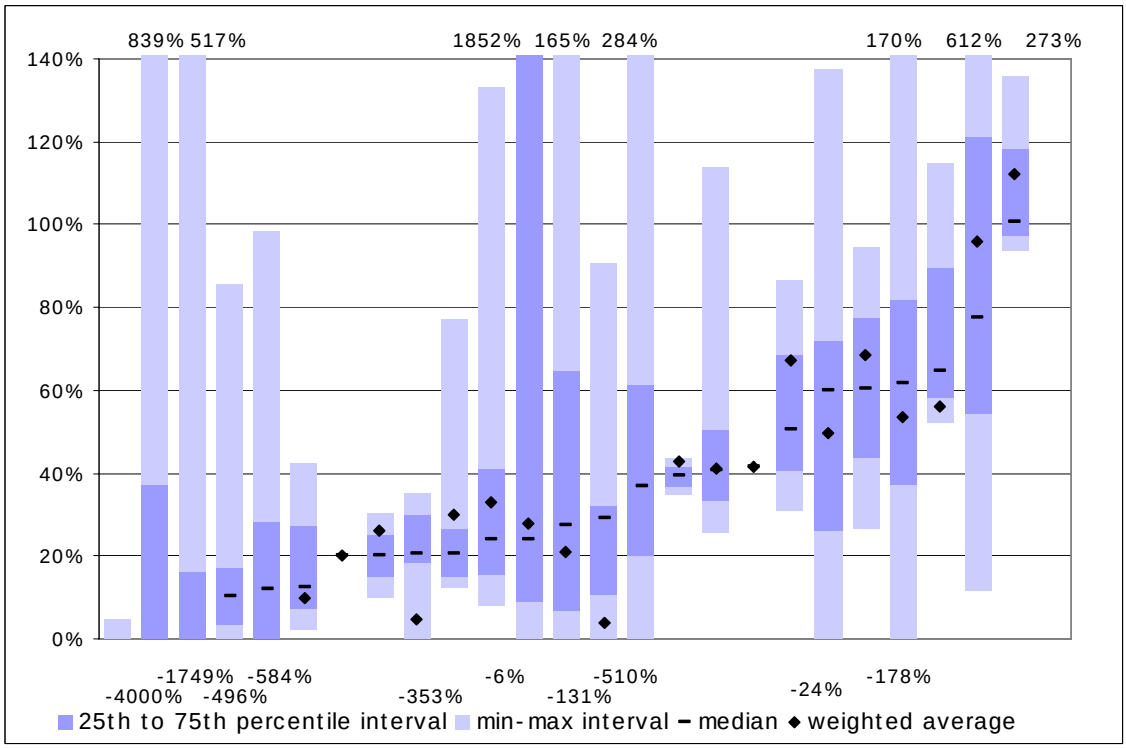


Figure 18: Ratio of MCR2 to SCR (life)

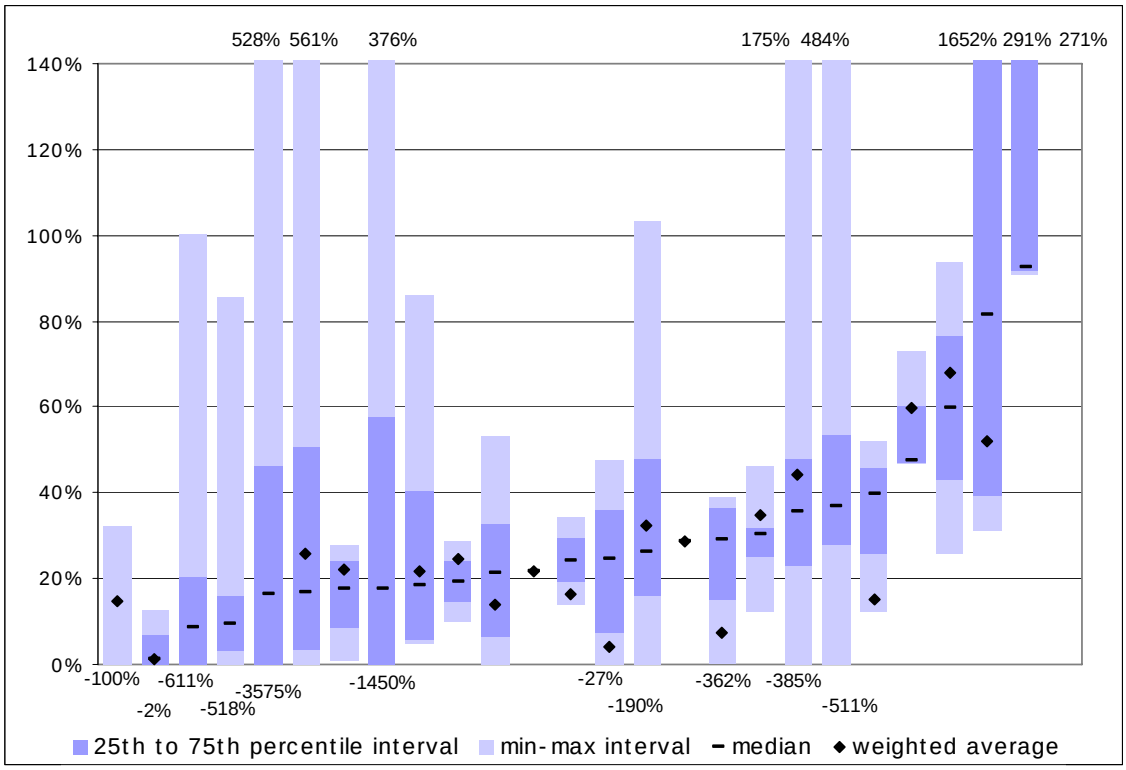


Figure 19: Ratio of MCR1 to SCR (composite)

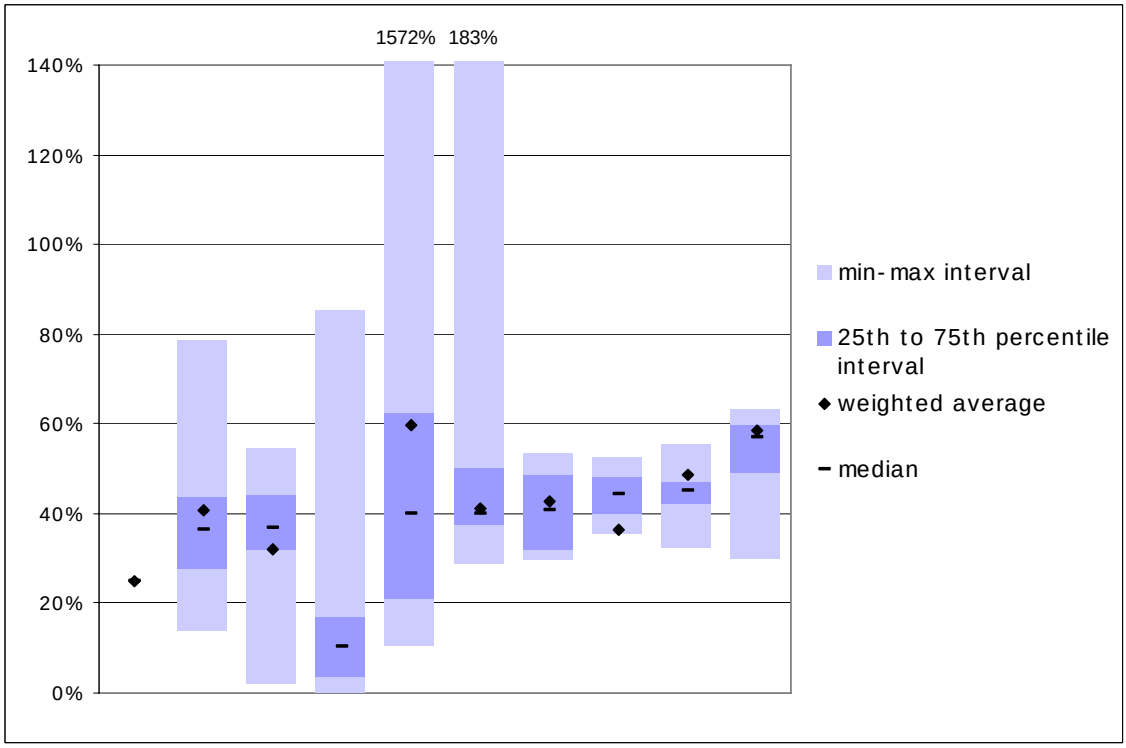
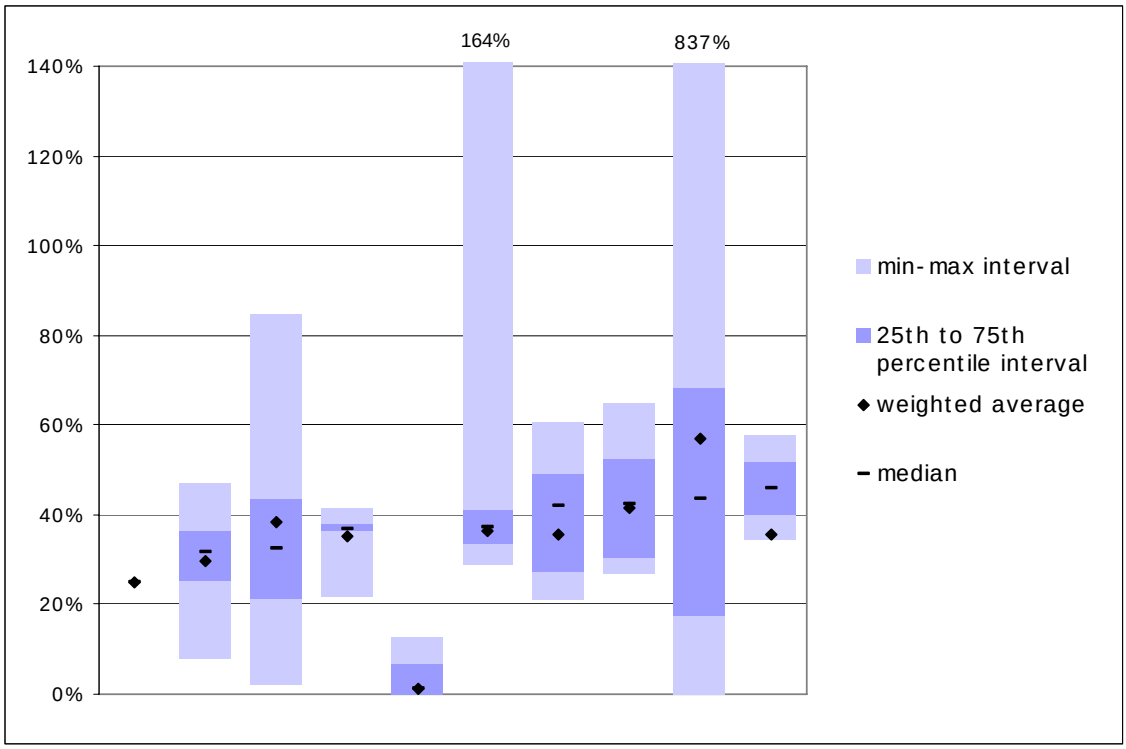


Figure 20: Ratio of MCR2 to SCR (composite)



7.3.2 MCR for non-life insurers per each module

For non-life underwriting risk, the interplay between the SCR and the MCR modules was adequate, and the calibration was mostly 'on target'. In particular, upward deviations were limited.

For market risk, for non-life insurers, the central 25th to 75th percentile interval was remarkably stable for both alternatives (except for those countries with a low number of participants). However some very high ratios were also observed. When compared with the life case, these results highlight a marked difference between the typical market risk exposures of life and non-life insurers.

Figure 21: Ratio of MCR_{nl} to SCR_{nl} (non-life)

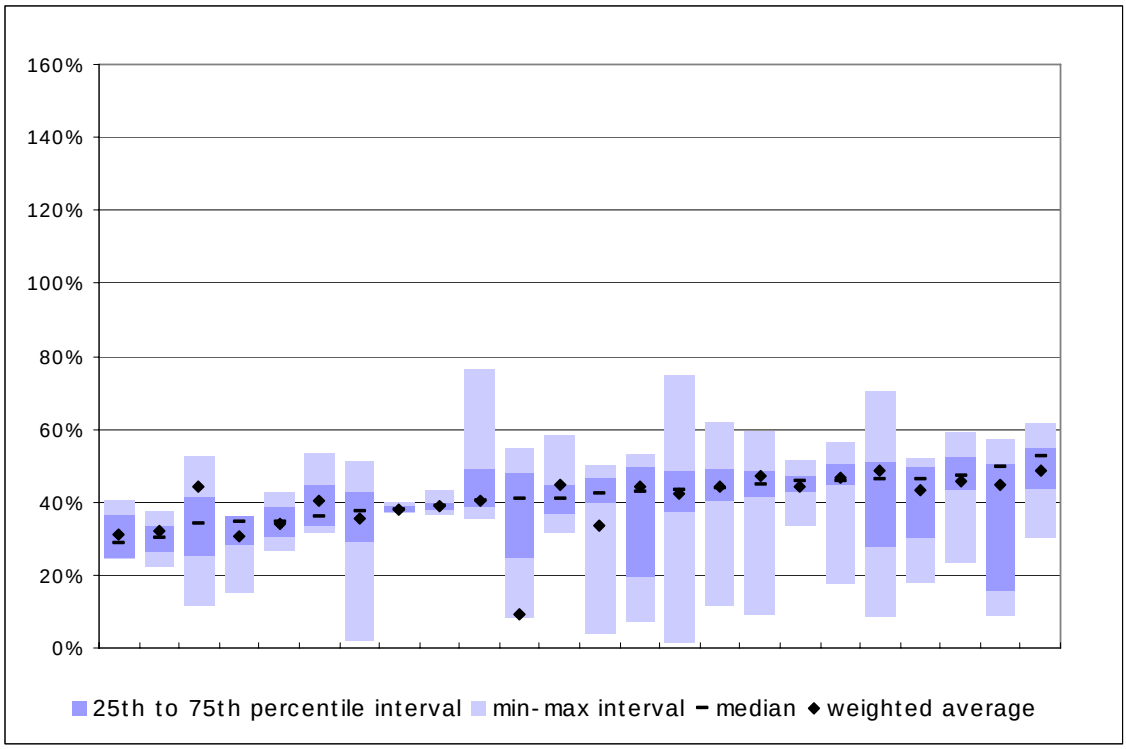


Figure 22: Ratio of $MCR1_{mkt}$ to SCR_{mkt} (non-life)

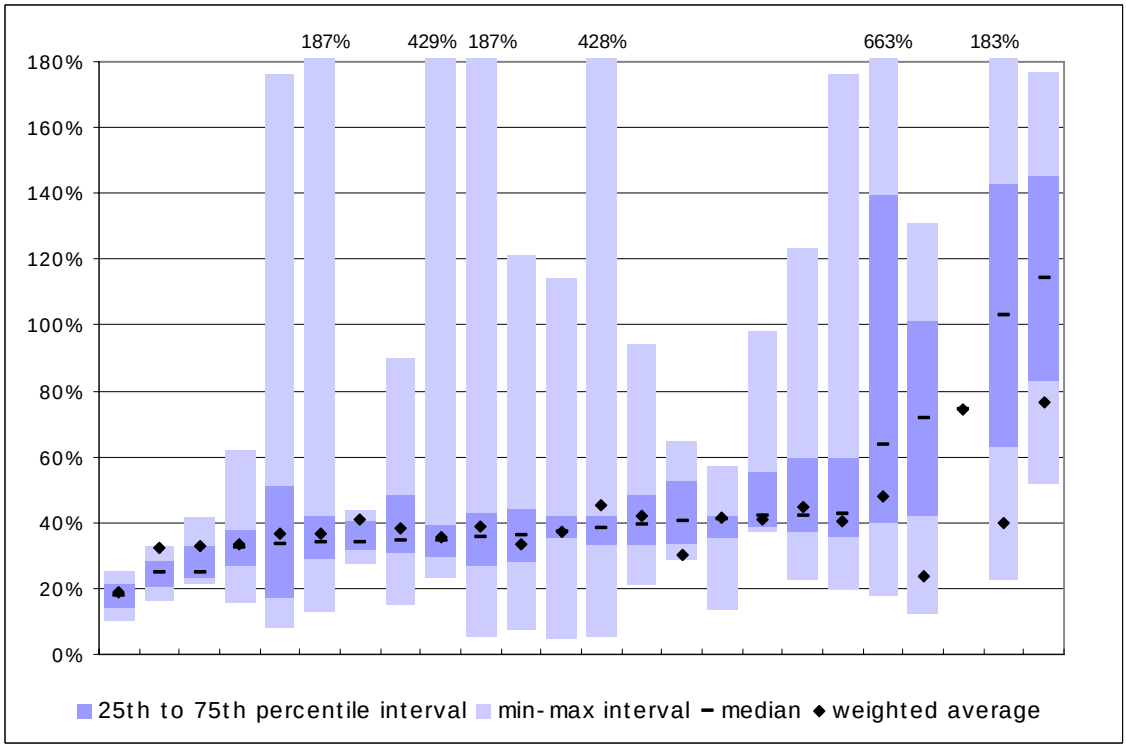
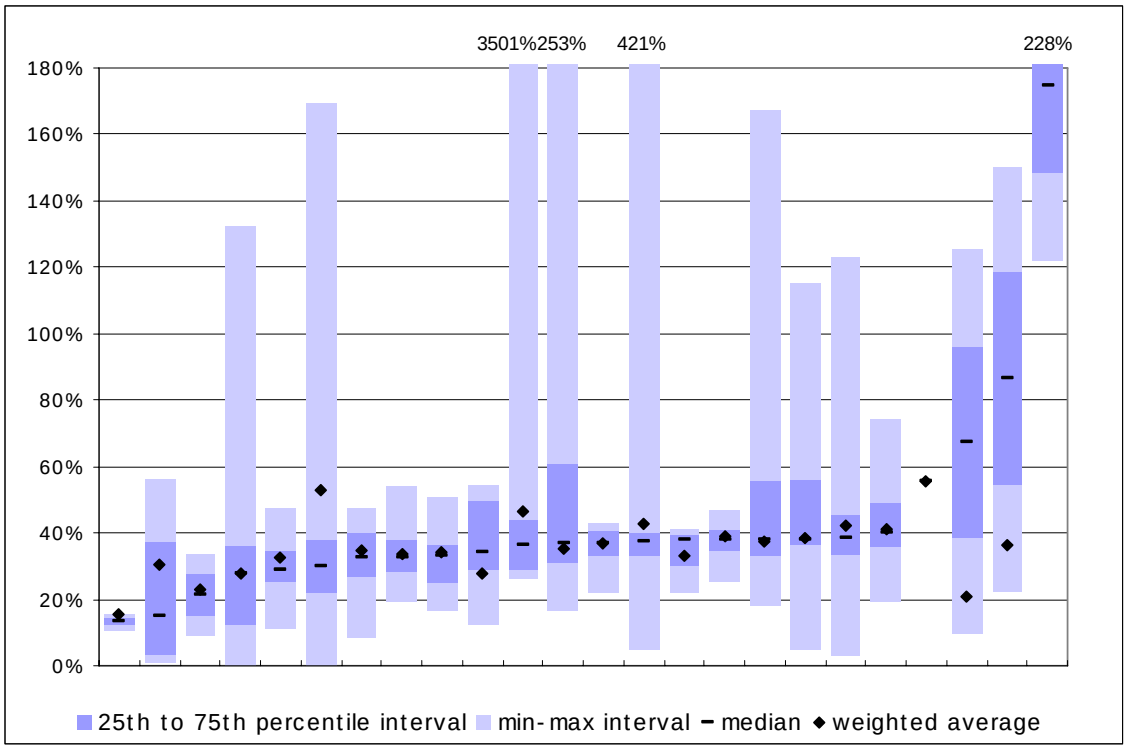


Figure 23: Ratio of $MCR2_{mkt}$ to SCR_{mkt} (non-life)



7.3.3 MCR for life insurers per each module

Reduction for profit sharing obviously was one of the key factors distorting the interplay between the MCR and the SCR in life in some markets. It was not present in every country, yet where it was used, widely different results were observed. More often than not, the RPS component of the MCR was higher than 80% of its SCR counterpart (the KC reduction), including a number of extremely high ratios. On the other hand, some low ratios were also observed.

For comparison, the graphs displaying the MCR to BSCR ratios before applying reduction for profit sharing (to the SCR and the MCR) are presented below. Although the negative results disappear, the residual interplay (i.e. without RPS) between the MCR and the SCR is still rather poor under alternative 1, although it is somewhat better if we look only at the 25th to 75th percentile results. The residual interplay was more stable under alternative 2 – the more extreme results came typically from those countries where the number of participants was low. However, even in alternative 2, and in those countries with a large number of participants, the residual MCR to SCR ratios show significant differences between countries and between firms in some countries.

Figure 24: Ratio of the reduction for profit sharing in the MCR to the SCR equivalent (life)

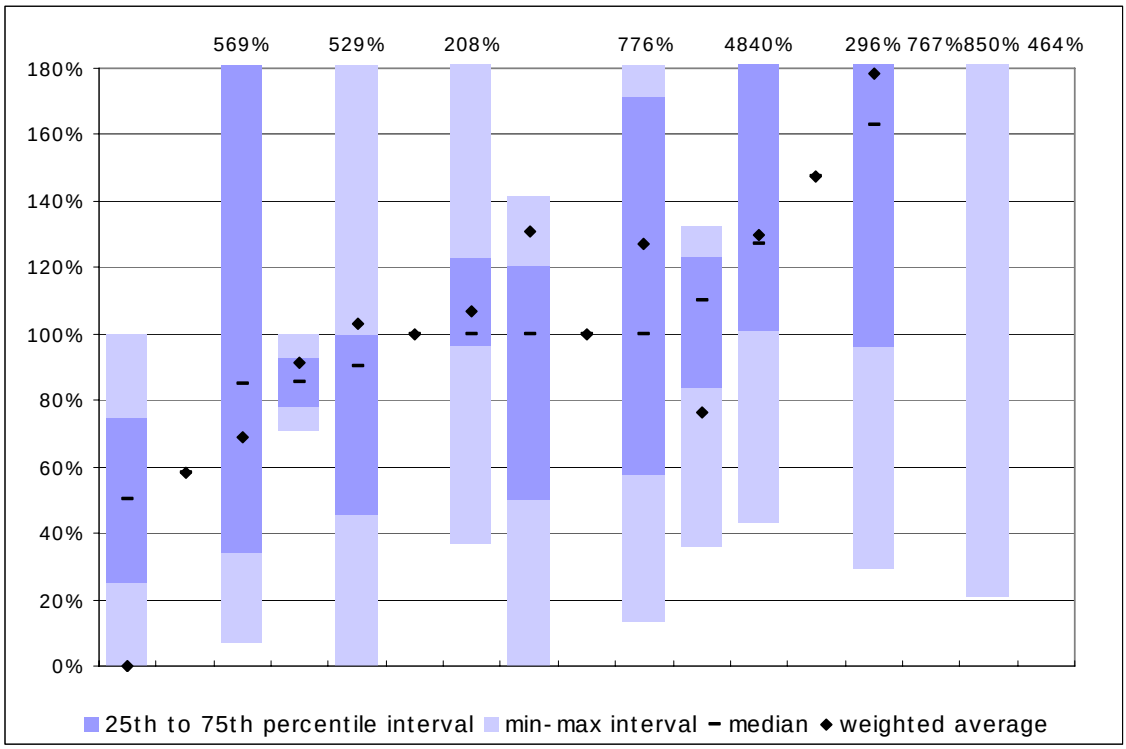


Figure 25: Ratio of MCR1 to BSCR, gross of profit sharing (life)

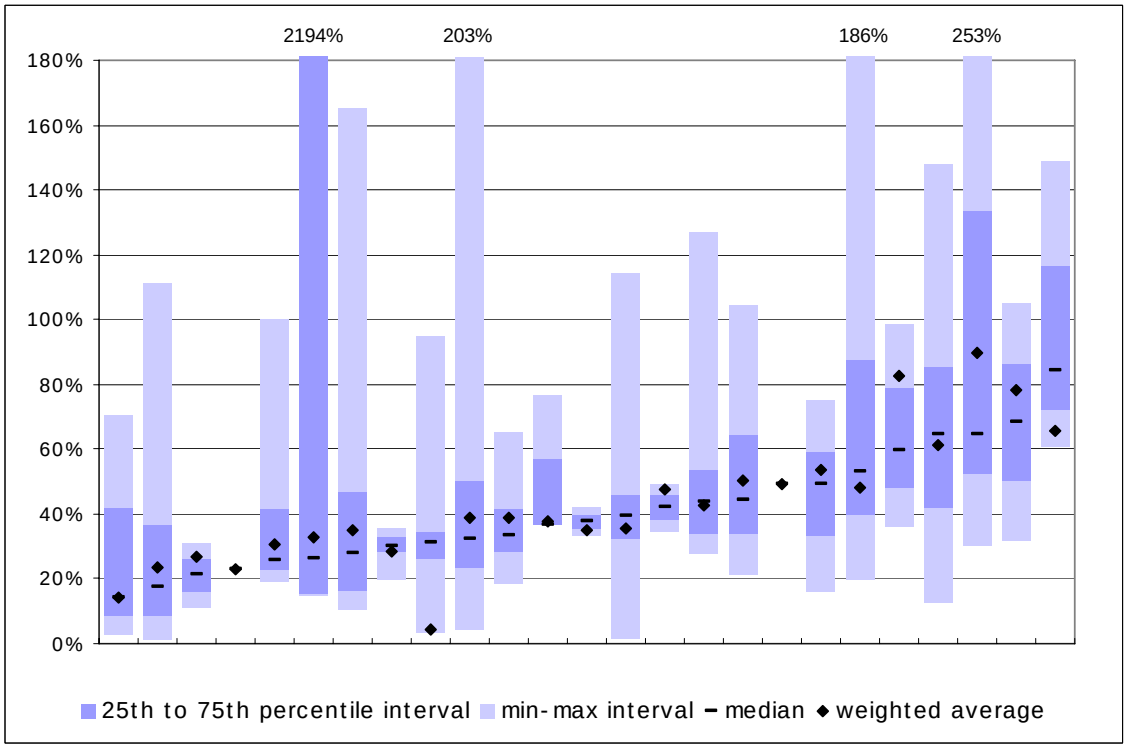
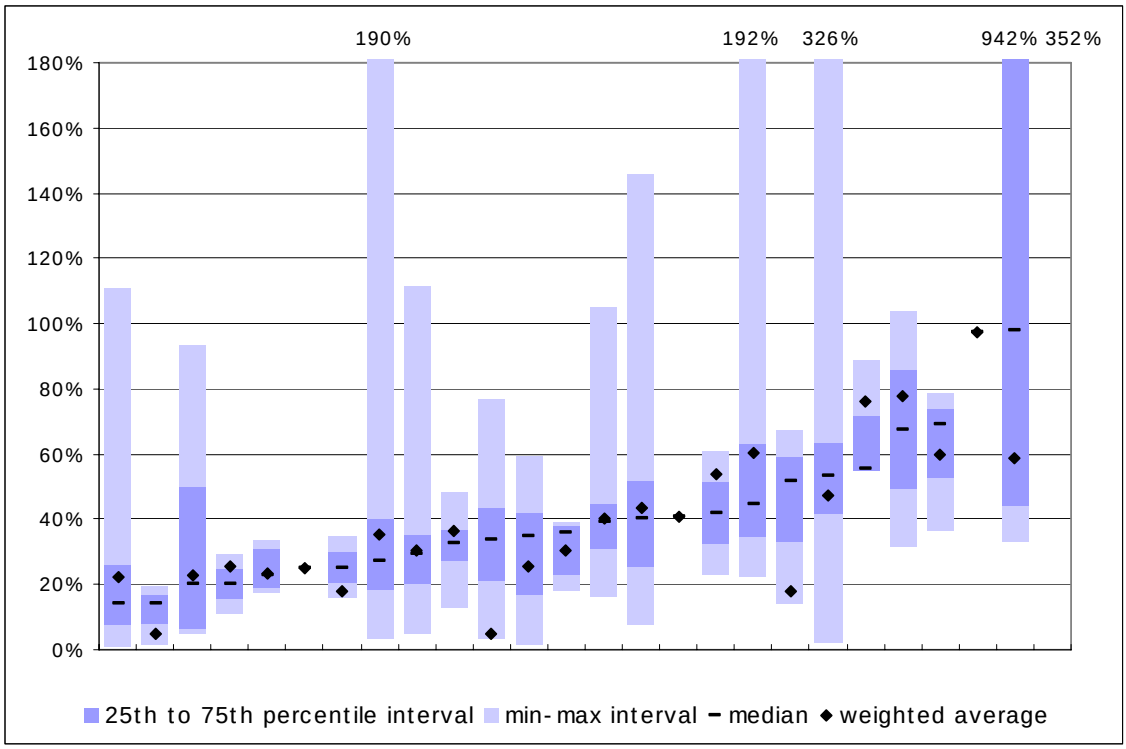


Figure 26: Ratio of MCR2 to BSCR, gross of profit sharing (life)



Life underwriting risk seems to have been calibrated rather low, with median and average ratios being typically below 10%. However, scaling up the same formulas (e.g. by a factor of 4) would not provide more satisfactory results. It would only introduce the same kind of wide ranges that were observed in the other risk modules.

Market risk alternative 1 showed a poor interplay with its SCR counterpart. It appears that, under alternative 2, at least for those countries with a high number of participants, the 25th to 75th percentile interval was typically not very far from the target. However, this observation comes with two important caveats. Firstly, large deviations from this central interval were apparently quite common – while alternative 2 is more sophisticated than alternative 1, it still could not capture certain market risk profiles very well. Secondly, a number of participants reported difficulties calculating market risk alternative 2, noting that the duration-based approach was not simple. This may leave doubts about the reliability and comparability of alternative 2 results.

Figure 27: Ratio of MCR_{life} to SCR_{life} (life)

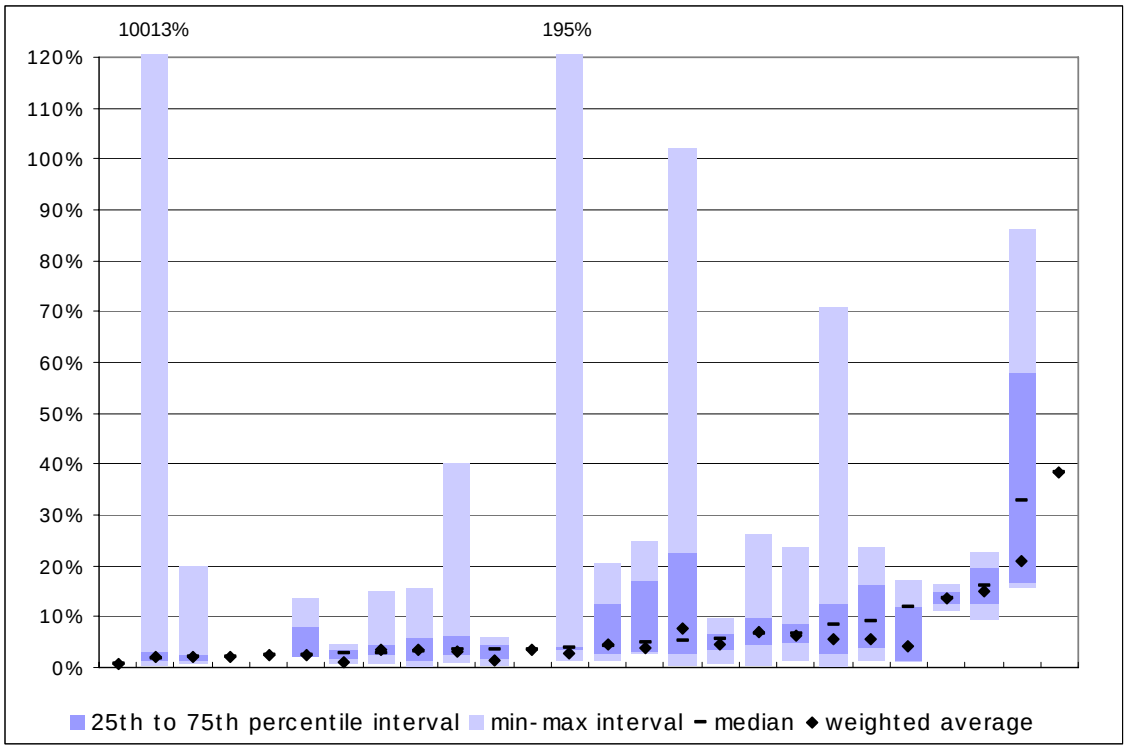


Figure 28: Ratio of $MCR1_{mkt}$ to SCR_{mkt} (life)

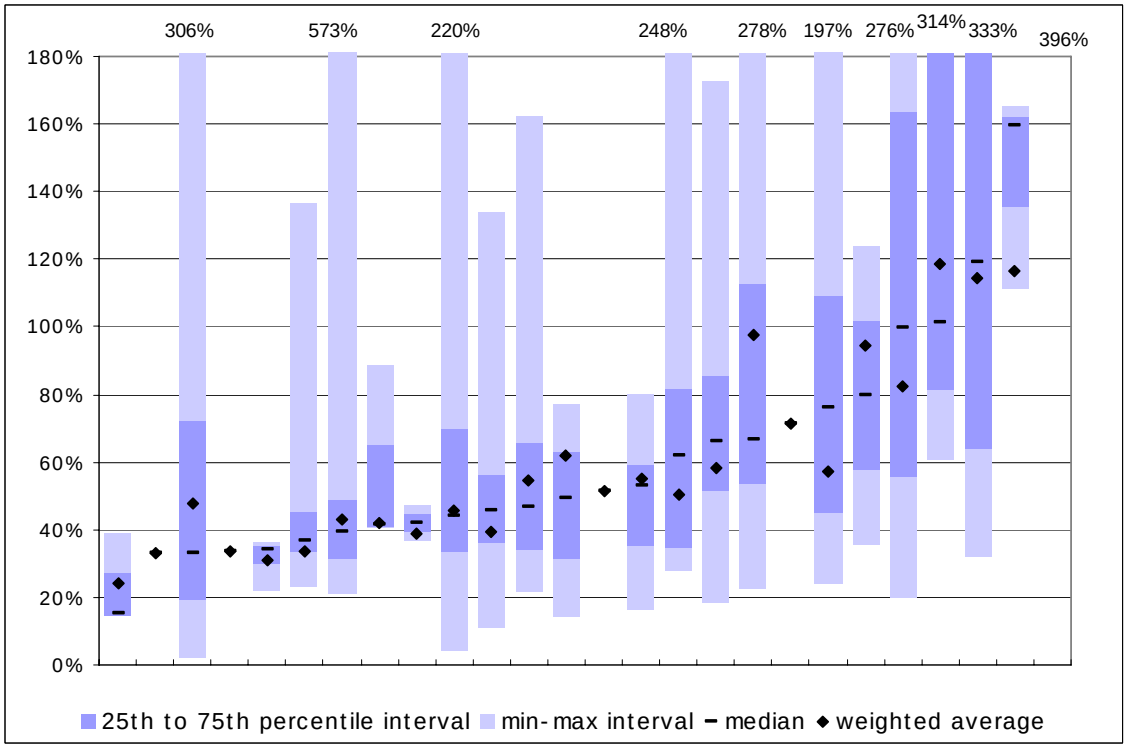
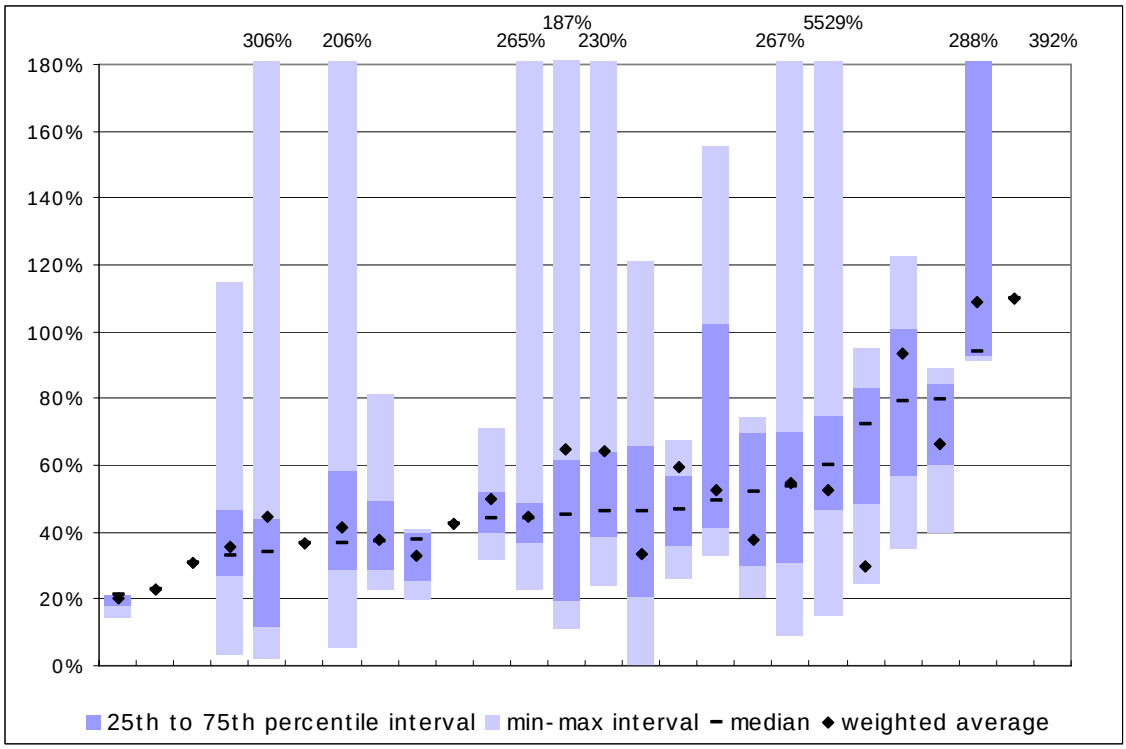


Figure 29: Ratio of $MCR2_{mkt}$ to SCR_{mkt} (life)



7.3.4 MCR for composite insurers per each module

The ratios of the MCR to the SCR per each module for composite firms are shown in the graphs below. Composite firms cover a large segment of the insurance market in nine countries.

In QIS3, composite participants were not required to calculate their MCR or SCR (or individual MCR and SCR modules) separately for life and non-life.[18] Therefore the results shown in the composite graphs display a mixture of the life and non-life characteristics discussed above.

The Directive proposal makes the calculation of a notional life MCR and a notional non-life MCR compulsory for composites; this is difficult in the case of the compact approach because the SCR calculation and especially, the corresponding assets need to be artificially split.

[18] The European Commission's framework Directive proposal would make the calculation of a notional life MCR and a notional non-life MCR obligatory.

Figure 30: Ratio of the reduction for profit sharing in the MCR to the SCR equivalent (composite)

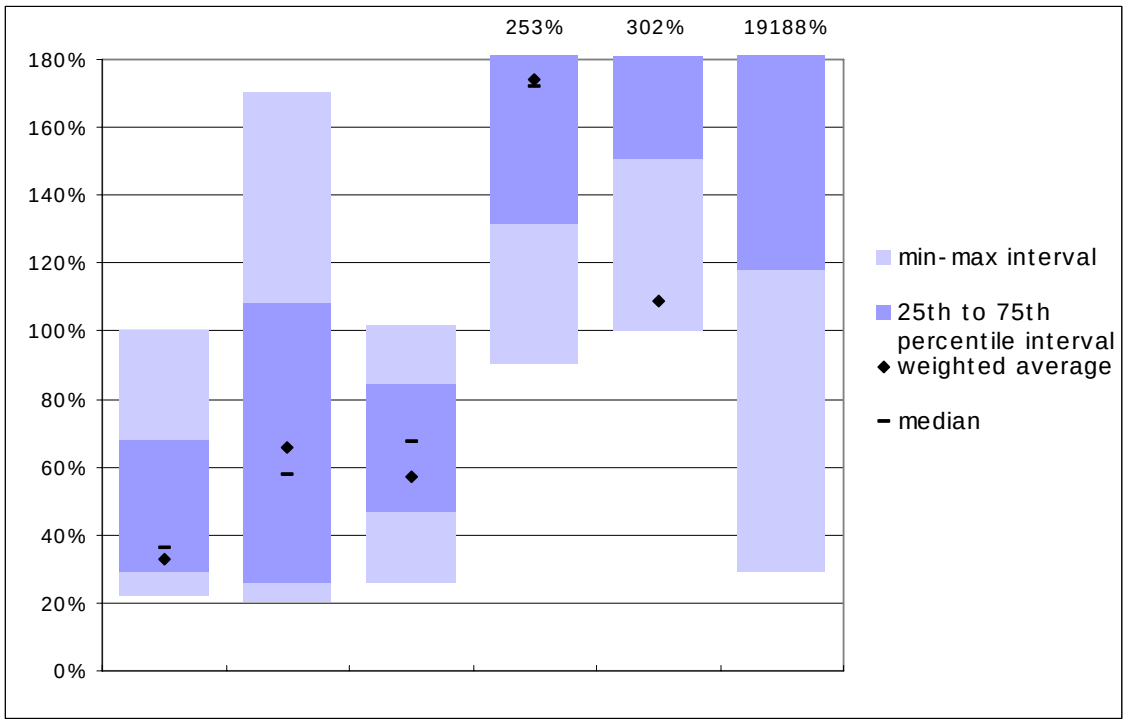


Figure 31: Ratio of MCR1 to BSCR, gross of profit sharing (composite)

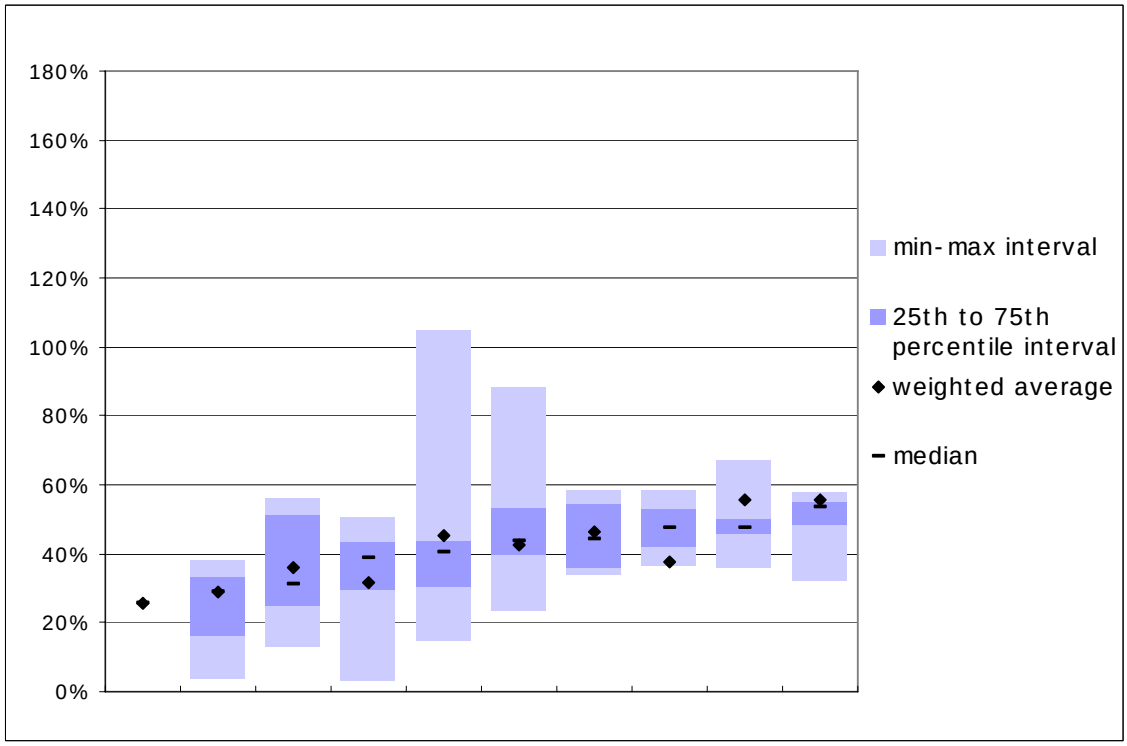


Figure 32: Ratio of MCR2 to BSCR, gross of profit sharing (composite)

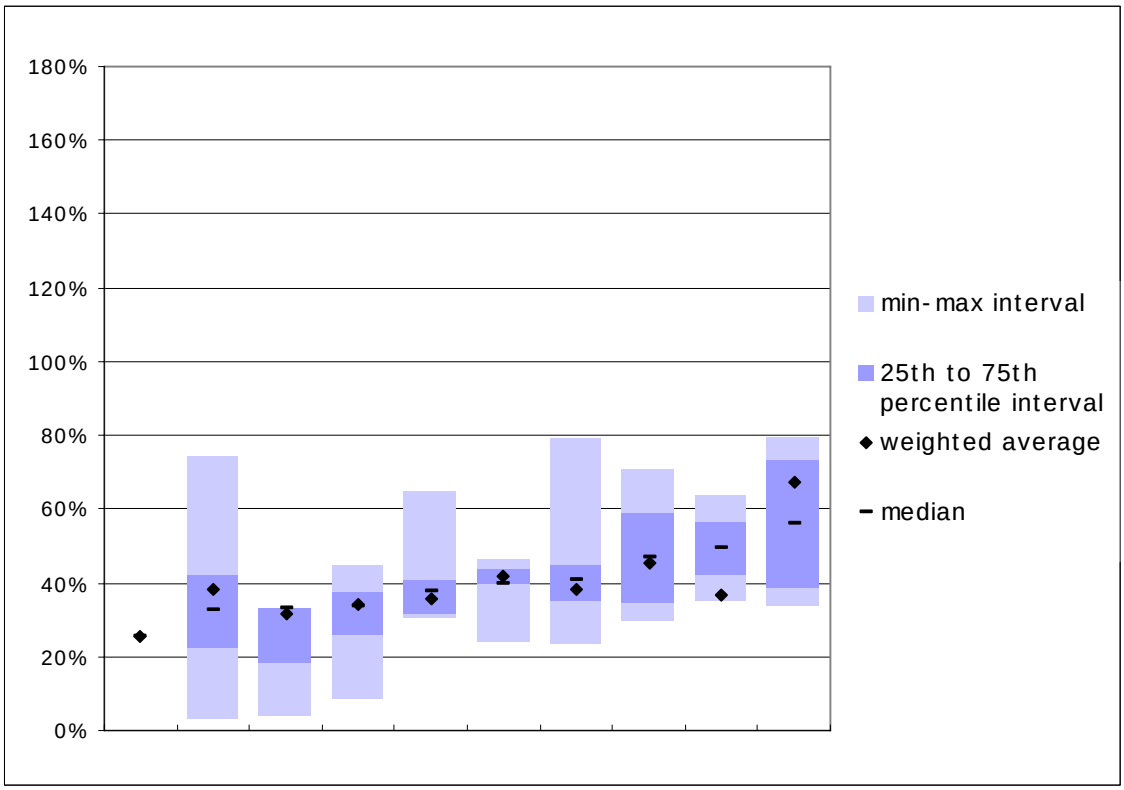


Figure 33: Ratio of $MCR1_{mkt}$ to SCR_{mkt} (composite)

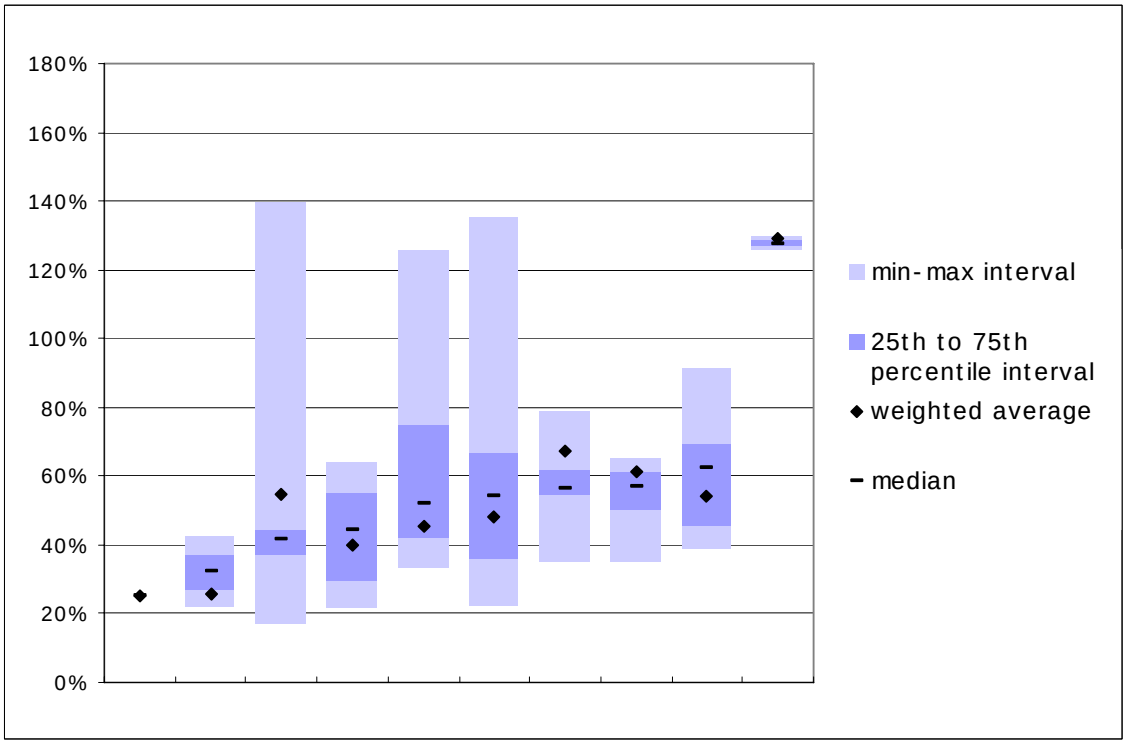
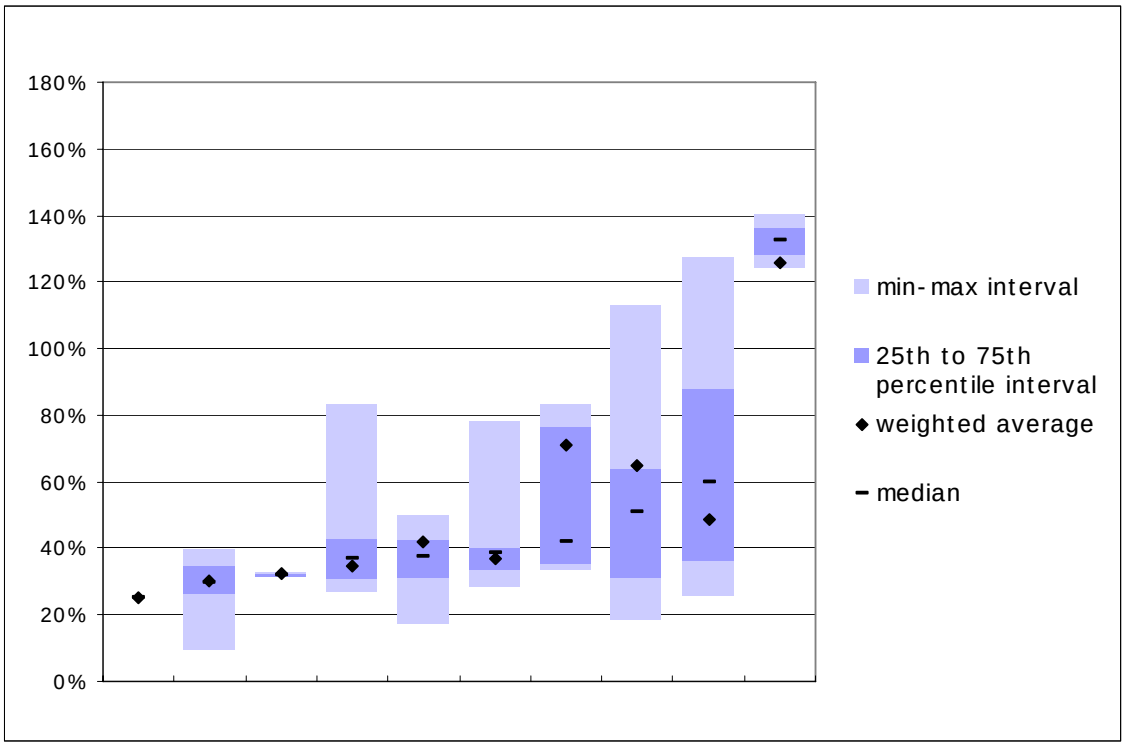


Figure 34: Ratio of $MCR2_{mkt}$ to SCR_{mkt} (composite)



7.3.5 MCR to SCR for health underwriting risk

Data from ten companies from four countries are available to calculate this ratio. For one company, the MCR health risk result was higher than the SCR counterpart. For the others the MCR health result was significantly lower than SCR health underwriting risk. (No graph is provided.)

8 Assessment of the SCR modules

8.1 Overall structure of the SCR formula

Few comments were received on the overall modular approach for the SCR, which can be seen as an implicit approval in such an exercise where the participants mainly concentrate on the perceived flaws. Some countries even reported a general approval on the overall design. Others found it difficult to trace the individual risk contribution to the overall SCR.

8.1.1 Correlations

In general, correlation coefficients as used in the SCR aggregation matrix were criticised only by a minority of participants. Arguments were brought forward by some participants that the correlation between market risk and life underwriting risk (currently 0.25) might be too prudent. Similar comments were received concerning the correlation between counterparty default risk and life underwriting risk (also 0.25 in QIS3).

Some participants and also one supervisor pointed out that the correlation factors should take account of tail dependencies. In this regard, other participants alluded to the fact that Value at Risk is not subadditive and that care should be taken when the underlying distributions are skewed.

For comments on the integration of operational risk in the standard formula and its implied full correlation with other risks, refer to chapter 10.

8.1.2 Risk mitigating effect of future profit sharing

Participants in some countries expressed their concerns with the calculation of the loss absorbency of future profit sharing. Though some participants saw an improvement over the K factor applied in QIS2, undertakings in some countries considered guidance as being too imprecise to achieve comparable results.

Also, the aggregation was criticised by undertakings in a number of countries. The approach of calculating a diversified 'gross SCR' and deducting a diversified loss absorbing capacity of discretionary benefits might be inaccurate as the KCs were likely to have a different level of diversification than the gross SCRs. It might be more appropriate to use diversified net SCRs instead. As regards the methodology, it is reported that valuing the SCR without risk mitigation and then reducing this for the loss absorbing capacity of discretionary benefits after applying a correlation matrix may produce a distortion of the results. Participants

in one country expressed their doubts about the use of correlations for non-linear profit-sharing mechanisms.

One supervisor mentions potential difficulties in the validation of KC calculations as most figures used by undertakings are not directly available to the supervisor.

One supervisor noted a problem with current setup: Where policyholders within the same fund have different proportions of the bonus reserves (provisions for future discretionary benefits) the calculation can lead to a situation where the basic SCR is underestimated. This occurs since the setup assumes that policyholders share losses evenly.

Figure 35: BSCR reduction to aggregated SCR (life)

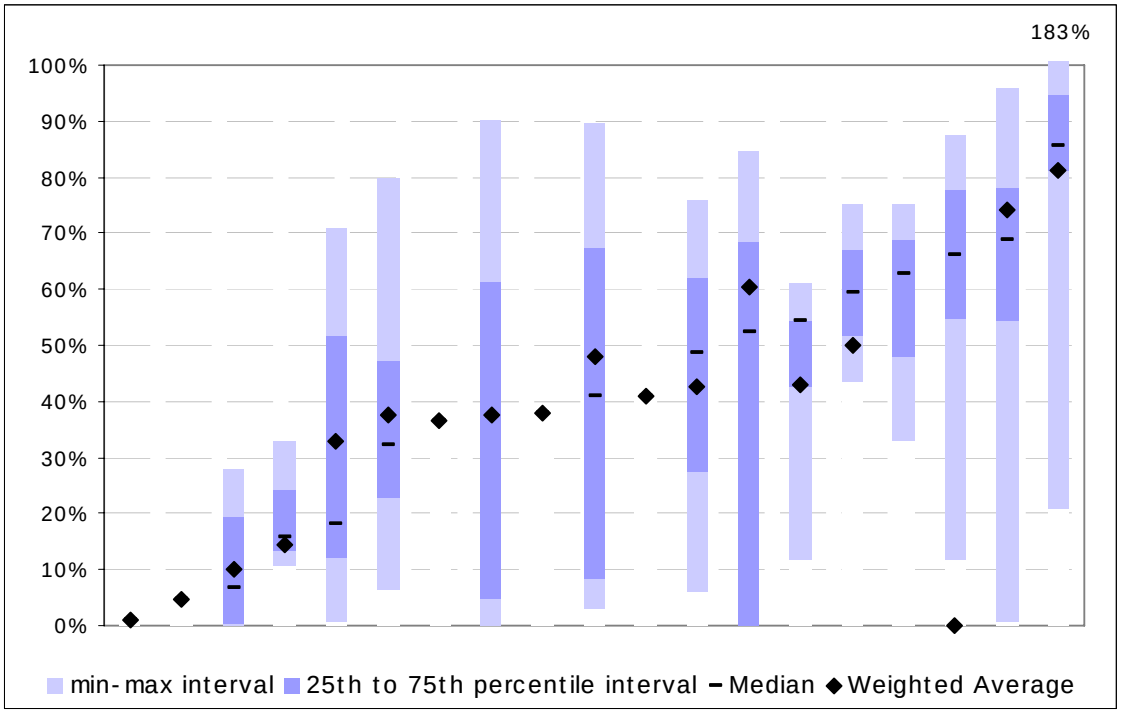
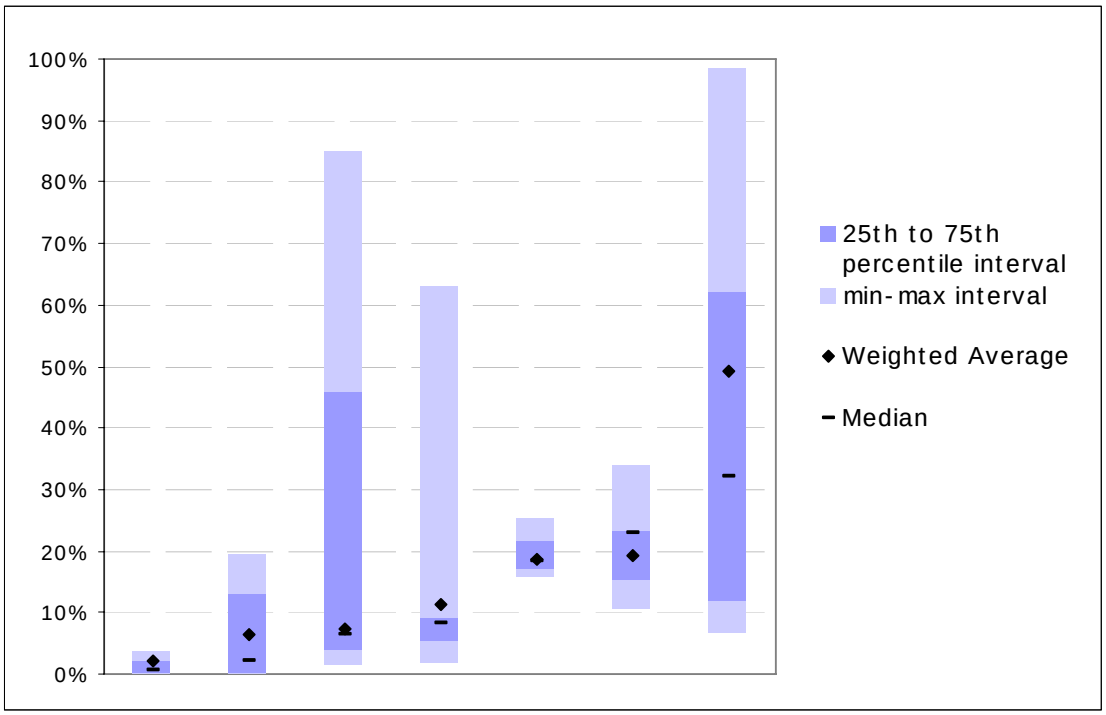


Figure 35 covers all countries with participants submitting relevant data. In cases where only the symbol for the weighted average is shown, only one life undertaking delivered relevant data. The diagram shows the mitigating effect of future profit sharing in terms of the aggregated SCR. The results in each country imply that the extent of risk mitigation strongly varies across undertakings and that this factor can assume a very high level in comparison to the aggregated SCR. The results in Figure 36 on composite undertakings are very much in line with those taken from the diagram on life assurances.

Figure 36: BSCR reduction to aggregated SCR (composite)



8.1.3 Expected profits/losses

Many undertakings from several jurisdictions regretted the fact that for reasons of simplification expected profit/loss in non-life business was no longer considered in the calculation as it was in QIS2 since this was considered to be an important contribution to the true economic valuation of non-life business.

8.1.4 Missing risks

8.1.4.1 Inflation risk

In some countries, the lack of attention towards inflation risk – on the assets and liabilities side – especially for annuities, was noted. For some business lines (e.g. annuities or own pensions) this risk was seen as potentially significant.

8.1.4.2 Credit risk for unearned commissions and other assets

Participants in one country stated that credit risk relating to non investment related assets such as unearned commission (that may be subject to claw back) might be missing. Under the QIS3 regime the only way to allow for this was through the 'best estimate' technical provision.

In another country, there were concerns that the counterparty risk module was quite narrow in scope and did not include deposits, loans, commercial paper, CDOs or other debtors.

8.1.4.3 Liquidity risk

A participant in one country proposed the inclusion of liquidity risk. The level of required liquid assets should be related to the timing of expected cash flows from liabilities taking into account the uncertainty of cash flows resulting from premium risk and market risk. An insurance undertaking should hold liquid assets equal to the best estimate of cash flows of e.g. the next five years and also to the SCR related to risks of the same period.

8.1.5 Composition of SCR

In most countries, market risk before diversification accounts for more than 70% of the BSCR of life firms. Diversification effects of the overall aggregation of risk modules amounts to 20% on average.

For non-life firms, the respective underwriting risk composes the major part of BSCR in most countries, on average around 75%. Diversification effects are similar to those observed for life firms; however, variations in this figure are comparably smaller across countries.

For composite firms, diversification effects are largest, amounting to around 30%. In those undertakings, BSCR is mostly dominated by market risk.

The following graphs visualise the composition of BSCR for the different business activities. Each of the bars represents the average outcomes for participants from national jurisdictions, and each bar sums up to 100%.

Figure 37: Composition of BSCR (life)

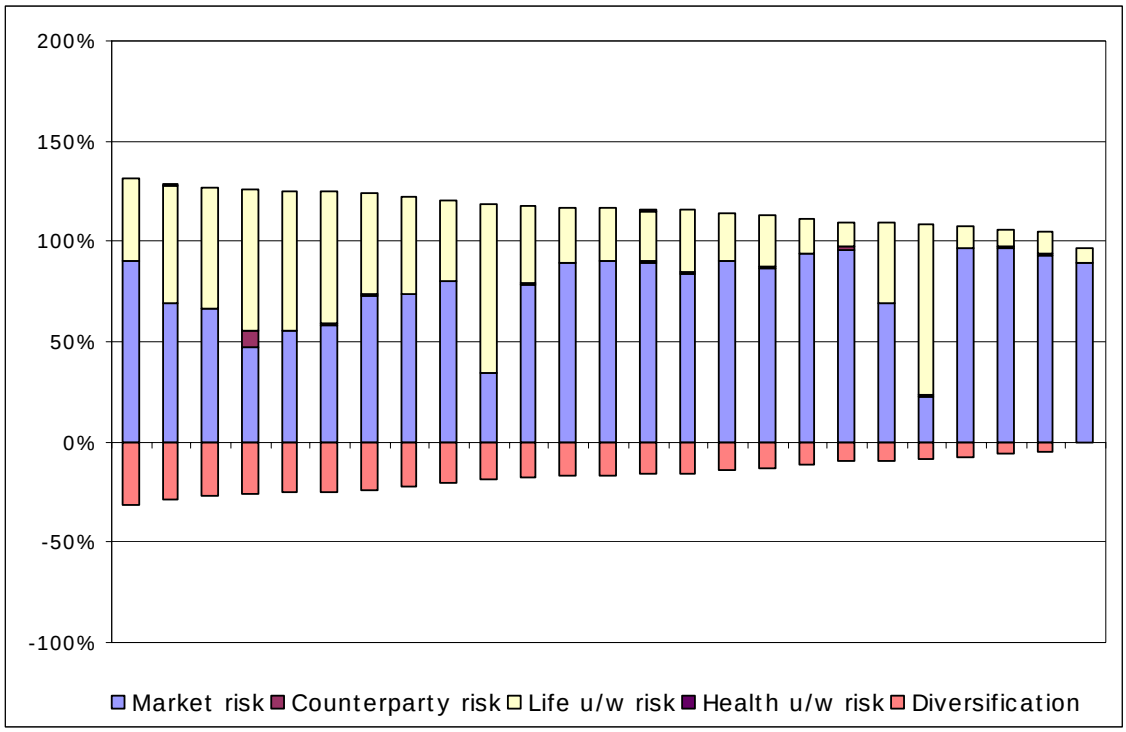


Figure 38: Composition of BSCR (non-life)

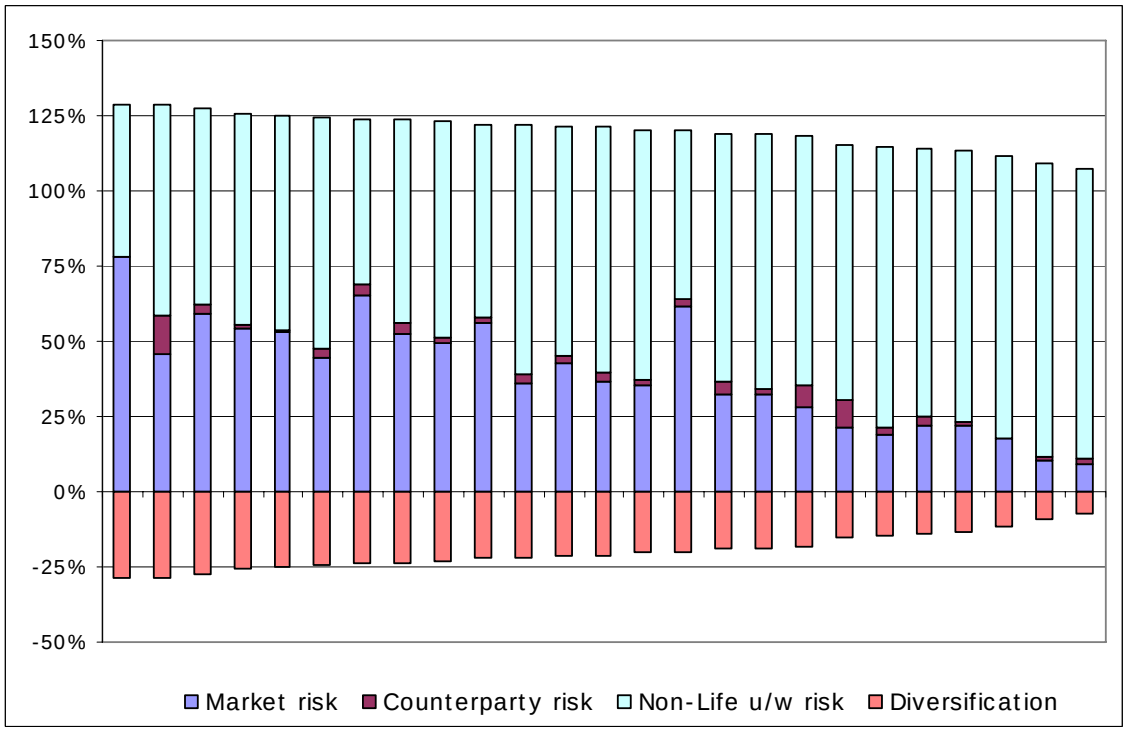
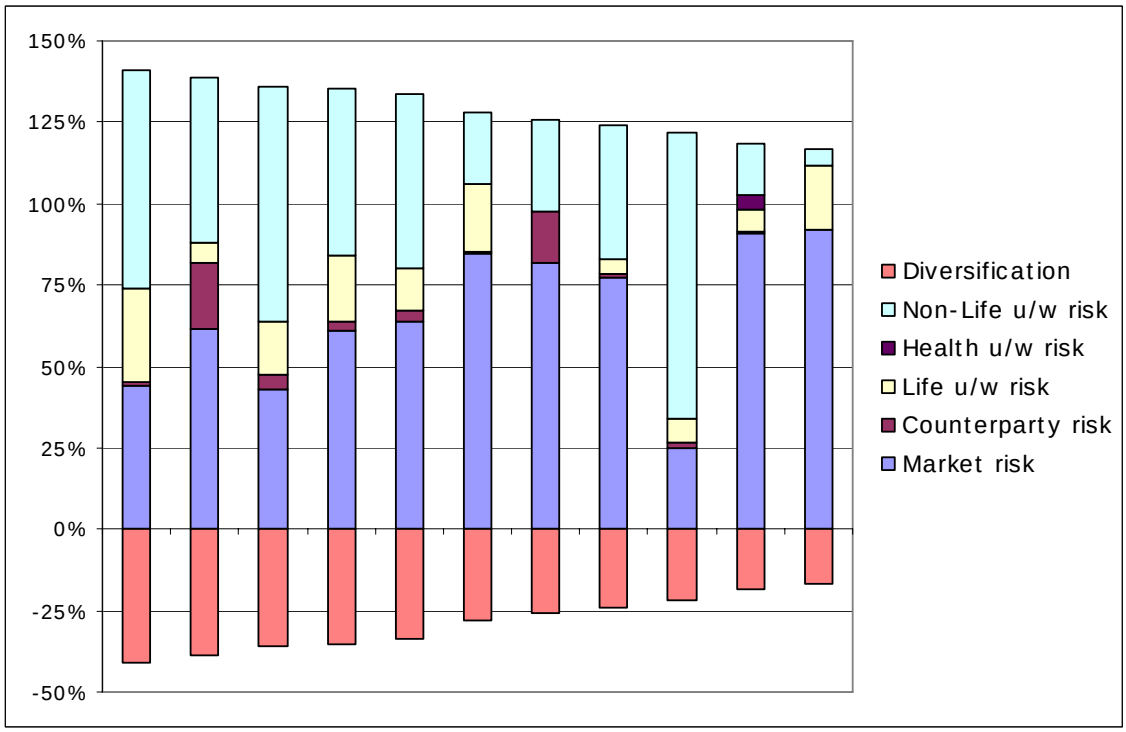


Figure 39: Composition of BSCR (composite)



8.2 Market risk

The market risk submodule was generally well received and seen as an improvement over QIS2. However, some issues still remain. This section first highlights the impact of the submodules on the overall market risk charge, and then discusses the main comments received by participants and national supervisors.

The following three figures give the weighted average share of the various market risk submodules to the overall market risk charge prior to any diversification benefits. These diversification benefits are shown separately, as it is not possible to assign the diversification effect to the constituent risks. Each of the bars represents the average outcomes for participants from national jurisdictions, and each bar sums up to 100%.

Figure 40: Composition market risks (life)

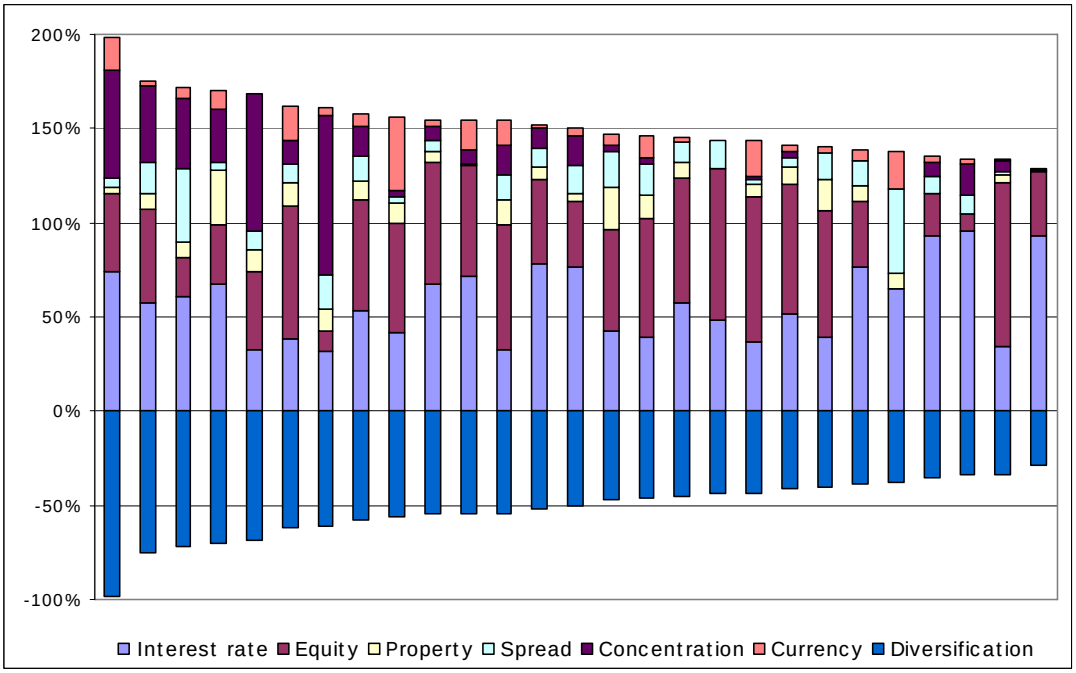


Figure 41: Composition market risks (non-life)

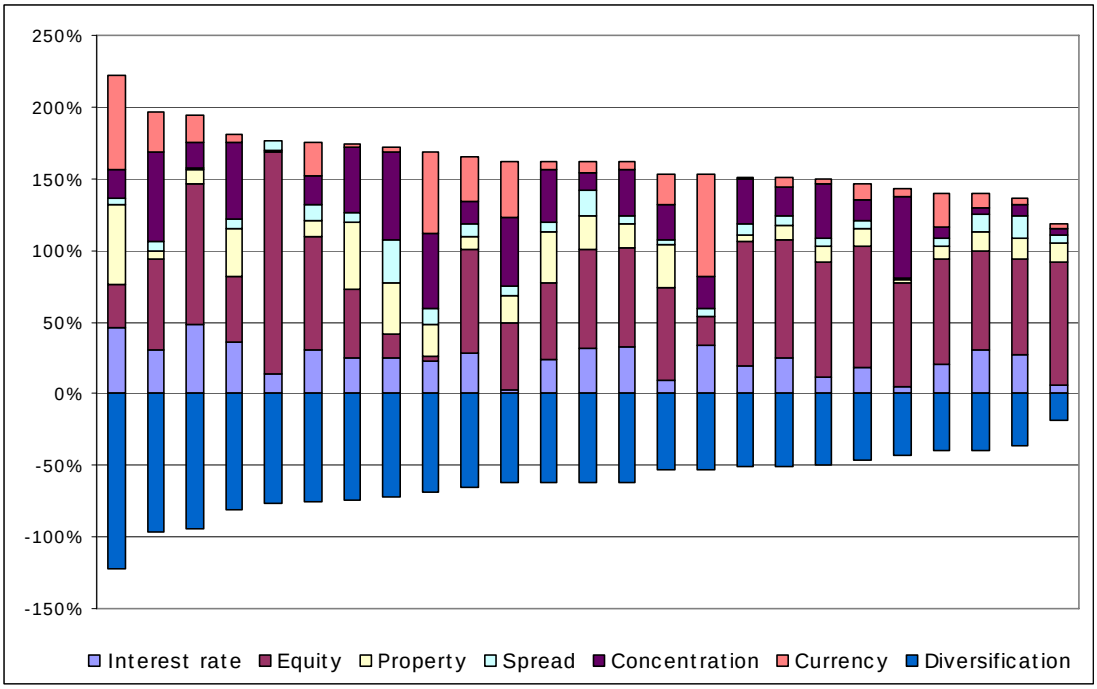
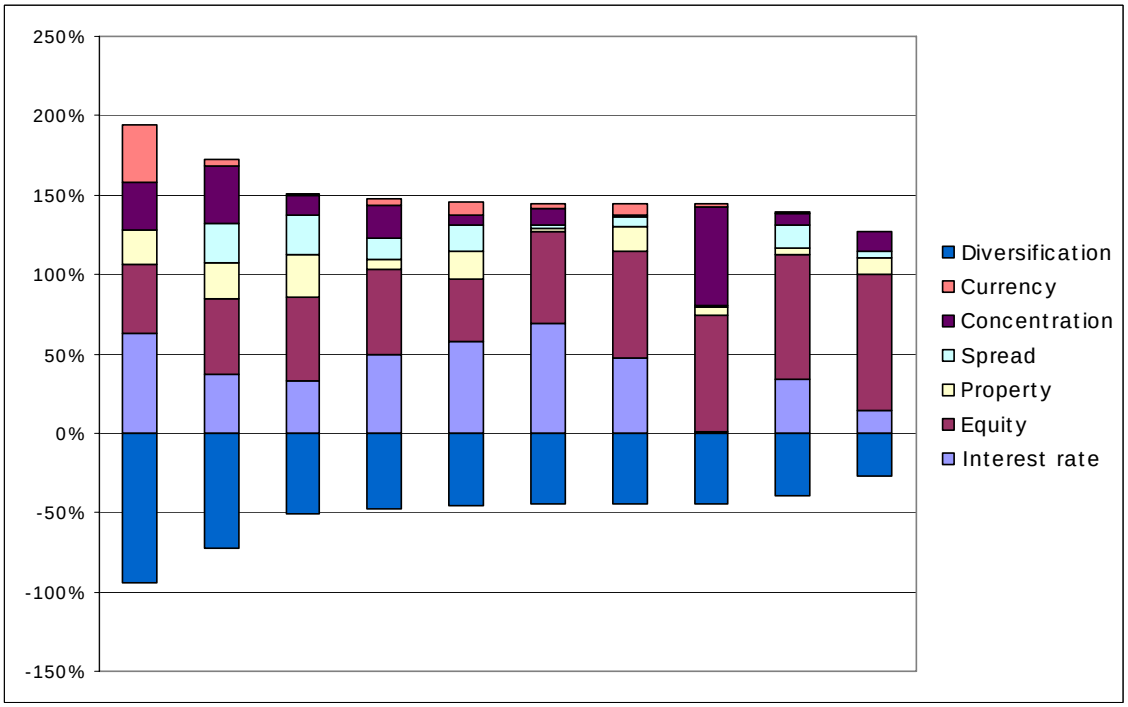


Figure 42: Composition market risks (composite)



The diagrams show that the main market risks are interest rate and equity risk, with the other risks being as important or more important in individual cases.

The diversification effect for market risk is substantial, which seems to be driven mostly by diversification benefits between interest rate and equity risk for which the assumed correlation in QIS3 was zero.

8.2.1 General comments

Some national supervisors stated that participating insurers questioned the absence of an inflation risk submodule. A liquidity risk submodule was also missed. One supervisor felt that the market risk module was challenging for smaller insurers since they generally lack in-house expertise. Participants from several countries requested guidance on how to calculate the 'delta NAV' (the change in the net asset valuation). One supervisor stated that the 'delta NAV' used for several market risk shocks is difficult to calculate without an internal model. Participants from some countries requested a clarification on how a look-through approach could be applied to a UCITS. The treatment of alternative investments such as structured products was considered to be relatively undeveloped and in need of more attention, among other reasons to prevent undertakings from gaming the regulatory requirements. Some participants felt that applying one shock across all European countries was not appropriate to local market conditions, especially for equity and property, see below. Two smaller non-Euro zone countries stated that hedging longer term market risk was impossible to achieve completely due to the limited volume of government bonds denominated in the government's own currency. Finally, two country reports stated that participants felt that for nonmaterial parts of the insurer's business, it should be possible to use a factor-based approach.

8.2.2 Interest rate risk

Some participants called the treatment of interest rate risk too detailed and would prefer a simple parallel shift of the yield curve. Others felt that it is still in need of refinement since it only calculates the effects of a shift of the curve and does not incorporate any other changes, such as an inversion. The treatment of floating rate bonds was considered to be flawed by some participants. Participants in some countries mentioned that the most adverse scenario (either the upward or downward shift) before risk mitigation might not be the same scenario as after risk mitigation.

8.2.3 Equity risk

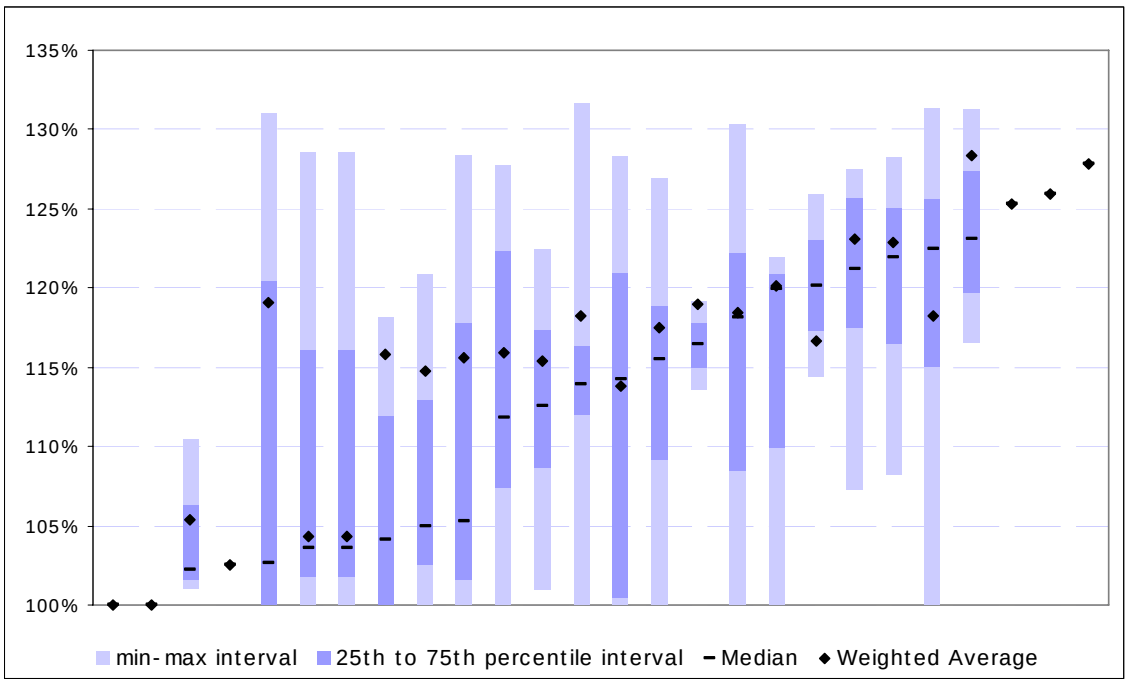
Some country reports noted that participants considered the equity risk module to be simplistic, for instance when compared with the interest rate risk module. It was suggested that the granularity for the equity risk module could be increased by increasing the number of indices, categorising them based on asset

class, region and/or sector. Some participants considered that hedge funds were being over penalised by being placed in the 'other' index. The rationale to treat investments in participations similarly to other investments was questioned. In one country, participations in other insurance firms were valued on a look-through basis, and the capital requirement for such participations was then deemed to be the SCR for the related undertaking.

Some participants considered the equity risk shocks to be too high, others felt they were too low.

Equity risk was altered considerably compared with QIS2: the equity shock was changed from a general 40% shock to a 32% shock for 'global' assets and 45% for 'other' assets[19], and the correlation with interest rate risk was decreased from 0.75 to 0. While the effect of the change in the shock is relatively straightforward to estimate, the effect of a change in correlation depends on the asset mix and only becomes visible on the level of the aggregated market risk shocks. To enable an appropriate analysis of this change in the correlation, the following figures give the quantitative implications of this change by comparing the market risk SCR based on a 0.75 correlation between interest rate and equity risk to the QIS3 correlation.

Figure 43: SCR market with QIS2 correlation to QIS3 SCR market (life)



[19] The index 'other' comprises emerging markets, non-listed equities and alternative investments.

Figure 44: SCR market with QIS2 correlation to QIS3 SCR market (non-life)

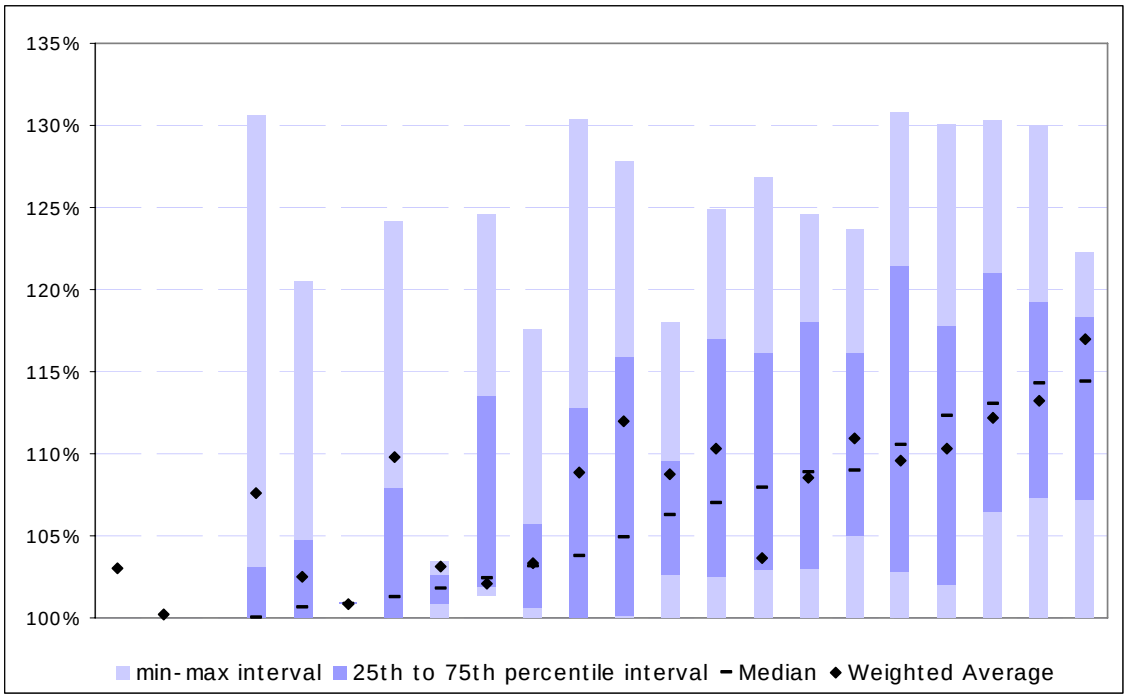
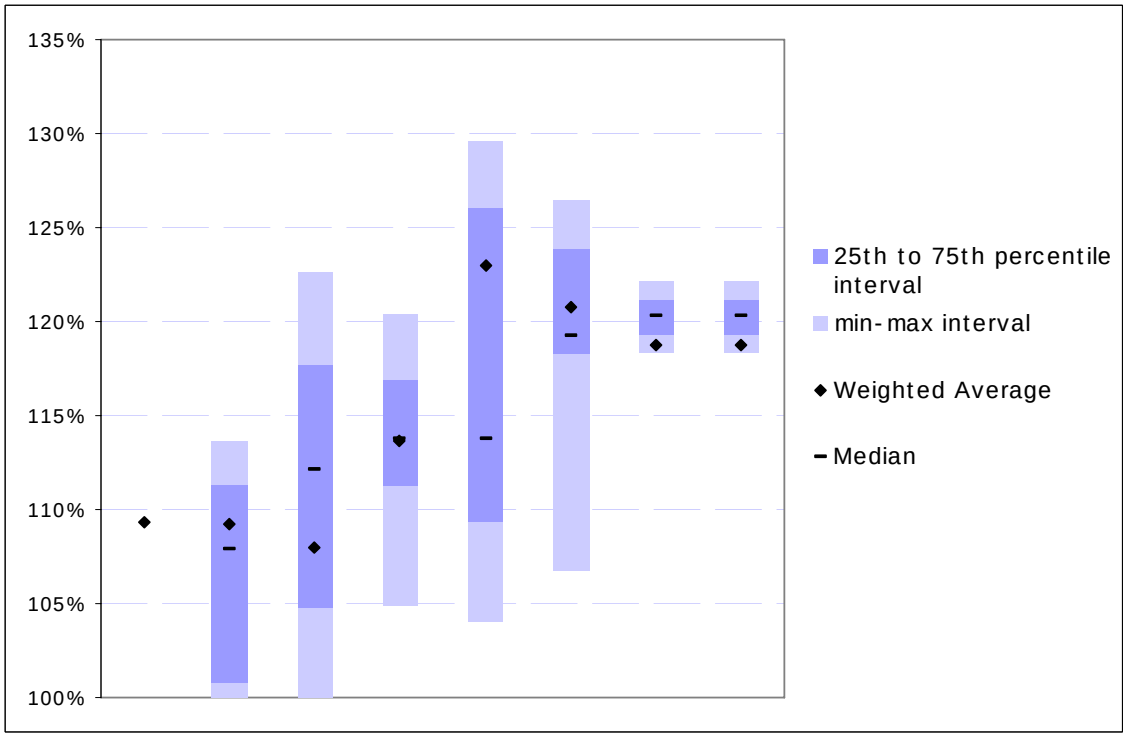


Figure 45: SCR market with QIS2 correlation to QIS3 SCR market (composite)



8.2.4 Currency risk

It was questioned whether a 'one size fits all' shock could be applied to currency risk, especially for currencies with fixed exchange rates, nor was it deemed likely that all exchange rates move against the insurer with the same amount and in the same direction. Participants in one country disagreed with the inclusion of equity listed in a foreign currency in currency risk, and suggested including the currency risk for equity in equity risk.

8.2.5 Property risk

Some supervisors felt that the granularity should be enhanced by distinguishing between property invested in to cover the insurer's liabilities and property owned (for instance as an office) by the insurer. In one country, this point is particularly highlighted by several participants. Participants from some countries felt it was inappropriate to assume the same shock across all regions. Participants from some countries felt that the property risk shock was too high.

8.2.6 Spread risk

Participants from some countries requested that all credit risk (sub) modules be integrated into one module, as in QIS2. Participants in one large country noted that the factor-based approach to spread risk does not allow for risk mitigating instruments. The treatment of government bonds in the spread risk module was questioned in several country reports: What is the rationale for exempting only government bonds issued in the government's own currency, and not all government bonds? Why treat secured bonds (such as mortgage bonds) differently from government bonds? The current methodology seems to favour governments with low credit ratings as the higher spreads receive no capital charge. Comments were also received regarding the treatment of unrated entities, which participants in one country felt were more onerous than under the Capital Requirements Directive for banks. Participants in another country also emphasised the importance of treating spread risk under Solvency II similarly as under the Capital Requirements Directive to avoid regulatory arbitrage. One supervisor requested that the calculations in this module be simplified. Participants from several countries felt that the spread risk charge was too high. Conversely, the participants in one country thought that the assumed variation in credit spreads for AA and AAA bonds was too low when compared with historical experience.

8.2.7 Concentration risk

It was requested by participants from some national jurisdictions that the concentration risk module be simplified. Some participants stressed that concentration risk should also include geographical and sectoral concentrations. Participants in another country noted that concentration risk does not take into account risk mitigation. Several supervisors felt that in smaller jurisdictions diversification options were generally more limited, leading to a higher charge. One suggested a higher threshold for more creditworthy investments as a solution. Some participants were concerned that intra-group operations (participations, internal loans, internal reinsurance) are faced with a concentration risk charge that is too prudent.

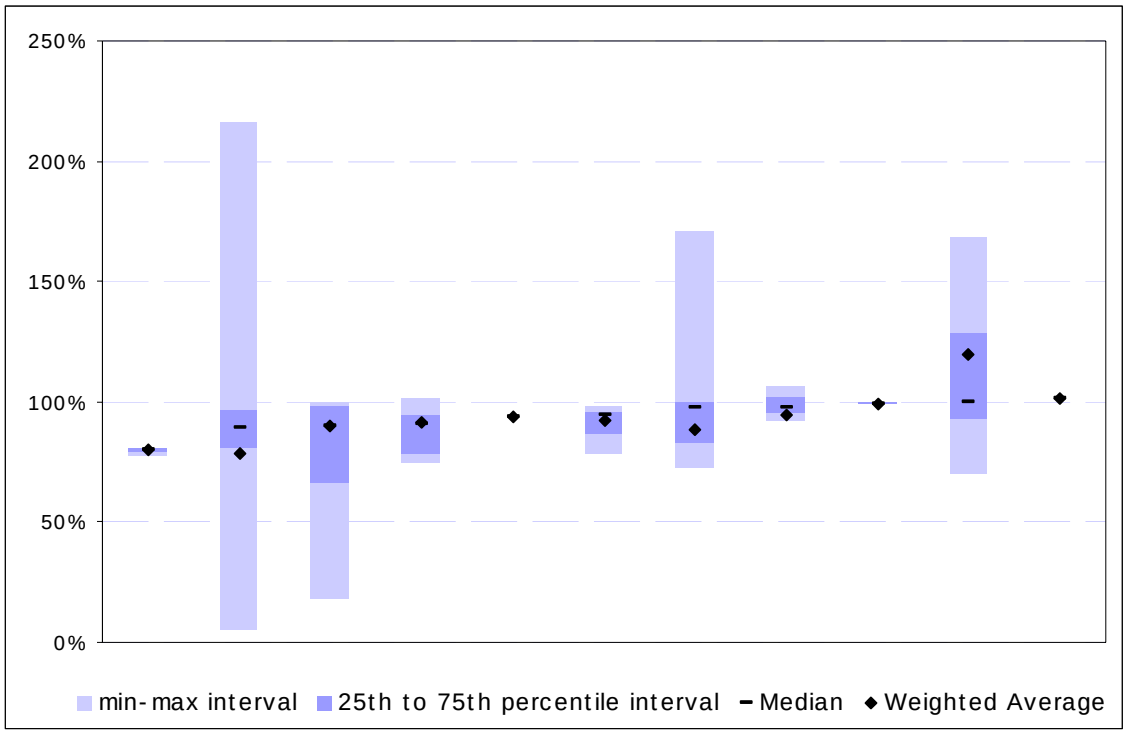
One supervisor points out that if consistency with banking rules is to be achieved the concentration risk module should assign a different threshold on claims secured by residential property (such as mortgage bonds).

8.2.8 Free assets

241 participants calculated the SCR excluding the free assets in the market risk module. In general, participants from a number of countries generally supported the approach. However, in some countries there were still questions regarding its validity and methodology: 'earmarking' assets for exclusion is considered by some to be arbitrary and could lead to arbitraging opportunities. Furthermore, the current methodology could in some very specific cases lead to a higher SCR if this would increase the asset-liability mismatch. Additionally, there were also several examples, where SCR without free assets found little attention, i.e. participants did not comment on the approach.

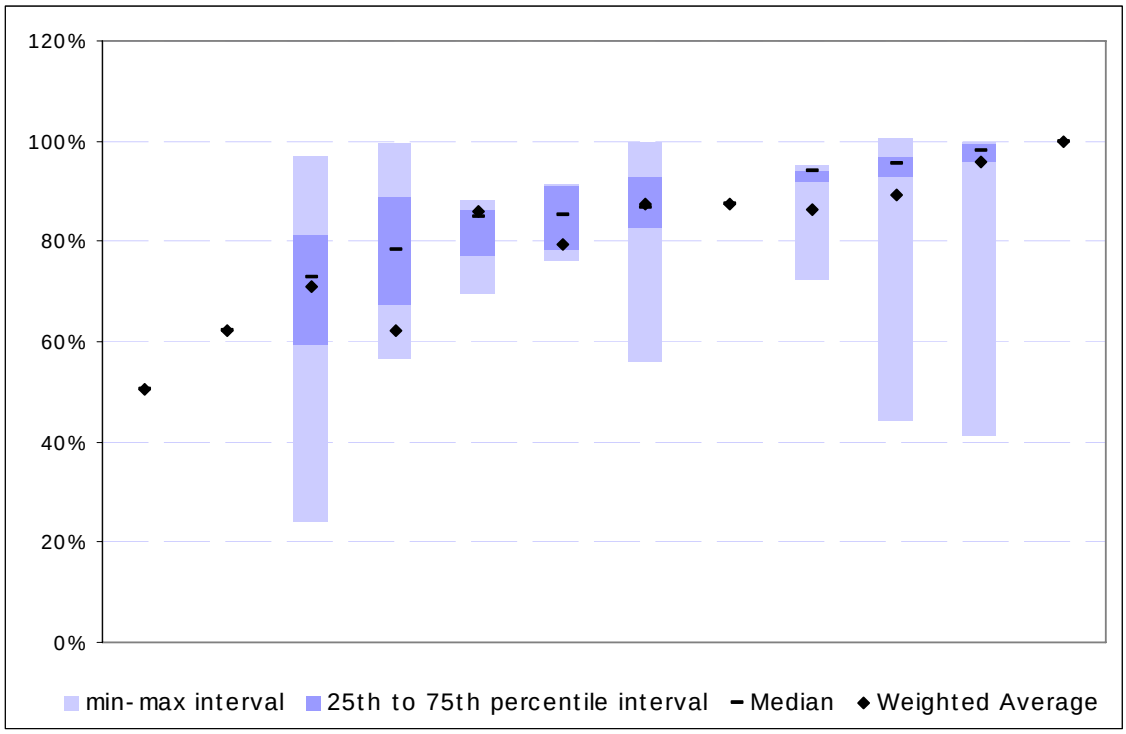
Following Figure 46 below, we can observe that in most cases the difference in the two approaches is rather negligible, i.e. the ratios are close to 100% for life assurances. Ratios above 100% may be the result of incomplete data provision.

Figure 46: SCR without free assets to standard SCR (life)



The results for the non-life insurers are more in line with what was expected. 100% is, with one exception, the upper threshold of the ratio and the SCR savings are more pronounced; in most cases the SCR without free assets is around 85% on average of the standard SCR based on all the assets.

Figure 47: SCR without free assets to standard SCR (non-life)



8.2.9 Alternatives to equity and property risk

117 'life' participants and 101 'non-life' participants calculated the equity and/or property risks based on the liability duration approach. Participants from some countries felt that the duration approach was adequate, whereas several others did not agree with the method or had questions concerning the allocation. Some participants commented that the methodology would still leave the problem of how to demonstrate solvency following a sizeable short-term market fluctuation.

The following figures compare the alternative approaches for the equity and property risks with the corresponding standard approaches. The capital savings vary considerably, with some cases even resulting in a surcharge. There are some very large outliers though, which have to be scrutinised more intensively. Both for equity risk and property risk the results are – neglecting the extreme outliers – fairly similar for the non-life and life sectors, with average capital savings slightly more pronounced for life.

Figure 48: Alternative to standard approach for equity risk (life)

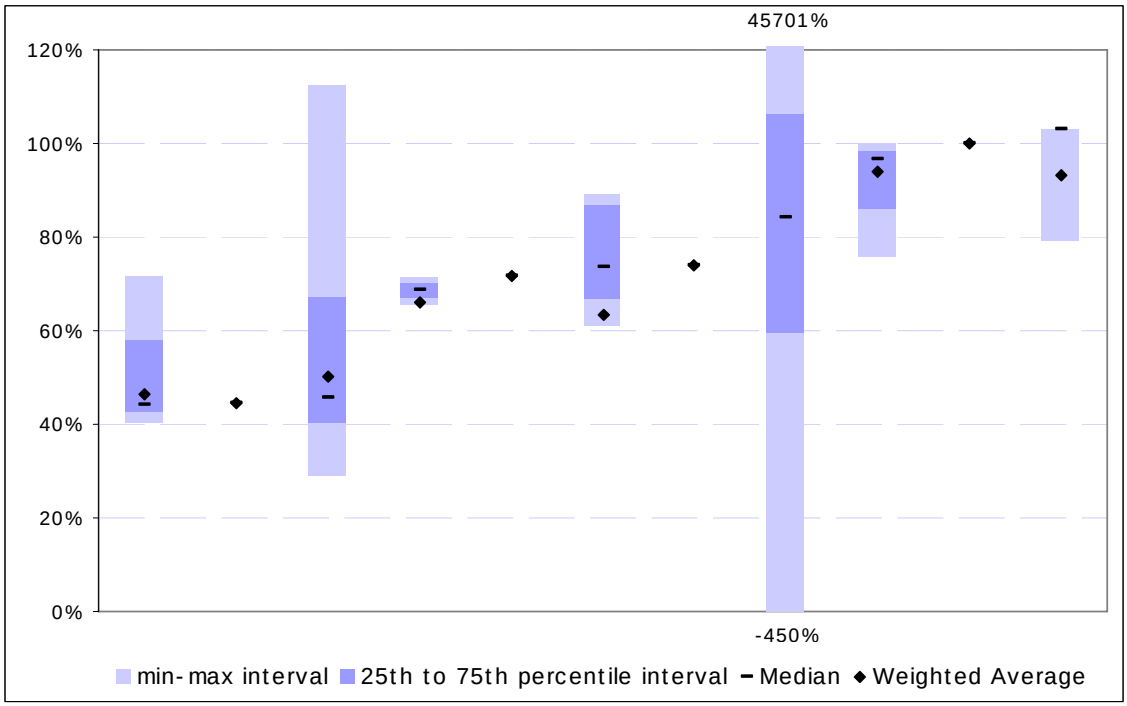


Figure 49: Alternative to standard approach for equity risk (non-life)

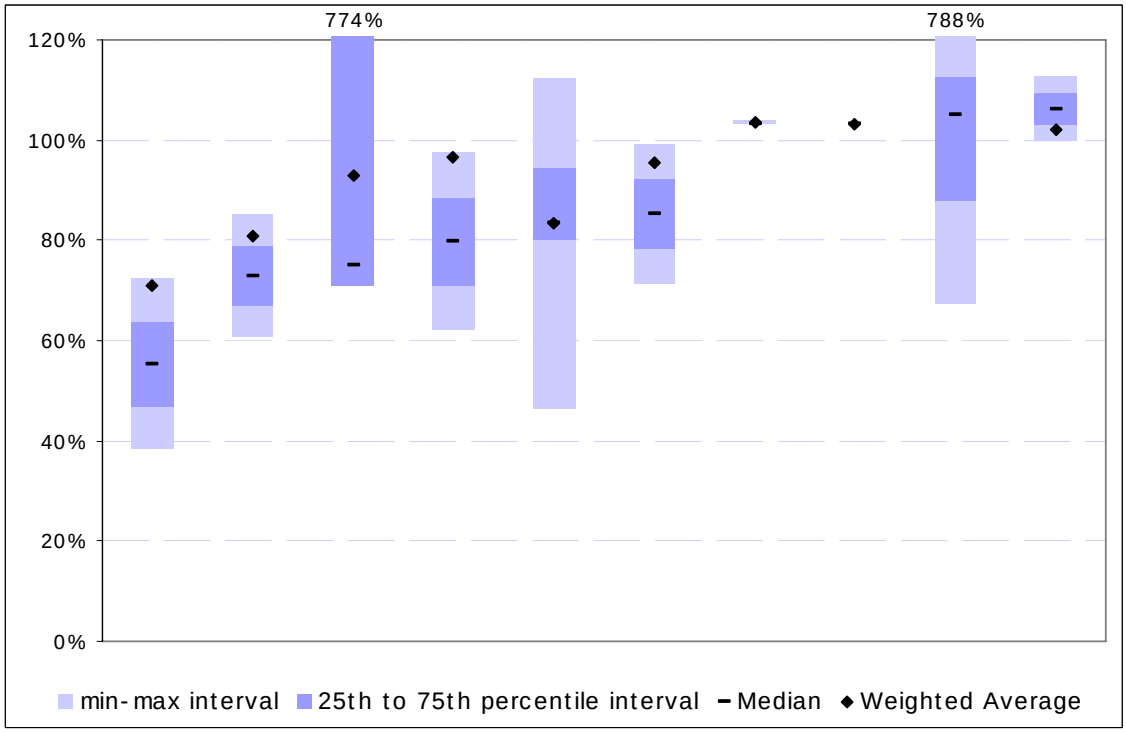


Figure 50: Alternative to standard approach for property risk (life)

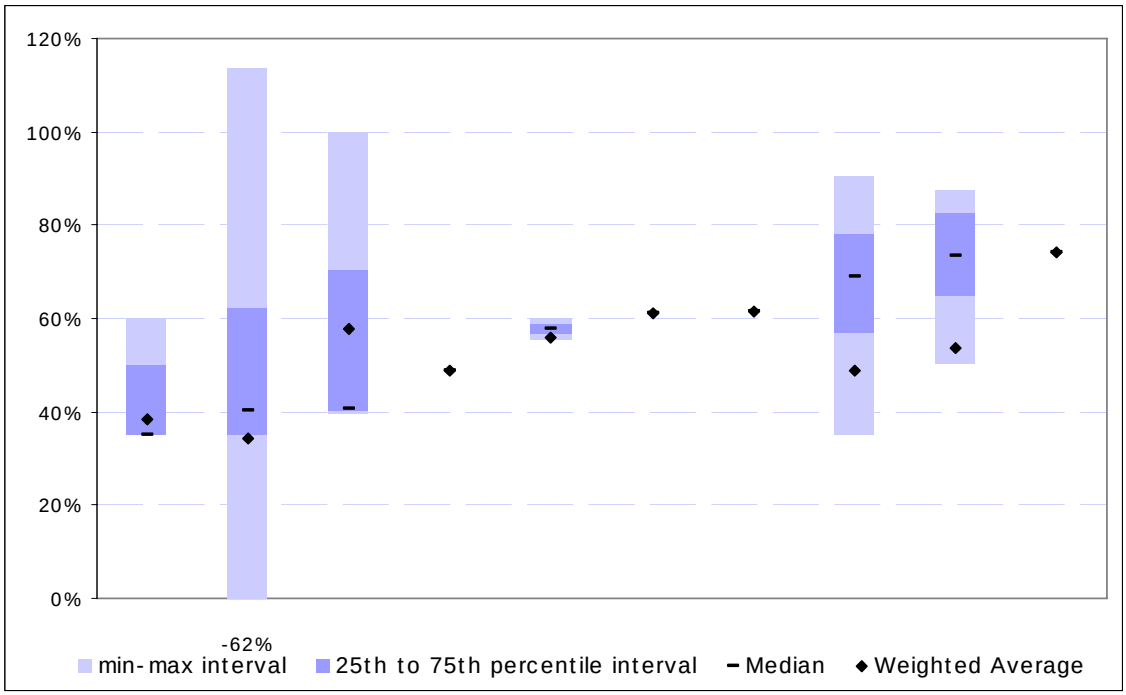
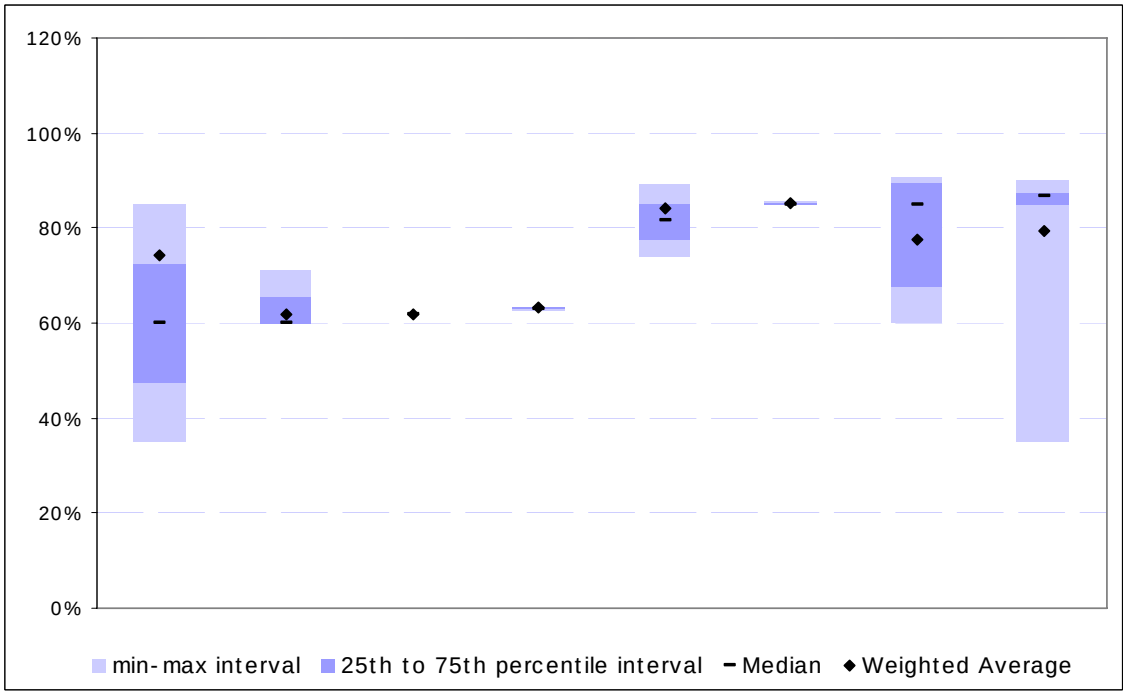


Figure 51: Alternative to standard approach for property risk (non-life)



8.3 Underwriting risk

8.3.1 Modular approach, scenario based and factor based risk assessment

Following the Technical Specifications, a modular approach was applied in the determination of the life and non-life underwriting risks, individual sub-risks being then aggregated through correlation matrices, for the SCR, in order to capture the diversification benefits. The individual life risks were mostly based on a scenario based approach whereas the non-life counterpart was the result of factor based approaches. For the scenario based approaches, a two step assessment, similar to the one used for market risks, was designed using KC components to capture the risk mitigating properties of technical provisions. The health (similar to life) activity relied on factor based techniques, with an allowance for the risk mitigating properties of technical provisions. In some countries, the lack of guidance to assess the risk mitigating property of the carried technical provision for factor based approach (non-life risks and health) received some comment similar to those for the factor based components of the market risk module, notably on the failure to recognise potential mitigating properties of the deferred taxes liabilities.

Figure 52: Ratio of SCR_{life} to BSCR (life)

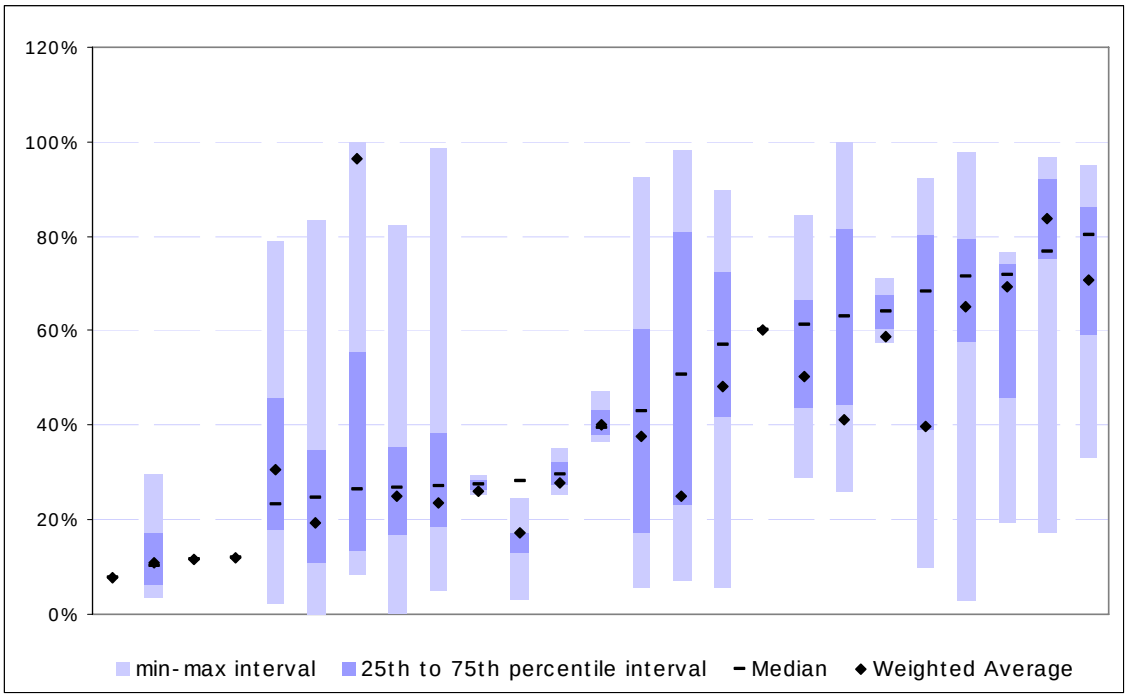
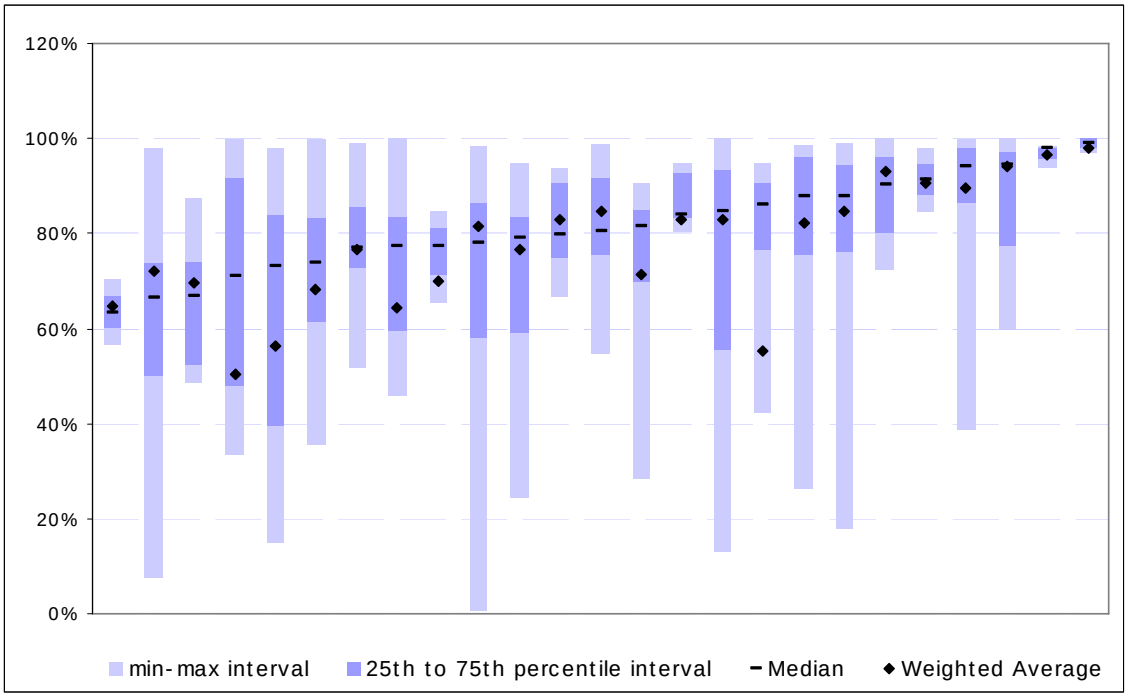


Figure 53: Ratio of SCR_{nl} to BSCR (non-life)



Few comments were received on the overall capital charge modelled. The non-life underwriting was rated as excessive when compared to internal models results in a few countries, with some countries explaining it by a rise in the correlations that more than offset a decrease in the assumed volatilities of certain lines of business (LoB) since QIS2.

The shortcomings of the non-proportional reinsurance modelling received some negative comments, for example when a stop loss treaty, addressing one of the modelled risks, is in force with a retention level lower than the calculated risk component.

The use of homogenous risks groups instead of the CEIOPS provided lines of business were advocated in some countries, notably when the in-force segmentation for reporting differs from the proposed one. The ability to use approximations when a specific line of business is not material also received some support.

Comments received on specific risk components are presented in detail below. A strong emphasis is put on catastrophe risk for two reasons: First, this risk has a potentially high impact and second it is diversely applied across countries, i.e. the underlying assumptions differ. All other risks are applied equally, with no country particular country characteristics included.

8.3.2 The catastrophe risk components

For the SCR, a CAT risk component was included in the non-life underwriting module, based on the aggregation of scenario based CAT net costs. Some scenarios were defined on a pan-European basis; others were left to the local supervisors. Man-made CAT risks were defined on a company basis. For life, a CAT component was included addressing the risk of mass surrender on unit-linked contracts.

The impact of the CAT risks can be quite high on the overall results, at least for some specific business lines (e.g. unit-linked).

These CAT risk components received a number of detailed comments:

8.3.2.1 The unit-linked life catastrophe component

Three main streams of comments were received:

1. A difficulty to address the potential overlap between the mass-surrender cat lapse risk and the otherwise included lapse risk component in the life risk module.
2. The high level of the factor based cat lapse risk (75%) result, and related questions on the calibration of this risk factor (deemed excessive and not justified by an appropriate study). This level is seen as very high when the ability to surrender is restricted by the local law (e.g. pension insurance).
3. Mitigation properties of non proportional reinsurance agreements were also cited as an ignored item.

Switching from a factor based to a scenario based approach (which is the approach of the Swiss Solvency Test) was suggested, or applying the sum of {current surrender values} as a minimum floor to the sum of {provisions plus the SCR}.

8.3.2.2 The non-life catastrophe component

A number of country specific, or business portfolio, CAT risks were used. A number of them were based on more or less recent experience of natural events (storm, floods, …). Issues mentioned were:

1. A difficulty to address the potential overlap between the CAT non-life risk, and the inclusion of the CAT risk impact in the premium and reserve risk assessment when CAT events were experienced in the near past in some countries.
2. The correlation assumptions used for combining the CAT scenario results were deemed inappropriate in a number of cases.
3. The subjectiveness of the selected CAT scenario, regarding the 1 in 200 probability of occurrence (seen either as more remote based on internal

models results, or more frequent) and the difficulty of choosing standard scenarios that are appropriate for the risk profiles and reinsurance arrangements at every firm. Importance of internal catastrophe modelling.

4. The potential effect of current reinsurance agreements.

8.3.3 The non-CAT risk components

8.3.3.1 Life

8.3.3.1.1 Life lapse and market module interest rate risks

A number of firms questioned the potential overlap between the market risk interest rate risk module and the lapse risk, assuming that one of the drivers of the lapse risk is the interest rate level and is already captured in the scenario based market risk component (that allows for a higher incidence of surrenders when interest rates are high). For unit-linked products, this also added to the life CAT risk capital charge (see above).

Computing the lapse risk on a policy by policy basis was also sometimes flagged as time consuming, and posing difficulties when one uses stochastic modelling with grouped data.

8.3.3.1.2 Mortality, longevity and disability risks

Some comments were received on the (in)coherency of simulating simultaneously a rise/decrease in the survival rates for the mortality and longevity risk modules which would understate diversification benefits between these two risks, with suggestions of using negative correlations between these two components, or selecting the highest combined capital charge of the two possible stresses.

Some country reports criticised the instantaneous assumption of the longevity shock and asked for the modelling of a trend risk driver. Splitting the longevity, mortality, disability risk between a trend risk and a CAT component was also suggested.

8.3.3.1.3 Unit-linked risk modelling

A number of firms asked for a risk assessment based on expenses as is usual in the competitive Collective Investment Scheme business.

8.3.3.1.4 Life simplified approach

Some simplified approaches were proposed for undertakings not able to use the scenario based default risks models. Views on these were mixed. The results of the disability risk simplified approach, or the expense risk simplified approach were nonetheless seen a particularly high by some firms. The graphs below display the capital requirements of each life underwriting submodule calculated

with the simplified approach as compared to the standardised approach. The results are based on the weighted averages of each participating country.

Figure 54: Simplified approaches to standard approaches (life)

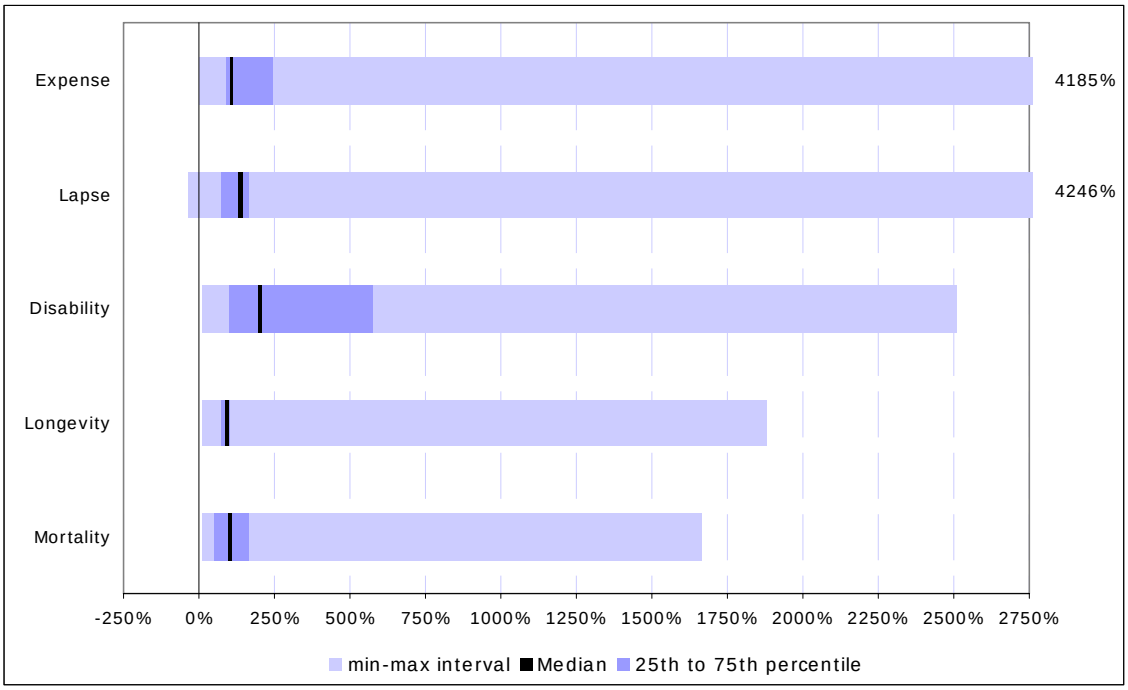
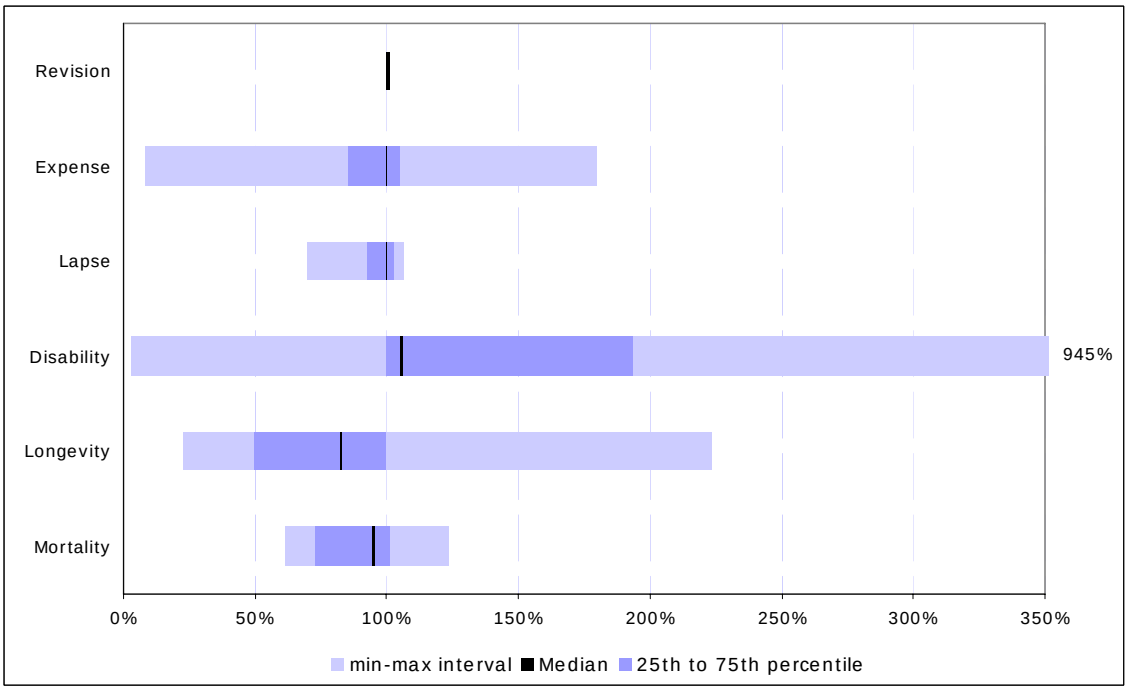


Figure 55: Simplified approaches to standard approaches (composite)



8.3.3.1.5 Fund structure

An approach to assess the existence of segregated funds was explained in the second part of the Technical Specifications (II.3.27, sum of independent calculated SCR). Few comments were received on it. Most of these were on the possible overstatement of the overall risk with this approach. It was also argued that the approach for calculating the standard SCR when a fund structure is in place has proved to be overly burdensome for insurance companies, as a small firm can easily hold dozens of funds.

8.3.3.2 Non-Life

8.3.3.2.1 The exclusion of expected profit and loss

In QIS2, provision for the expected profit and loss was included in the tested model. These provisions were removed in QIS3.

This exclusion of expected profit or loss in the non-life underwriting module was often reported as a downside compared to QIS2, where a change in the premium rate to reach a stronger premium level or to follow an underwriting cycle would increase the historical volatilities used in the premium risk valuation without any corresponding adjustment for the expected profitability (in case of an increase in the premium rate).

8.3.3.2.2 The inclusion of future premiums

The inclusion of some non-life future premiums (without expected profit / loss) in the non-life underwriting was deemed as inconsistent with the exclusion of future premiums in the life underwriting risk module.

8.3.3.2.3 The net loss ratio or net combined ratio approach for the premium and reserve risks

The model to assess the premium and reserve risk was based on market-wide volatilities of the net loss ratios. For premium risk the market parameter could be mixed with the firms' own experience, provided a sufficient history of experience was available.

A number of comments were received on this part of the model: European wide market parameters may prove difficult to determine with the number of existing differences in the legal systems, geographical exposure etc. between countries (motor third-party liability was often cited as an example of such differences). Some concerns were expressed that uniform parameters for all areas of the European Union may understate the risks in one area whereas overstating it in another which could jeopardise the objective of the SCR. The correlation between lines of business may also vary among members states. Geographical diversification is not recognised.

The credibility weighted mix between market wide volatility parameters and entity's own experience for the premium risk showed a gap between 6 years (0%) and 7 years (68%). A more smooth transition was sometimes requested. In some countries this historical period was seen as too long; and past data older than a few years (4 or 5) deemed as inaccurate.

The entity experience based on historical net loss ratios posed a number of problems for young entities (with meaningless high volatility in the first years), firms with significant shifts in the portfolio (mergers) in the historical years, changes in the reinsurance coverage, the use of non-proportional reinsurance and changes in the premium level (rates). This model was also seen as an incentive to buy innovative reinsurance instruments to lower the reported volatility without lowering the effective risk level.

Using entity's own experience nonetheless received some strong support, and a number of firms asked for also using it for the reserve risk.

Regarding the reserve risk calibration, the issue of the time horizon of the model was raised in some reports, where the volatilities used were deemed to be based on the whole run-off of the provisions, whereas the model is supposed to be on a one-year time-horizon.

8.3.4 Appropriate selection of the adequate risk module

The QIS3 Technical Specification contained a principle of substance over form, implying that the existing portfolio of contracts were to be allocated based on the underlying risk drivers. This principle of unbundling raised some issues.

Some firms experienced problems in splitting the unit-linked and non unit-linked components of life contracts, or in isolating the longevity and mortality components of their business.

Difficulties were also encountered by non-life undertakings when a single line of business includes a variety of risks which are mixed together, and then assumed all to have the same premium and reserve risk parameters, as well as the same correlation with other LoB (e.g. Burial included in miscellaneous).

Difficulties in selecting the appropriate LoB classification between health (similar to life), and the three non-life accident & health LoB were also reported.

Reinsurers, accepting both life and non-life risks faced a general difficulty in allocating their business between the appropriate lines of business.

Some problems were also reported on the unbundling of contracts with a mix of guarantees, notably when some risks could be first classified as non-life risks and then at a later point in time as life risks, e.g. workers compensation. Problems also arose with life riders in non-life products, motor third-party liability (MTPL),

and protection guarantees such as disability. For these risks, the revision risk component received a number of comments (see next paragraph).

This could have a material impact on the reported SCR results.

There were also some difficulties experienced with the classification of claims under workers compensation business, for which it was not clear whether these should be regarded as covered by the life or non-life modules.

8.3.5 The revision risk module

In some country reports, the revision risk module was viewed as not being a significant risk, or irrelevant when the local rules forbids the revision of non-life annuities. In a number of others, the principle of this risk component received a positive feedback (for MTPL, disability, life riders, workers compensation), but mixed comments were received on the calibration: Too high on a longer time horizon, but too low on a one year horizon. Some difficulty in isolating this risk component from the overall non-life provisions was also reported (see above).

8.3.6 Diversification benefits

The diversification benefits through correlation matrices were widely appreciated, but some niche operators complained about the absence of recognition of their experience, which, in their views, contribute to a less than market-based volatility, that results in part from the more specialised nature of their risks, and in part from a greater understanding and control of these risks.

Concerns were also expressed by reinsurers or firms with branches, on the potential geographical diversification benefits which are not recognised in the solo model. Some comments on this issue were also received regarding the group model, which bases the diversification on the legal status of firms instead of geographical areas.

The quantitative results show diversification effects within the life underwriting risk being between 40% and 60% in most countries. In the non-life underwriting risk module diversification between the two submodules amounts to less than 20% in the majority of countries.

Figure 56: Composition life underwriting risks (life)

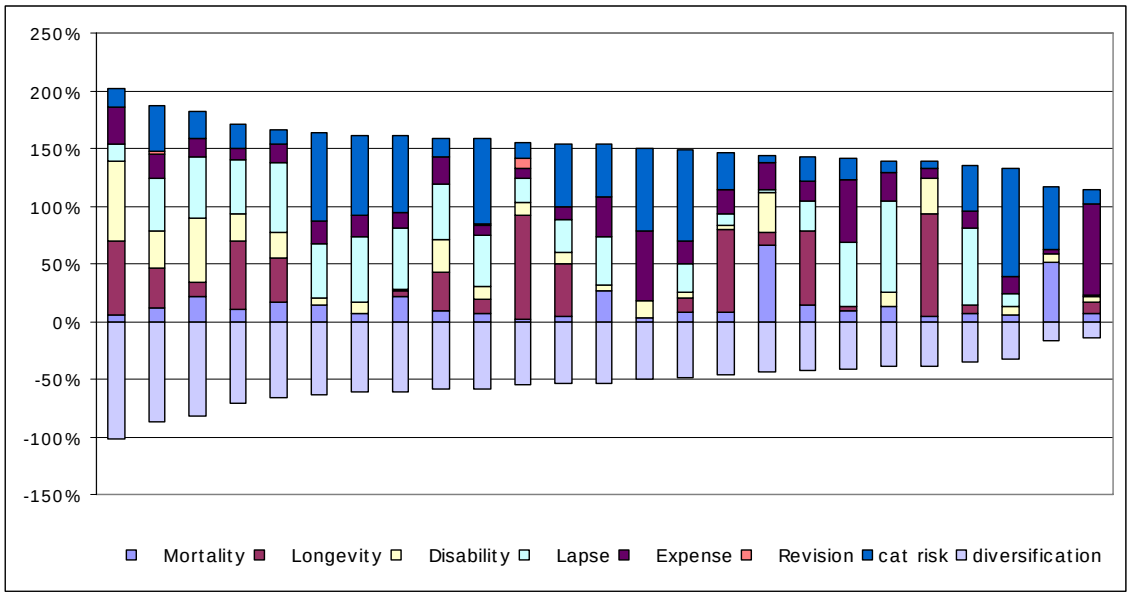
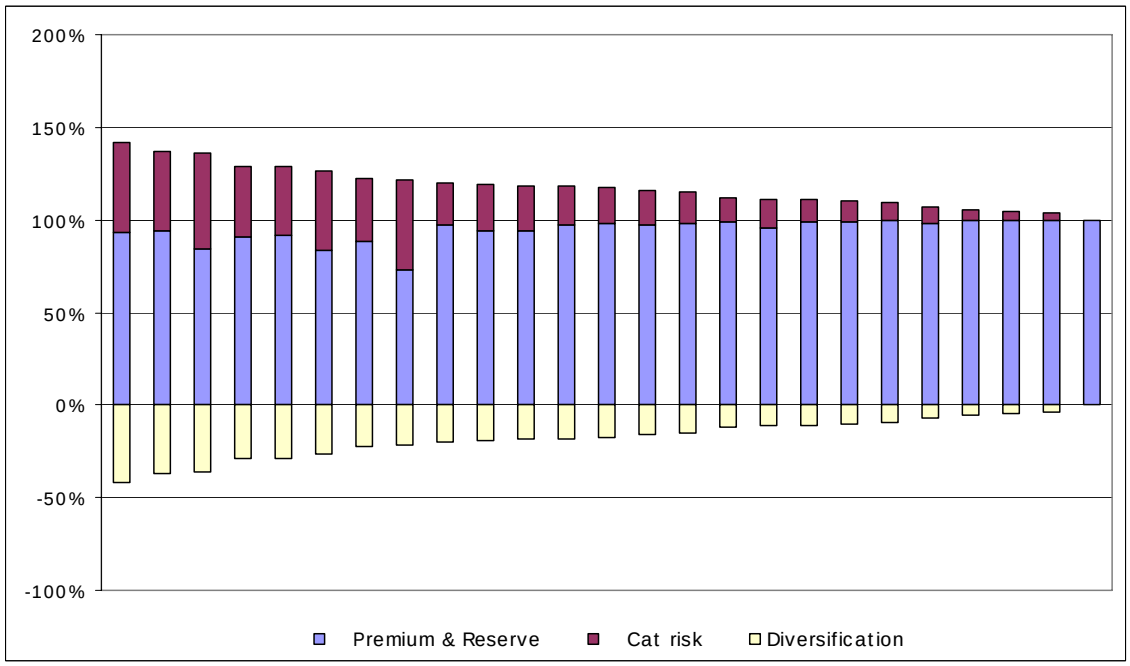


Figure 57: Composition non-life underwriting risks (non-life)



8.4 Counterparty default risk

8.4.1 General comments

The method of calculating the replacement cost was considered to be unclear to participants from several countries. It was questioned why the counterparty default risk (CDR) module did not allow for recoveries made after default on reinsurance exposures. Several participants felt that the capital charge calculated by the CDR module was too onerous for intra-group reinsurance activities with an unrated internal reinsurer. Participants in two countries wondered if the Vasicek formula would be the most appropriate way to calculate the capital charge for an inherently heterogeneous sample of reinsurers. One supervisor stated that CDR is strongly related to the duration of the underlying liabilities, which is disregarded in the proposed method. Participants in one country felt that the CDR module does not address counterparty default risk adequately by ignoring other credit risk exposures, for instance on debts, commercial paper and deposits. Several supervisors noted that participants requested that the CDR module be simplified. On the other hand a request for a more sophisticated approach taking account of the impact of catastrophe events was also made.

8.4.2 Using ratings for reinsurance default risk

Several comments were received on the use of credit ratings for assessing the capital charge for reinsurance. Participants from one country were opposed to using ratings from commercial rating agencies, and requested that if such ratings were to be used, CEIOPS should provide a specific mapping of the rating categories for all of the four large agencies instead of just for one of these. One country asked for a stand on directions for intercompany reinsurance. Clearer guidelines are needed, particularly for programs which are reinsured by a subsidiary in an unrated parent, but where the parent, together with its own business, reinsures/retrocedes the program to unaffiliated reinsurance companies, which are rated. Some country reports mentioned that the treatment of unrated entities in the CDR module is arbitrary. Participants from one of these countries offered an alternative which could potentially deal with both issues: for EEA reinsurance undertakings it should be possible to base the capital component on the level of cover for their SCR capital requirement. Finally, a discrepancy was identified by some participants between the treatment of unrated entities in the spread risk submodule and unrated reinsurers in the counterparty default risk module. In the former, an unrated entity would receive a charge close to the charge a BBB rated entity receives, whereas in the latter, an unrated entity would receive a charge equal to a CCC rated entity (unless it is an unrated EEA reinsurer).

9 Own funds classification

9.1 Allocation of capital to different Tiers

In most countries, more than 50% of participating firms had only Tier 1 capital, comprising primarily paid-up equity, retained earnings and valuation differences. The average proportion of Tier 1 capital across the industry was over 94% for both life and non-life firms in almost every country.

Tier 2 and Tier 3 capital comprised mainly subordinated liabilities, member calls and unpaid share capital. For those firms with at least some Tier 2 capital, the average proportion of Tier 2 capital was less than 25% in almost every country. For those firms with at least some Tier 3 capital, the average proportion of Tier 3 capital was less than 20% for life firms, and less than 33% for non-life firms in almost every country.

The subsequent figures show the distribution of Tier 1 capital across insurance undertakings within different countries, which strongly support the aforementioned arguments. In many cases Tier 1 capital covers 100 percent. No significant differences can be observed between different sectors, i.e. life, non-life and composite.

Figure 58: Tier 1 capital as a share of total capital (life)

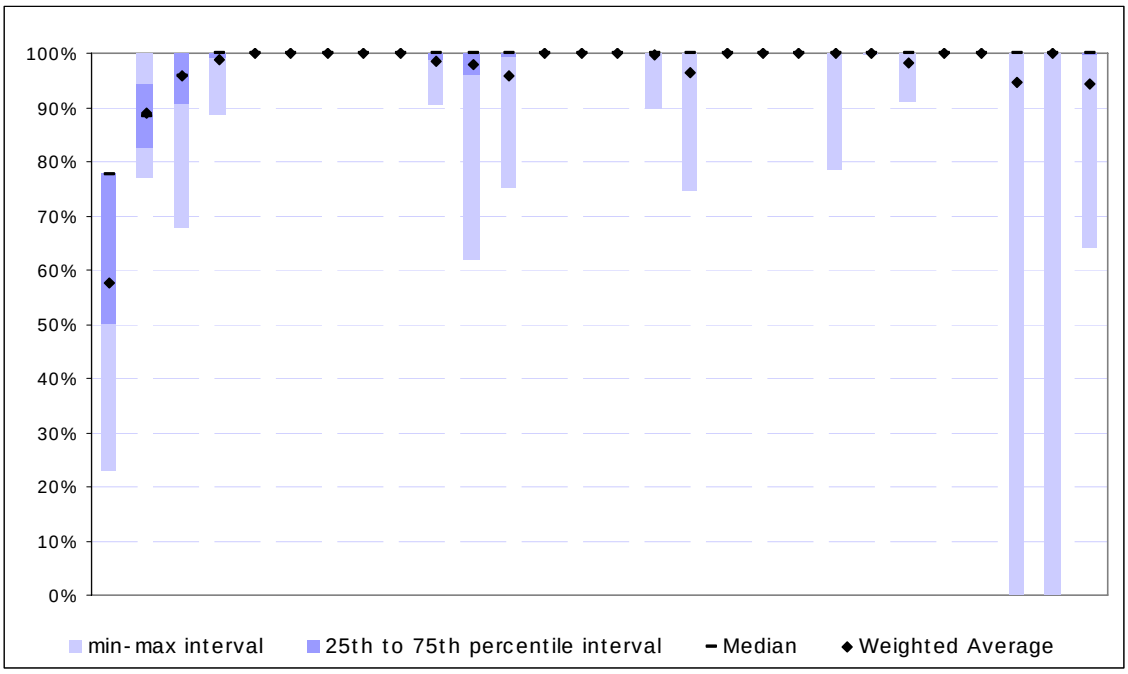


Figure 59: Tier 1 capital as a share of total capital (non-life)

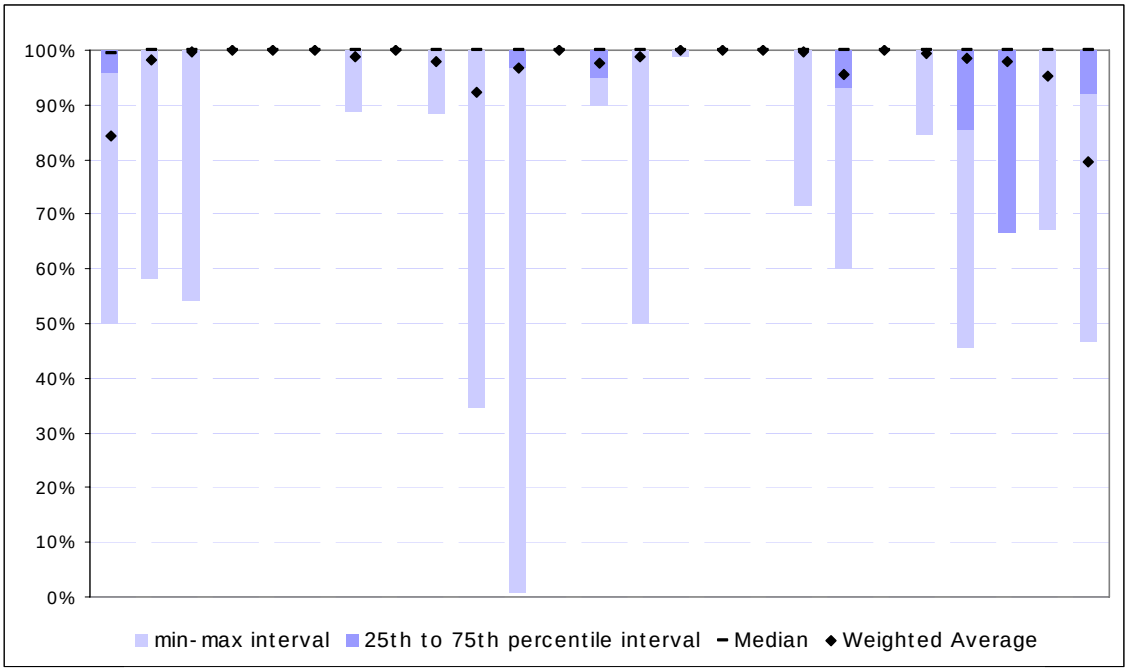
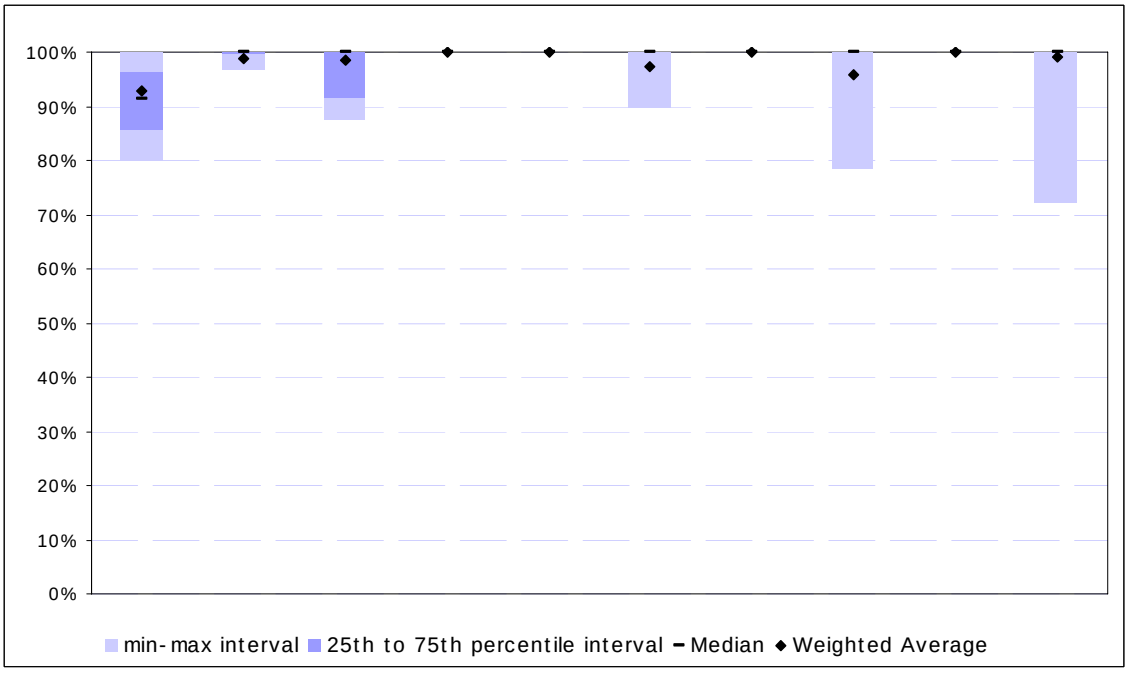
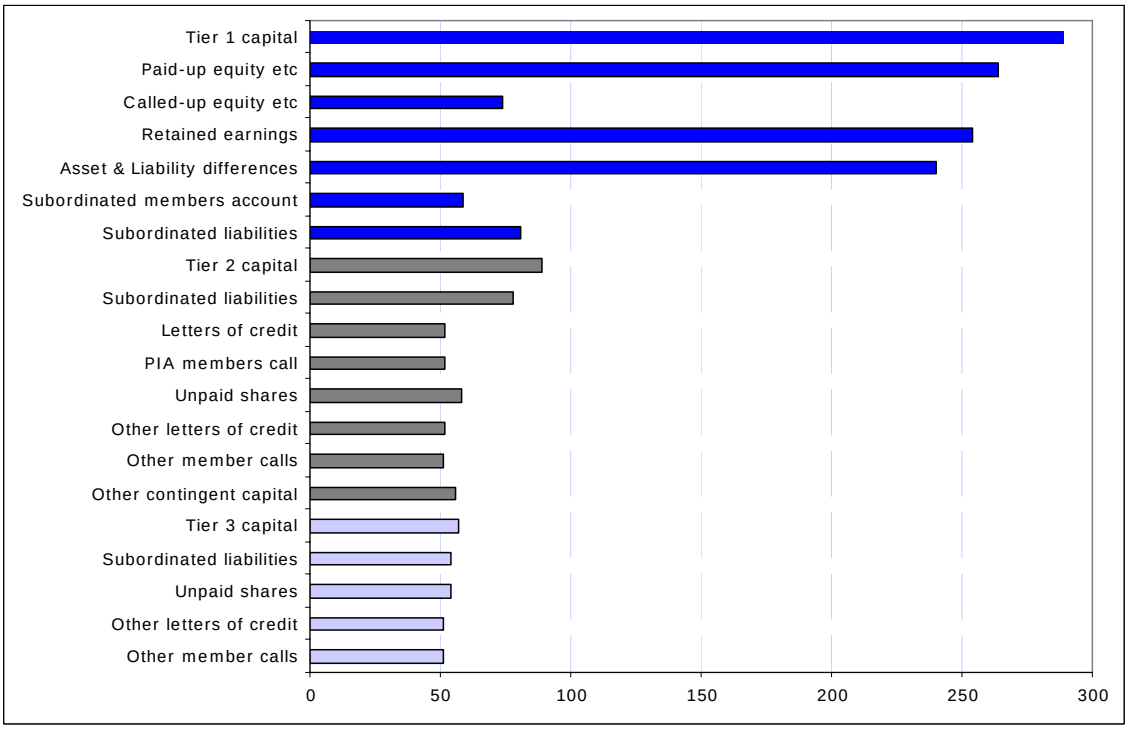


Figure 60: Tier 1 capital as a share of total capital (composite)



Comparing the different categories of capital we see that insurers mostly held their capital in a few categories. The subsequent graphs show the currently most relevant categories of capital[20].

Figure 61: Number of participants using different types of capital (life)



[20] Mind that the graph does not say anything on the amount of capital that was actually attributed to each category by the various insurance undertakings.

Figure 62: Number of participants using different types of capital (non-life)

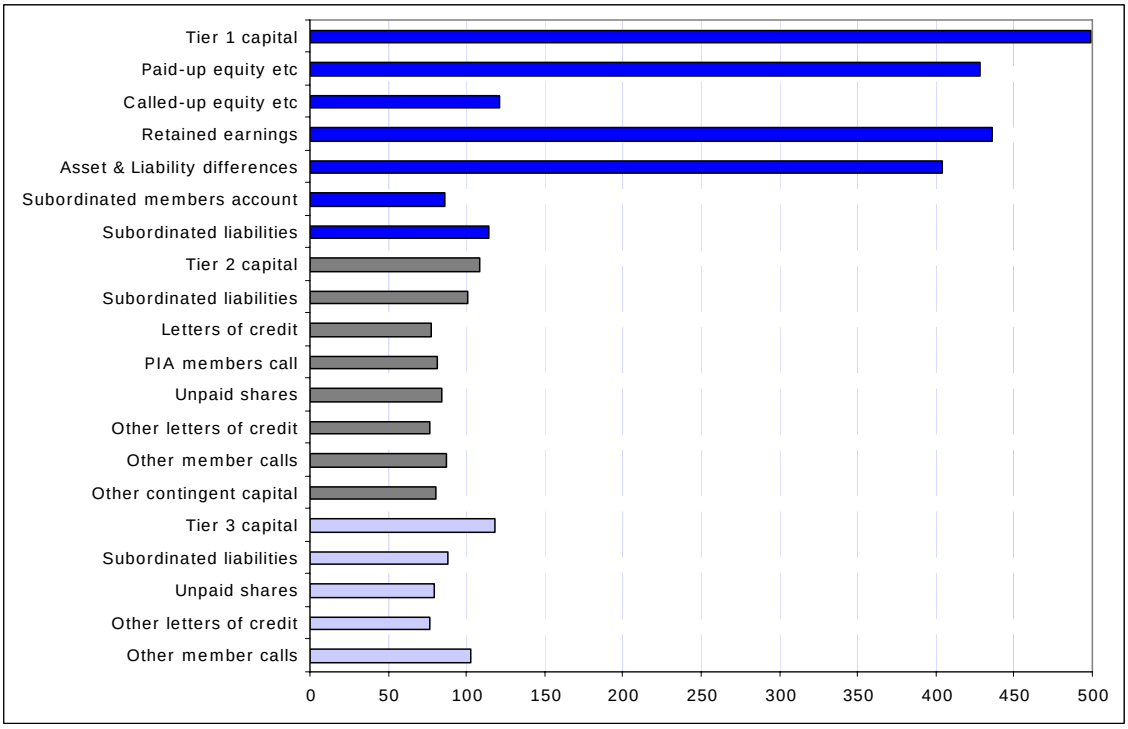
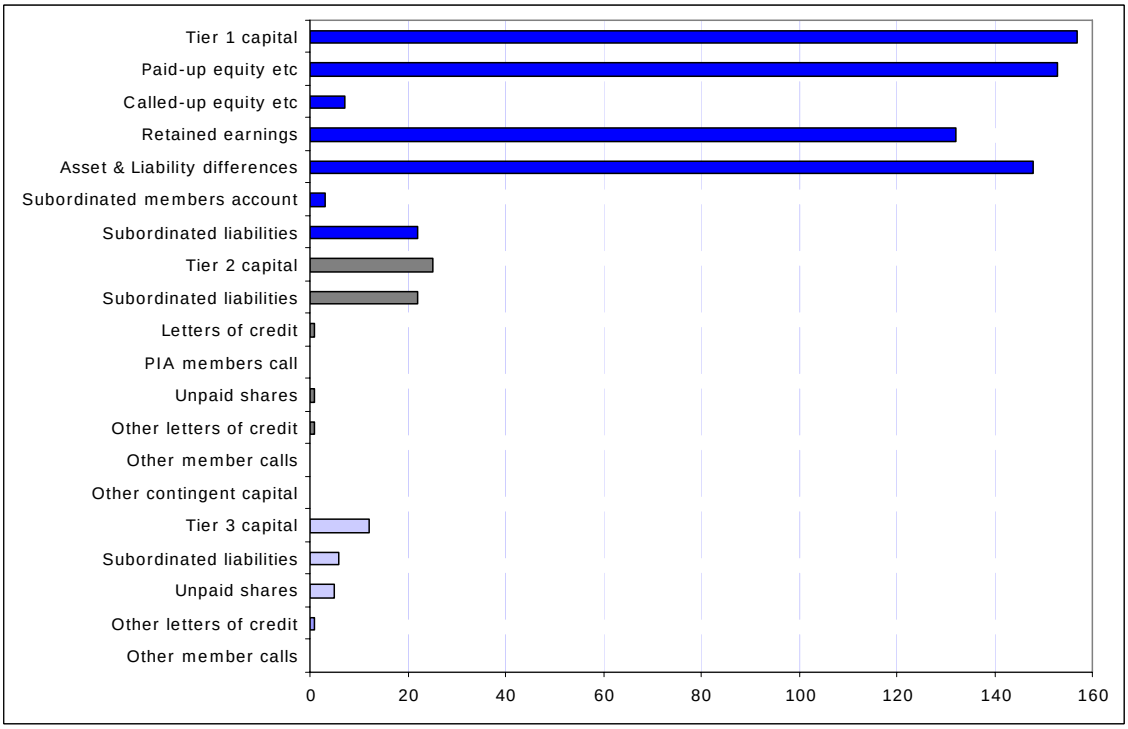


Figure 63: Number of participants using different types of capital (composite)



9.2 Characteristics of subordinated liabilities and contingent capital

There were very few firms that provided any qualitative information about how they had made the classification of these instruments within their own funds. However, one country said that they were undertaking a fresh survey of their firms to obtain some more specific information.

In most countries there were more firms that categorised subordinated liabilities as Tier 1 than Tier 2, but in some countries there were more firms that categorised these instruments as Tier 2 than Tier 1.

Only two countries reported that a significant number of loan instruments were categorised as Tier 3, mainly because of the relatively short duration of these instruments.

One country explained that due to lack of guidance relating to the precise characteristics of capital items, firms were not able to allocate correctly capital into the prescribed Tiers and items. As a result, all capital items had been classified as Tier 1 capital.

A number of firms in one country commented on 'grandfathering' arrangements. They said that from time to time, insurers issue regulatory capital instruments, with long or perpetual maturity, operating in good faith that regulatory capital requirements will not change materially such as to create an unreasonably adverse status for those existing instruments. They added that amendment of a firm's capital structure is not a simple, quick, cheap or flexible solution.

Unpaid share capital was included as Tier 2 capital by several firms in some countries, and by one firm in some other countries. Conversely, this was shown as Tier 3 capital by a few firms in two countries, and by one firm in two other countries. The reasons for this classification were not stated.

There were no countries in which life firms included any members' calls – which under current rules are not eligible as own funds for life assurance undertakings – within their capital. For non-life firms, members' calls were recorded in Tier 2 by the P&I Clubs, and by five other firms in one country, two firms in another country, and by one firm in three other countries. There were member calls recorded as Tier 3 capital by a number of firms in three countries, and by one firm in two other countries.

Very few other types of Tier 2 or Tier 3 capital were reported by firms.

However, one country said that the excess of anticipated future management charges over expenses for linked business might be regarded as contingent capital, though it had been classified as Tier 1 by firms. In another country a question was raised about how to classify the value of reinsurance arrangements where repayments to the reinsurer were contingent on future surplus arising. In

both cases, it would be helpful to clarify whether the appropriate classification is Tier 1, or whether it should depend on the extent of loss absorbency in either a going concern or winding up scenario.

Most firms, other than the P&I clubs, had little experience of calling on members or calling up unpaid share capital, but in one country with many mutuals, the rate of recovery of calls had been excellent, and in another country, one firm said it had achieved a 95% recovery rate. A number of firms referred to the creditworthiness of their owners, and two countries said there was a legal obligation for the owners to pay the calls, or shares, if called on.

In the case of P&I clubs, it was explained that supplementary calls are contractual, and that both penalties and remedies exist to enforce these provisions, in addition to careful membership admission criteria ab initio. It was also said that there is a history over many years of making additional calls, and of receiving them in full. It was commented further that there are material differences between the current requirements for capital and the QIS3 standard for P&I clubs, these differences being a mix of positive and negative, but with QIS3 being overall more prudent.

9.3 General comments

Many firms commented that the interpretation of the requirements for categorising elements of capital and particularly for calculating eligible elements is confusing and overly complex.

Some firms suggested that a simplified system to determine the eligible elements of capital, that was based on risk absorbency from a policyholder view, would be preferable.

Supervisors in a number of countries requested more specific criteria for assessing the different types of capital, and then describing why each item of capital (on the proposed list) is considered to meet or nor each criterion. One country suggested that the supervision authority should be asked by firms for their opinion regarding the classification of different types of capital.

The supervisor in one country suggested we should try to clarify, from a conceptual point of view, each of the applied criteria, both by defining its meaning and defining its opposite (e.g. what it means to have loss-absorbency capacity in winding-up situations, and what it means to lack such capacity).

Many firms and supervisors said that they would have appreciated clearer guidance, and examples, on the classification of ‘own funds’, and in particular on the interpretation and application of the characteristics for the allocation of particular types of instrument to the various tiers. Guidance was requested on

the classification of equalisation reserves and on the treatment of expected dividend payments.

It was also requested that guidance should be provided on the value to be ascribed to subordinated loans and other instruments when they are included as part of own funds. One country provided a useful analysis to demonstrate the difficulty posed by potential differences between the value that is ascribed to this capital and the economic value of these instruments.

A frequent difficulty encountered by firms was that it was not clear how the duration criterion in Article 92(4) of the Directive proposal and the 'incentives to redeem' criterion in Article 92(5), should be applied in practice, in order that an instrument can be deemed to meet 'substantively' these criteria.

There was also some confusion by firms over the meaning of the second criterion in Article 92(2) and how this differed from the criterion in Article 92(1).

One country suggested that there should be a clearer distinction between 'available' capital (Tier 1) and 'callable on demand' capital (Tier 2).

Comments were also made by a number of firms that deferred taxes should be counted as part of available capital since under stressed conditions, which the solvency regime should focus on, the insurance and reinsurance undertakings would not need to pay taxes.

10 Operational risk

Overall, the majority of undertakings that answered the questionnaire seem to recognise operational risk as an area that requires special attention. However, many participants considered the operational risk module as tested under QIS3 as being too simplistic. The opposed the 100% correlation between operational risk and other risk factors and demanded the recognition of diversification effects. Second, participants in 14 countries criticised the module for not taking into account the quality of operational risk management within the insurance firm – in its current form, the formula would not incentivise the development of adequate risk management systems. As a third area of concern participants in six countries mentioned the use of premiums and provisions instead of administrative costs – especially for unit-linked business the latter is seen as the more appropriate measure which would also be more in line with Basel II provisions.

The following figures show a comparison between the BSCR[21] and the operational risk for life, non-life and composite insurance undertakings. The do not allow a generalised interpretation as both the variation within and across countries is particularly high. Comparisons between the three different sectors are also difficult. Nevertheless, looking at the interquartile range (25^{th} to 75^{th} percentile) and the weighted averages, it seems as if operational risk of life firms have, on average, a higher relative operational risk coverage than non-life or composite insurance undertakings.

[21] The operational risk is not part of the BSCR, however the ratios can provide a crude impression on this particular risk's dimension. Furthermore it allows a comparison with other risk modules, which are subsumed under the BSCR.

Figure 64: Operational risk to BSCR (life)

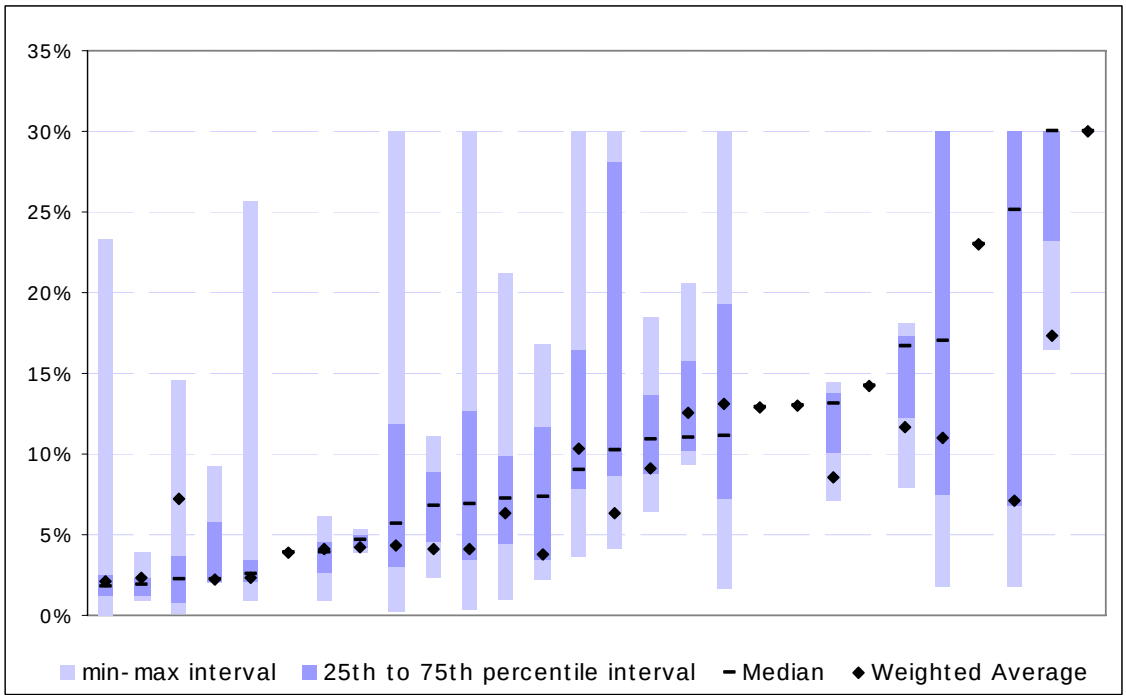


Figure 65: Operational risk to BSCR (non-life)

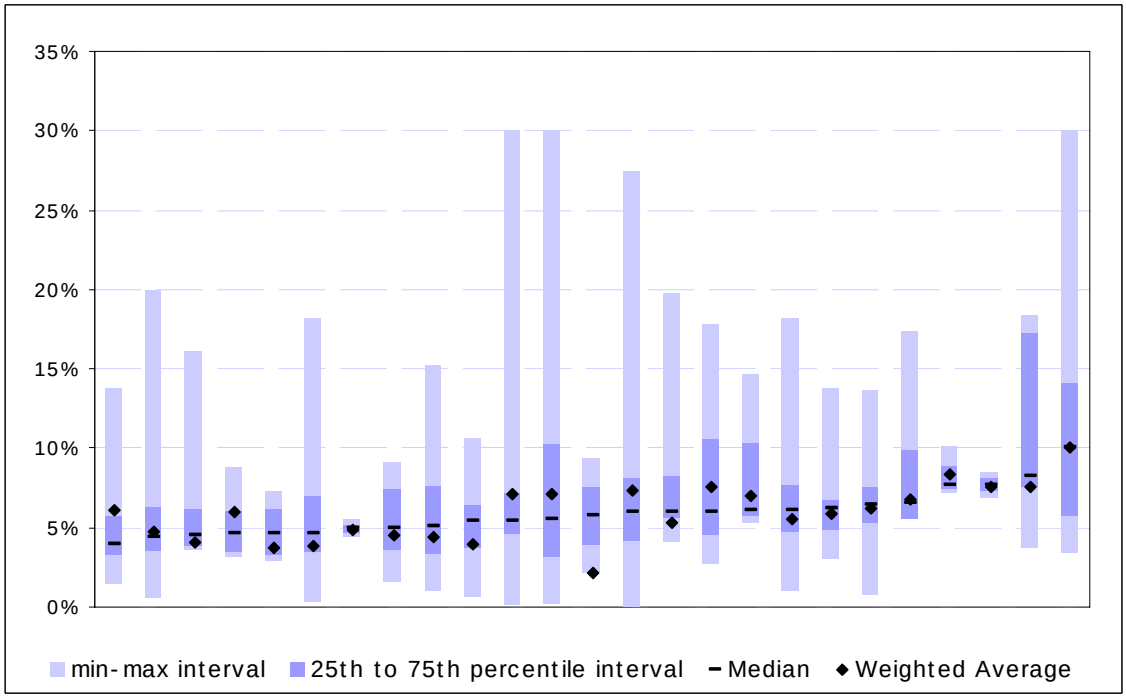
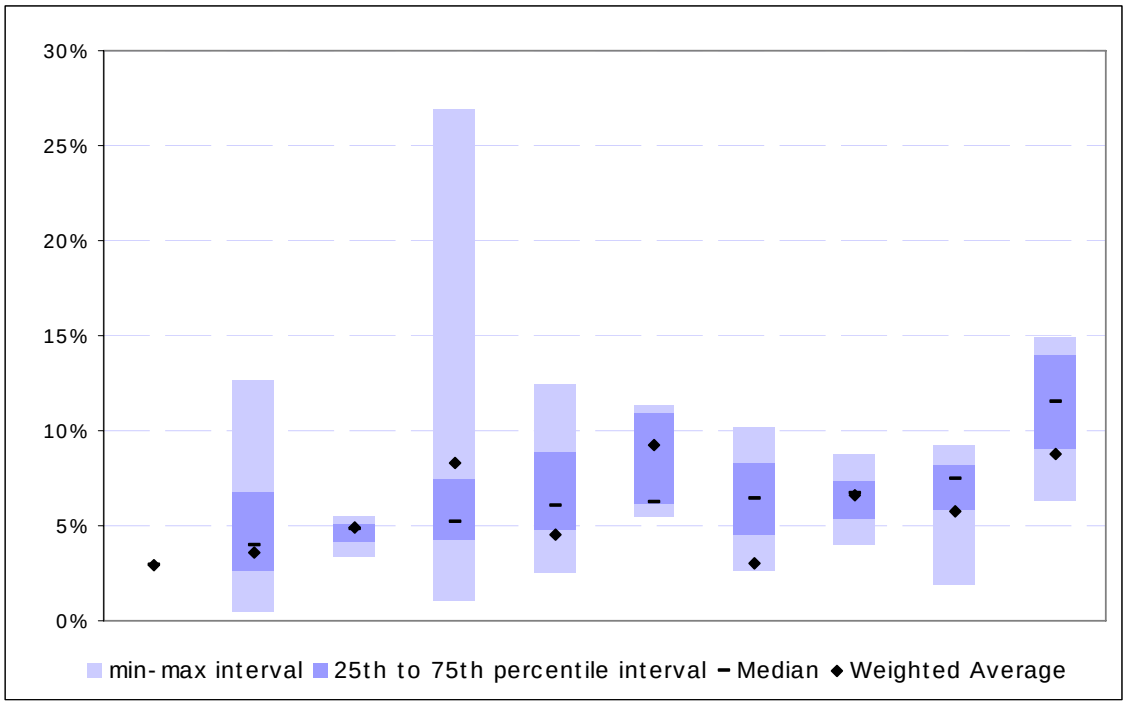


Figure 66: Operational risk to BSCR (composite)



10.1 Theoretical foundation for operational risk management exists very often; nevertheless further work seems necessary

79% of the respondents already operate or plan to operate with an operational risk strategy approved by the board of directors; this leaves a large chunk of 21% of undertakings which do not consider an operational risk strategy necessary at all. Of those having already implemented a strategy still 30% regard it as unnecessary to define their risk appetite for operational risk in their underlying strategy.

An interesting point might be that the number of undertakings currently operating with an operational risk policy is higher than those operating with an operational risk strategy. One answer could be that those policies might have developed by the needs of day to day business.

10.2 Operational risk management structure often applied but quality of implementation differs

69% of the undertakings have an operational risk management structure/ organisation with clearly defined roles and responsibilities and 16% plan to implement one, but only 59% (22% planned) regard it as necessary to document it in policies or guidelines. Further, this leaves 15% of the undertakings having no operational risk management structure/organisation at all.

57% (8% planned) of the respondents currently use an independent operational risk management function in 17% of the cases where an internal audit function is used for managing and controlling operational risk.

65% of the respondents prefer to use or plan to use a committee structure for operational risk management, in 65% of these cases the board of directors will be involved directly in the committees work.

10.3 Operational risk reporting is not a matter of course and bypasses senior management quite often

23% of the respondents do not have an operational risk reporting structure and over 27% do not forward any operational risk report to the senior management level.

10.4 Operational risk management can be further improved

A quarter of the respondents do not have any means for increasing employees' operational risk awareness.

Self assessment is the most popular tool for operational risk management, followed by risk mapping and key risk indicators. Roughly 30% of the undertakings do use scenario approaches for operational risk management and 18% are planning to do so.

Only 38% of the respondents do currently collect historical loss data but 24% are planning to do so. Only 10% of the respondents use operational risk management tools subject to correlations analysis based on actual loss data. Nevertheless, 20% intend to do so in the future.

Operational risk sharing consortia are either unattractive or currently unknown. Only a tiny 7% of the respondents use them, 12% intend to do so in the future.

10.5 Little interest for validating operational risk methods and tools

38% of the respondents indicate they are using or planning to develop quantitative methods (e.g. internal models) for the management of operational risk. But the approaches will mostly not be equivalent to the ones used for banking supervision.

Finally, 54% of the undertakings do not see a need in validating their used methods and tools for operational risk management.

Table 22: Operational risk policy of participants

	Yes	Planned	No
Does your insurance undertaking have an approved (by the board of directors or management board) operational risk strategy?	53%	26%	21%
Has the board of directors (or management board) defined your insurance undertaking's appetite and tolerance for operational risk as part of this strategy?	42%	28%	30%
Does an Operational Risk Policy exist in your insurance undertaking?	63%	21%	16%
Are there any policies/guidelines explaining and supporting Operational Risk Policy?	66%	19%	15%
Does your insurance undertaking have an operational risk management structure/organisation with clearly defined roles and responsibilities?	69%	16%	15%
Are these roles and responsibilities documented in policies/guidelines?	59%	22%	19%
Is there an independent operational risk control/ management function in your insurance undertaking?	57%	8%	35%
In case there is no independent operational risk control/management function in your insurance undertaking, is it the internal audit that manages/controls operational risk?	49%	6%	45%

	Yes	Planned	No
Are there any committees (e.g. Operational Risk Committee) involved in operational risk management in your insurance undertaking?	53%	12%	35%
Is the board of directors or management board involved in work of such committees?	54%	11%	35%
Is there a clear operational risk reporting structure in your insurance undertaking (e.g. local contact person - central operational risk function - committee - management board)?	60%	17%	23%
Are there any regular operational risk reports delivered to senior management at your insurance undertaking?	52%	21%	27%
Are there any means (training session, workshops, newsletters) to increase employees' operational risk awareness employed in your insurance undertaking?	56%	19%	25%
Does your insurance undertaking use risk mapping as an operational risk management tool?	45%	20%	35%
Does your insurance undertaking use risk/self assessments as an operational risk management tool?	67%	14%	19%
Does your insurance undertaking use risk indicators (key risk indicators) as an operational risk management tool?	39%	29%	32%
Does your insurance undertaking collect historical data on operational risk losses and incidents?	38%	24%	38%
Are operational risk management tools (e.g. risk indicators, risk/self assessment) subject to correlation analysis based on actual loss data?	10%	20%	70%
Has your insurance undertaking (or its parent company) joined any operational loss data sharing consortium (e.g. Operational Risk Insurance Consortium - ORIC)?	7%	12%	81%
Does your insurance undertaking use scenario analyses as a part of operational risk management?	30%	18%	52%
Does your insurance undertaking use quantitative methods (internal models) for the operational risk management purposes?	19%	20%	61%
If yes: Is the quantitative method comparable to those applied in banking supervision (e.g. AMA)?	24%	10%	66%
Does your insurance undertaking carry out a validation process for all applied operational risk methods and tools?	26%	20%	54%

10.6 Operational risk management and firm size

Risk management systems for operational risk differ significantly in their degree of sophistication. Especially large firms seem to have established strategies and procedures earlier than smaller firms as Table 23 shows. Most strikingly are the differences with regard to:

- the establishment of an independent operational risk management function (existing in 85% of large firms, but only in 39% of small firms),
- the comparability of quantitative methods to those used in banking (59% vs. 12%), and
- the use of training sessions to increase employees' operational risk awareness (78% vs. 38%).

Table 23: Operational risk policy of participants (by size class)

Percentage of firms answering 'Yes'	Large	Medium	Small
Does your insurance undertaking have an approved (by the board of directors or management board) operational risk strategy?	67%	52%	45%
Has the board of directors (or management board) defined your insurance undertaking's appetite and tolerance for operational risk as part of this strategy?	56%	41%	35%
Does an Operational Risk Policy exist in your insurance undertaking?	67%	55%	49%
Are there any policies/guidelines explaining and supporting Operational Risk Policy?	73%	60%	51%
Does your insurance undertaking have an operational risk management structure/organisation with clearly defined roles and responsibilities?	80%	66%	54%
Are these roles and responsibilities documented in policies/guidelines?	70%	52%	42%
Is there an independent operational risk control/management function in your insurance undertaking?	85%	60%	39%
In case if there is no independent operational risk control/management function in your insurance undertaking is it the internal audit who manages/controls operational risk?	56%	57%	45%
Are there any committees (e.g. Operational Risk Committee) involved in operational risk management in your insurance undertaking?	70%	53%	40%

Is the board of directors or management board involved in work of such committees?	68%	55%	42%
Is there a clear operational risk reporting structure in your insurance undertaking (e.g. local contact person - central operational risk function - committee - management board)?	66%	58%	49%
Are there any regular operational risk reports delivered to senior management at your insurance undertaking?	57%	54%	42%
Are there any means (training session, workshops, newsletters) to increase employees' operational risk awareness employed in your insurance undertaking?	78%	51%	38%
Does your insurance undertaking use risk mapping as an operational risk management tool?	73%	51%	38%
Does your insurance undertaking use risk/self assessments as an operational risk management tool?	83%	60%	49%
Does your insurance undertaking use risk indicators (key risk indicators) as an operational risk management tool?	37%	37%	37%
Does your insurance undertaking collect historical data on operational risk losses and incidents?	56%	32%	37%
Are operational risk management tools (e.g. risk indicators, risk/self assessment) subject to correlation analysis based on actual loss data?	22%	9%	7%
Has your insurance undertaking (or its parent company) joined any operational loss data sharing consortium (e.g. Operational Risk Insurance Consortium - ORIC)?	7%	7%	8%
Does your insurance undertaking use scenario analyses as a part of operational risk management?	48%	31%	22%
Does your insurance undertaking use quantitative methods (internal models) for the operational risk management purposes?	36%	21%	11%
If yes: Is the quantitative method comparable to those applied in banking supervision (e.g. AMA)?	59%	30%	12%
Does your insurance undertaking carry out a validation process for all applied operational risk methods and tools?	51%	30%	18%

11 Internal models

In the QIS3 135 insurers (about 13% of all participants) from 14 countries provided their internal model results. A first analysis of the reasons for the modest feedback can be summarised as follows:

- insurer has no internal model,
- burden for filling out:
  - time constraints,
  - personal constraints,
- insurers are reluctant to share the information with the supervisors,
- early stage of development of the internal model.

11.1 Partial internal models

The partial internal models of the participants of the QIS3 who provided information generally covered one or more of the following risk modules (or parts of them):

- Underwriting risk (52 out of 55 life insurers and 61 out of 65 non-life insurers),
- Market risk (127 out of 135 insurers),
- Operational risk (109 out of 135 insurers),
- Credit risk (51 out of 135 insurers).

Table 24: Submissions by risk type

	Life firms	Non-life firms	Composite firms
(partial) submissions	55	65	15
SCR	54	56	15
Market risk	52	61	14
Credit risk	12	34	5
Life underwriting risk	52	4	14
Non-life underwriting risk	1	61	9
Health underwriting risk	1	3	0
Operational risk	46	53	10

11.1.1 Underwriting risk

Against the background of the QIS3 standard formula, life-insurers saw the main improvement of internal modeling regarding the design of the lapse sub risk module (especially the lapse catastrophe risk) and/or the design of the expenses sub risk module. However there are also good reasons for some insurers for a different modeling of the mortality and disability sub risk modules.

Differences between the standard and the internal modeling of the life underwriting risk module named by some insurers:

- liabilities are valued from a shareholder perspective (e.g. future discretionary bonuses are not treated as available capital but serve for risk mitigation),
- European Embedded Value (henceforth: EEV) or Market Consistent Embedded Value (henceforth: MCEV) results used as proxies,
- different criteria to assess the market value margin (for instance the market value margin could not take into account the one year cost of the capital relating to hedgeable market and credit risks),
- consideration of trend and uncertainty in the longevity and mortality risks.

For non-life insurers a more realistic assessment of the volatility (standard deviations of the lines of businesses) and the diversification effect (correlations between the lines of businesses) as well as the consideration of profit from future business are reasons for internal modeling. In most cases the individual modeling results in a lower capital requirement for non-life underwriting risk (lower standard deviations, higher diversifications effects, allowance of profit from future business).

Some differences between the partial internal model and the standard formula for non-life underwriting risk:

- no lognormal distribution assumed (not representative for the loss ratios of the undertaking),
- usage of Monte Carlo simulation,
- different modeling of basic/frequency losses (e.g. assessment of a distribution for the severity of claims and a distribution for the number of claims; mixed Pareto distribution for the total severity of claims) and high losses (e.g. assessment of a distribution for the total loss),
- no explicit risk margin,
- AA swap curves used for discounting,
- EEV or MCEV results used as proxies,
- inclusion of profits from underwriting.

11.1.2 Market risk

In most cases the partial internal models are developed for the equity, interest rate and property risk sub modules. In some cases, also the spread and currency risk sub module are considered.

For most insurers, the reason for internal modeling is the general purpose to assess market risk under a more sophisticated approach to reach a more individual and realistic picture of the own risk situation. In this regard, some insurers stated that the given shocks of the standard formula are not representative (e.g. for equity risk and credit spread risk) for their portfolio and/or pointed out that the specified correlations of the standard formula are not adequate (especially the correlation between the equity and interest rates).

Main differences of the partial internal model compared to the standard formula:

- usage of historical data and economic scenario generator (henceforth: ESG),
- consideration of the implied volatility for the interest rate and equity risks and the effect of changes in implied volatility on the value of options,
- take different scenarios into account.

11.1.3 Operational risk

For operational risk the reasons for building a partial internal model are

- to get a more individual and realistic view on risk in this field, and
- to assess the effectiveness of internal controls and risk mitigations.

11.2 Internal model vs. placeholder calculation of SCR components

There is a wide dispersion in the reported ratios of the internal model calculations to the standard formula SCR, particular so for some of the individual components e.g. market risk and credit risk.

In brief, the following explanations for differences between internal model SCR and standard formula SCR are mentioned:

- use of company specific/individual data,
- different shock scenarios,
- different calibration,
- different correlation assumptions,

- different handling of sub-risks and risk mitigation (i.e. reinsurance).

Some respondents point out that the internal models define sub-categories in a different way than the QIS3 and therefore it is hard to compare internal model results with standard formula outputs.

Some more specific comments related to life insurance firms and non-life insurance firms, respectively, are listed below.

11.2.1 Life Insurance

For a majority of the life insurance firms reporting internal models calculations, the internal models produced a lower total SCR than the standard formula. This is mainly explained by lower capital requirements for market risk and life underwriting risk. On average, the reduction in total SCR when using internal models is about 15 percent.

Historical data used to model market risk produces different shock scenarios than in the standard formula. Although the overall picture is a lower capital requirement for market risk when using internal models, the ratio of internal model SCR to standard formula SCR varies considerably between firms. Two countries comment that free assets are included in the standard formula SCR but normally left out of account in the internal models when stressing the portfolio, and this affects the ratio.

For many firms the capital charge for underwriting risk calculated by their internal model comes to less than ¾ of the charge produced by the standard formula SCR. The comments related to underwriting risk in life insurance are scarce. One country points out that the calculation of technical provisions within models generally does not include a risk margin. In addition it is remarked that in most life firms' models there are no allowance for lapse cat risk, and the high lapse risk catastrophe charge in the standard formula partly explains the difference between the output from internal models and standard formula.

The internal models generally produce higher partial SCR for credit risk than the standard formula. Some respondents comment that the standard formula focuses on credit risk related to risk mitigation contracts like reinsurance, whereas internal models account for credit risk on a wider range of assets (e.g. bank deposits, property tenants). In addition concentration risk and spread risk might be treated as credit risk in the internal models, whereas QIS3 reflects them within market risk.

For operational risk, quite a few undertakings report that their internal model leads to a partial capital charge far above the standard formula SCR, but there are also some respondents reporting significantly lower SCR when using the internal model compared to the standard formula.

11.2.2 Non-life insurance

Overall, the internal models in non-life insurance produce significantly lower total SCR than the standard formula. Only a limited number of firms report internal model SCR that are higher than the standard formula. The average reduction in total SCR is about 25 percent. The reduction seems to be largely due to the non-life underwriting risk capital component, the main capital component in the SCR for most non-life firms. In their internal models, undertakings use company specific data and internal estimates. Firms claim that this gives a better reflection of the risks than market volatility parameters used in the standard formula. The assumed volatility of non-life loss ratios and technical provisions is generally lower than in the SCR. It is also pointed out that the internal models better account for the effect of reinsurance and diversification.

For market risk, the picture is more or less the same as in life insurance, i.e. on average the internal models produce lower SCR.

Non-life insurance undertakings report internal model SCR for credit risk and operational risk far above the standard formula SCR. The same comments as to life insurance apply for the credit risk component.

11.3 Reasons for inconsistencies?

11.3.1 Valuation

- Where liabilities were not able to be valued on a market consistent basis, EEV or MCEV results were used as proxies
- Not including a risk margin in the calculation of technical provisions
- Different criteria to assess the market value margin (for instance the market value margin could not take into account the one year cost of the capital relating to hedgeable market and credit risks)
- Using historical data and ESG

11.3.2 General

- Different confidence level and/or risk measure, consideration of longer time horizon
- Usage of individual data, different shock scenarios, different calibrations, the modelling of national specifics or explicit modelling of reinsurance
- Entity specific probability distribution for risk drivers

- Different risk mitigation approaches (e.g. applying mitigation actions before correlations), handling of sub-risks (the standard formula focuses on credit risk related to risk mitigation contracts like reinsurance, while some internal models account for credit risk on a wider range of assets, i.e. bank deposits, property tenants), Reinsurance programmes were often explicitly modelled

11.3.3 Aggregation

- Non-linearity adjustment in aggregating the risk factors, non-linear correlations in risk interactions
- Different structure or correlation matrices
- Entity specific correlations between equities and interest rates

11.3.4 Non-life underwriting risk

- More comprehensive and detailed catastrophe modelling (including reinsurance protections)
- Assumed volatility of non-life loss ratios and reserves
- Entity specific standard deviation of the portfolio

11.3.5 Expected profit in non-life business

- Inclusion of profits from underwriting, regarding to expected profitability in non-life business

11.3.6 Market risk

- Individual credit spread stresses and duration caps
- Entity specific assessment of current asset risk, volatility of business, diversification between classes, equity and interest rate shocks and stresses, AA swap rates used for discounting
- Stress tests of the free assets are taken into account in the standard formula but left out in some internal models
- Individual profit and loss distribution of the credit portfolio

11.3.7 Life underwriting risk

- No allowance in life firms' models for lapse cat risk

11.3.8 Additional risks

- Additional risks (changes in take-up rates for options, changes in implied volatility, changes in retirement ages, and pension scheme risks) are included in the internal model but not in the SCR

11.3.9 Are there risks (covered by the internal model) which are not at all covered by the standard formula?

- Non-life underwriting risk – Premium Cycle test: The Premium Cycle test stresses premium rates falling and the possible impairment of profitability over the underwriting cycle. Historical combined operating ratios are charted until the point at which the first switch from loss to profit occurs. A formula based on implied losses and anticipated profits determine the internal model amount.
- Largest Single Risk: The Largest Single Risk test stresses the exposure impact such that the claim arising from a single largest risk would not exceed the financial resources available. It adds an additional layer of prudence – the calculated amount is compared to the overall internal model result and the larger number is taken. This test differs from the Cat test which covers the impact of the largest exposure on a group of associated policies.
- Combination test: The combination test factors in additional prudence into the internal model calculations by taking into account the interactions between the single risk factor tests that could realistically be expected to occur in practice except for the Premium Cycle and Largest Single Risk tests. At least two combination tests (out of four) are required to be completed, based on the fixed scaling factor methodology, including at least one interest rate up and one interest rate down for both the policyholder and total balance sheet internal model bases.
- Implied volatility for the interest rate and equity risks
- Trend and uncertainty in the longevity and mortality risks
- The effect of changes in implied volatility on the value of options
- The interaction of persistency and option take-up rates with changes in financial market conditions
- Some international groups also modelled the effect of geographical diversification on their different risks
- Pension scheme risks
- Non-linearity of risk interactions (such as interest rates and property)

- New business risk
- Closure
- Liquidity risk
- Taxation
- Other group risks (such as the failure of subsidiaries or associated companies)

11.3.10 Are the risk modules of the standard formula combined or divided for the internal model?

- Some internal models for market and credit risks define sub-categories in a different way than the QIS3 study (e.g. concentration and spread risks are included in credit risk category while QIS3 reflects them within market risk)
- The lapse risk both in the lapse and catastrophe risk modules overlap one another in an important part. This would be the reason for the difference in the life underwriting risk module.
- In one case an undertaking considered the operational risk subdivided in event risk (covers both internal and external event risk) and moral risk (it is not related to an immediate financial loss but to the probable loss of future business provoked by the disruption of the confidence of the policyholders towards the group because of events which might morally rather than legally be attributed to the group). Moreover for each previous risks the undertaking assessed the impact of the risk factor on both the market value of assets and liabilities using market consistent and stochastic techniques in order to measure the impact of the stress tests on profit sharing, minimum guaranteed rates, lapse rates, withdrawal rates and taxes.

12 Special issues

12.1 Suitability of QIS3 for small insurance firms

12.1.1 Significant increase in participation of small insurers

Small insurance firms showed a strong interest to participate in QIS3: Compared with QIS2, the number of small undertakings that took part in the study considerably increased by 172 percent, so the participation far more than doubled. The share of small insurers in the overall number of participants rose from 30% to 41%.

12.1.2 Few observations on different impact on financial position

There is no straightforward answer to the question how the financial position of small firms is affected by the requirements under QIS3. Some supervisors observed a larger impact on smaller undertakings, though it was sometimes difficult for the supervisor to ascertain whether there is causality between the size of the undertaking and the impact. Another supervisor noted that smaller and larger undertakings felt a greater impact from the SCR and MCR compared with medium-sized undertakings, but no explanation could be delivered. Finally, one supervisor identified a greater volatility on the financial impact for smaller undertakings.

12.1.3 Assessment of technical provisions as a main concern

In general, smaller undertakings were confronted with the same problems as the other participants; however the severity of the problems (e.g. availability of data and resources) appears to have been higher. One supervisor expressed a particular concern that the resource implications will be disproportionate for smaller companies, and for companies in smaller territories, where expert assistance may be scarce.

In particular, small firms in a number of countries experienced practical difficulties with the assessment of best estimate provisions, and with the proposed segmentation for non-life business, partly because of the small amount of claims data for some lines of business.

A number of small and middle sized insurers said that the CEIOPS proposed methodology for the risk margins is quite complicated and data demanding, and some said they would therefore prefer the CEA methodology suggested for QIS2.

It was suggested that for non material parts of business, proxies could be used in respect of the calculation of the technical provisions. Further, it was suggested by some firms and supervisors that more guidance like market-wide parameters (e.g. run-off triangles or assumptions on lapses) could be provided which could make the calculations more feasible, more reliable and consistent throughout the market.

Two supervisors believe that there is a clear minimum expectation of expertise and capability to assess insurance liabilities and related risks that must be expected of every undertaking of any size. One of these supervisors added that, allowing alternative approaches may present undertakings with an option to choose whichever approach results in a lower capital requirement, which would be undesirable in terms of what the new solvency requirements are trying to achieve.

A number of firms commented that the 'simplified approach' proposed by CEIOPS in Annex B of the specification, was not a simplified approach in their view, while some other firms welcomed this approach.

12.1.4 Priorities for future work – Feedback by small firms

The following tables compare the expectations of small and large participants regarding CEIOPS' future work. This analysis follows the approach outlined in chapter 4.1.2: Pictured below are the average priority ranks assigned by the participants of each country to the necessity of prescriptive rules, guidance for calculation and simplifications to the methodology as compared to the QIS3 Technical Specifications.

Table 25: Priorities seen by small and large participants (life)

	Small Life firms	Large Life firms
Guidance for calculation of SCR	High (1)	High (4)
Guidance for calculation of technical provisions	High (2)	High (1)
Guidance for calculation for assessment of eligible capital	High (3)	High (2)
Simplification of methodology for technical provisions	High (4)	Medium (6)
Guidance for calculation of MCR	High (5)	High (3)
Simplification of methodology for calculation of SCR	Medium (6)	Low (11)
Simplification of methodology for calculation of MCR	Medium (7)	High (5)
Guidance for calculation of value of assets	Medium (8)	Medium (9)
Prescriptive rules for assessment of eligible capital	Medium (9)	Medium (7)
Simplification of methodology for value of assets	Medium (10)	Low (15)

Prescriptive rules for calculation of MCR	Low (11)	Medium (8)
Simplification of methodology for assessment of eligible capital	Low (12)	Medium (10)
Prescriptive rules for technical provisions	Low (13)	Low (12)
Prescriptive rules for calculation of SCR	Low (14)	Low (13)
Prescriptive rules for value of assets	Low (15)	Low (14)

Table 26: Priorities seen by small and large participants (non-life)

	Small Non-Life firms	Large Non-Life firms
Guidance for calculation of technical provisions	High (1)	High (3)
Guidance for calculation of SCR	High (2)	High (2)
Guidance for calculation for assessment of eligible capital	High (3)	High (5)
Guidance for calculation of MCR	High (4)	High (1)
Simplification of methodology for calculation of SCR	High (5)	Medium (9)
Guidance for calculation of value of assets	Medium (6)	Medium (6)
Simplification of methodology for calculation of MCR	Medium (7)	High (4)
Simplification of methodology for technical provisions	Medium (8)	Medium (8)
Simplification of methodology for value of assets	Medium (9)	Low (15)
Prescriptive rules for assessment of eligible capital	Low (11)	Medium (10)
Simplification of methodology for assessment of eligible capital	Low (11)	Low (14)
Prescriptive rules for technical provisions	Low (12)	Low (11)
Prescriptive rules for calculation of MCR	Low (13)	Medium (7)
Prescriptive rules for calculation of SCR	Low (14)	Low (13)
Prescriptive rules for value of assets	Low (15)	Low (12)

Guidance is a top priority for both small and large firms (averaging between 3.2 for small non-life firms and 3.8 for small and large life firms). Further, small firms requested simplifications more often than large firms; the average rank awarded by both small life and non-life firms is 7.8 while it is 9.4 for large life firms and 10.0 for large non-life firms. Among small undertakings, prescriptive rules are considered as less of a priority (average rank between 12.4 and 12.8) than among large firms (10.6 - 10.8).

While the calculation of the MCR is in general the item that raises the highest priority expectations among large firms (average rank 4.0 for non-life firms and

5.3 for life firms), the average priority assigned by small life undertakings is only 7.7 (non-life: 8.0). Technical provisions rank top among small firms (life: 6.3; non-life: 7.0) followed by the SCR calculation (7.0 for both life and non-life) – both items are ranked quite similar by large firms. The assessment of eligible capital seems to be more of a concern for small non-life insurers who rank this item higher (7.7) than large firms (9.7). For life undertakings the respective ranking is the other way around (8.0 for small firms, 6.3 for large firms). Finally, further work by CEIOPS on the valuation of assets is of less importance for all participants, though the priority is somewhat higher for small firms (life: 11.0; non-life: 10.0).

12.2 Health insurance

12.2.1 General comments

Several countries commented on the issue, even though for some it was sometimes found difficult to isolate the 'life-like' health component of the relevant products, as firms have no separate health component.

Some insurance undertakings writing health business found it to be counterintuitive using the non-life module when there is a separate health module. For health undertakings classification as health or as non-life may be material since the operational risk charge for non-life is 10 times the charge for health (when based on the technical provisions).

Consistency with the other modules was further challenged regarding the differences in the treatment of the number of required historic loss ratios between the health and non-life modules: Why should health undertakings require only 10 historic years for a maximum credibility of company-specific data of 100%, while under non-life 15 years are required for a maximum credibility of company-specific data of (15/19)*100%? Further, the health module allows own data for both the expense and claims module, while the non-life module must use the market-wide estimate for reserve risk.

It was stated several times that the correlation of health insurance according to life techniques and health insurance according to non life techniques is not, as assumed in QIS3, zero.

12.2.2 Suitability of the module

12.2.2.1 Stochastic vs. deterministic approach

Some companies expressed their difficulties on the assessment of the health-life technical provision and the CoC risk margin.

One supervisor of a major market applying the health module provided a software tool to support the simplified deterministic calculation of health best estimates, using proxies based on current accounting, which was appreciated by participants. Calculating the loss absorbency of future profit provisions in health underwriting risk was reported to be very challenging, as there is no formula to apply.

Only few participants applied simulation techniques to produce the best estimate [22] . The reasons for favouring deterministic approaches were in particular:

- The deterministic approach is more practical than a simulation approach. Most insurers have IT systems at their disposal that can perform the necessary calculations.
- The results under the deterministic approach are more comparable than simulation results.
- The deterministic approach is more transparent than a simulation approach and its results are more likely to be comprehensible.

Many participants argued that the stochastic simulation techniques may not be suitable for the valuation of 'health as life' insurance liabilities. The cash flows of these liabilities are characterised by the following features:

- The contract period is very long; participants reported durations up to 40 years for their portfolios.
- The claims inflation cannot be predicted reliably in the long run since it depends heavily on medical, demographic, legal and political developments.

Owing to the long durations, the outward cash flow is extremely sensitive to the assumptions on claims inflation.

- In case of adverse developments, the insurer has to adjust the premiums to a sufficient level (premium adjustment clause).
- The dates of premium adjustments as well as the level of the adjusted premium cannot be predicted reliably.
- The inward cash flows and the investment profits of the insurer heavily depend on the dates and the level of premium adjustments.
- Because of the premium adjustment clause, health insurance liabilities bear a limited risk.

Pursuant to the premium adjustment clause, the insurer has to raise the premiums in line with claims inflation. As inflation risk is efficiently minimised by

[22] These calculations were partly based on deterministic assumptions, though.

this mechanism, even simplified deterministic approaches (cf. to paragraph I.1.100 of the QIS3 Technical Specifications) appear to be suitable.

The results of QIS1 and QIS2 demonstrated that a minimum comparability of the projected cash flows can only be ensured if harmonised assumptions (e.g. claims inflation, mortality etc.) are used. Therefore a national supervisor specified these assumptions.

12.2.2.2 Expected profit

Most insurers criticised that the expected profit of new business during the solvency time horizon is not allowed for in the SCR calculation. The premiums of health insurance policies comprise prudent safety margins by law, resulting in a certain profit of new business. Under an economic approach, it was considered to be inappropriate not to allow for the risk mitigating effect of this expected profit.

12.2.2.3 Risk mitigation

It was mentioned that there is no means (neither in health nor in non-life) of benefiting fully from public risk mitigation offered by specific health insurance systems, resulting in adverse effects on solvency positions for a majority of participants in one country.

It was further noted that the calculation of a modified duration is not a correct approach for a health insurer, since those insurers have the right to adapt premiums also for existing contracts in case of need. The duration of liabilities has been calculated by the formula

$$\text{Duration of liabilities} = \frac{\text{change in technical provisions}}{\text{technical provisions} \cdot \text{change in interest rates}}$$

leading to a duration of 11 years for the liabilities. The adoption of market interest rates in the calculation from 2012 on is a central assumption in this calculation. Without the possibility to adapt premiums, the duration of liabilities would have been 61 years.

12.2.2.4 Size

‘Smaller’ health insurers seem to be somewhat in favour of more prescriptive rules, more guidance for calculation and simplification for methodology in the fields of technical provisions, valuation of assets, assessment of eligible capital, calculation of SCR (and MCR).

It was suggested that the rules for the young and small companies should take account of a longer phase to reach stability of statistical data. One young insurer noted that the module gave unreasonably high capital charges because the combined ratios shortly after start up were very high. The improvement of the ratios during the past years led to a high statistical variance of ratios. This

problem may be addressed by excluding the first ratios after start up of young insurers from the time series that is used in the module.

12.2.2.5 Taxation

In the opinion of some companies, deferred tax liabilities as appearing from the valuation method raised in the Question & Answer document should be made available to reduce the SCR (or increasing the eligible elements), as these tax liabilities will decrease in case of a major adverse development of claims for example.

12.2.2.6 Operational Risk

For health undertakings, it is material if their business is classified as health or as non-life since the operational risk charge for non-life is 10 times the charge for health (when based on the technical provisions). This is based on a different treatment of health insurance similar to life insurance v health insurance similar to non-life insurance, but health insurance undertakings find that using the non-life module when there is a separate health module is counterintuitive.

12.2.3 Quantitative aspects

The solvency ratio on average substantially increased. For most participants ratios between 175% and 600% were reported, some significantly higher.

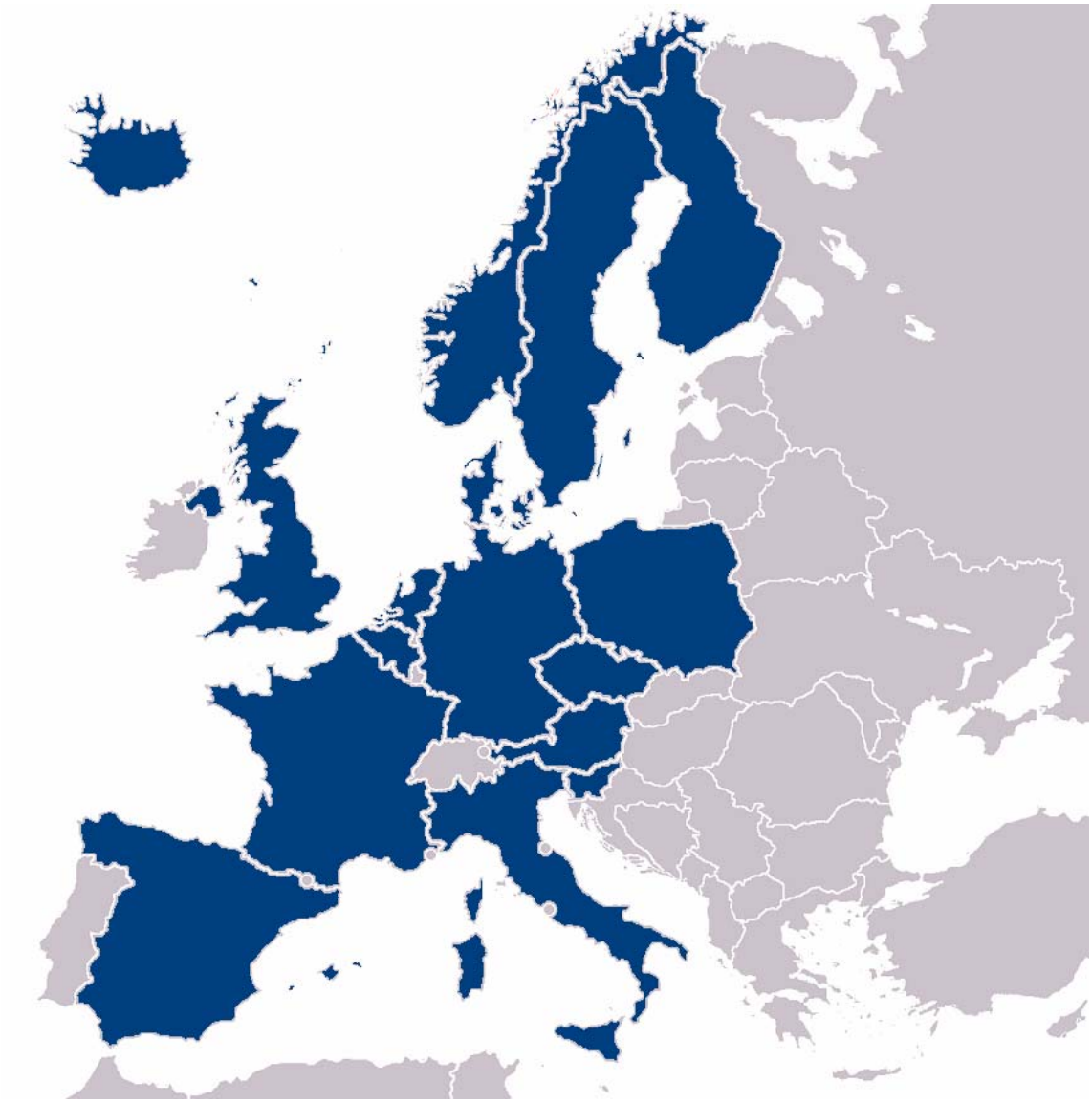
QIS3 technical provisions were reported somewhat lower than the current technical provisions on average. For most participants, the decrease ranges from 0% to 20%.

On average, the SCR was reported 2.7 times higher than the Solvency I capital requirement. The factor ranged from 0.9 to 3.5 for most of the participants.

13 Insurance groups

13.1 Representativeness of group data provided

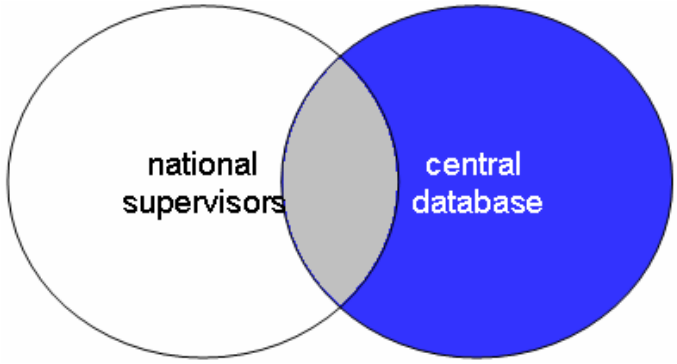
Figure 67: Group submissions (country reports and central database)



13.1.1 QIS3 participation

In QIS3 for the first time a particular emphasis was put on insurance groups. In total 16 countries provided input to the study, covering a significant share of the market.

The data were analysed at two different levels, which to some extent overlap due to their use both by the national supervisors and the central database: On the one hand, there is the data collection and analysis by the corresponding group supervisor who could contribute his specific knowledge about the respective groups. On the other hand, there is the central database where those groups that agreed to do so were compiled. The advantage of this central database lies in the fact that confidentiality problems could be overcome due to the larger sample. In several countries the small number of entries in the national group database (caused by scarcity of groups) or the dominance of a single large group necessitated the restriction of relevant data for further assessment and comparison at European level.



Due to the existing overlaps in the databases, two different kinds of tables are presented. The conclusions drawn from the central database complement the ones from the national analyses and give additional insight based on a larger European sample.

13.1.2 Data based on the national databases

The participating groups are categorised according to size class and type of group in order to structure the assessment for QIS3. This classification follows the rules explained below.

13.1.2.1 Group type

Groups can be allocated to four different types with capital requirements as the basis of separation.

Cross-sector groups	more than 20% of the total capital requirement for non insurance activities.
International groups	more than 20% of the total insurance capital requirement for non EEA activities (assessed with local rules)
European groups	more than 20% of the total insurance capital requirement for non-national activities
National groups	groups that do not fall within the above categories

13.1.2.2 Size class

The size class of a group is determined based on the gross written premiums of its consolidated business. In case of cross-sector groups, the contribution of the banking part should be measured by using net revenues.

size class	gross written premiums (million €)
large	> 10 000
medium	1 000 – 10 000
small	< 1 000

Table 27: Size classes of group participants

	number of respondents			
	Small	**Medium**	**Large**	**Total Number of Respondents**
Cross-sector groups	0	1	0	1
International groups	1	2	4	7
European groups	1	5	3	9
National groups	9	19	6	34
Total	11	27	13	51

Table 27 shows the classification of the groups according to the national group reports. Overall, 51 groups submitted quantitative data, half of them belonging to the medium size category. 13 large groups and 11 small groups participated. There is a very uneven distribution with respect to the group types. Two thirds of the respondents belong to national groups; nine groups are evaluated as European and seven as international. Only one group was recognised as a cross-sector group.

Table 28 provides information on the groups' domiciles. The respondents' European market share can be assumed to be well above 20 percent.

Table 28: Number of respondents

Group supervisor	Total number of respondents
Denmark	6
Finland	2
France	13
Germany	8
Iceland	1
Italy	5
Norway	2
Poland	2
Slovenia	1
UK	11
EEA wide	51

13.1.3 Submissions to central database

The subsequent Table 29 is similar to the previous one. It shows the number of groups in the central database whose data were available for further treatment and analysis by CEIOPS. 20 groups, covering around 21 percent of the European insurance market, were – at least partially – analysed. The total number of 29, stated in parentheses, illustrates the overall number of submissions to the central database.

Table 29: Participation according to central database

	number of respondents			
	Small	**Medium**	**Large**	**Total Number of Respondents**
Cross-sector groups	0	0	0	0
International groups	1	0	1	2
European groups	0	1	4	4
National groups	2	7	4	13
Total	3	8	9	20 (29)

Table 30: Level of detail of submissions

submissions			**full**	**partial**	**none**
group as if solo (I.6.6)[23]	Balance sheet		20	2	7
	Eligible elements		23	1	5
	Best estimates		21	0	8
	CoC		11	0	18
	SCR	Market	23	1	5
		Life	17	1	7
		Life (simplified)	3	2	20
		NL	21	0	6
		OpRisk	22	1	6
	MCR	Alt 1	15	0	14
		Alt 2	13	0	16
		RPS	8	0	21
	SCR without free assets		2	0	27
	SCR liability duration		1	1	27
Sum of solo (I.6.7)[23]			24	0	5
Whole aggregation (I.6.5)[23]			21	4	4
Internal model			6	1	22

[23] Reference to the corresponding chapter in the QIS3 Technical Specifications.

Due to limited data availability it was not possible to classify all submissions, i.e. also those that could not be processed, according to the matrix in Table 30. Nevertheless, those groups, whose data did not allow further processing, could still be considered in the qualitative part of the analysis because some of these groups provided comprehensive input to the question raised by CEIOPS.

Table 30 shows the number of groups that could provide details on the various modules of QIS3. It gives first insight into where the most imminent difficulties can be found and it explains why not all 29 groups could be considered for further analysis[24].

Six groups provided a full internal model and one group a partial model only. In the final sample of 20 entities, however, only four internal models remained for comparative purposes.

The subsequent table differentiates between the three different alternatives proposed to calculate group capital requirements. The whole aggregation approach recognised as the main methodology is taken as the reference procedure. Diversification effects are calculated as the difference between the sum of solo result and the result of any of the two other approaches. Thus, diversification effects can (slightly) vary with the method applied[25].

[24] Some submissions could not be further quantitatively analysed due to the following reasons:

- The 'whole aggregation' was missing.
- The 'sum of solo' calculations were not conducted.
- The group did not provide 'consolidated' data and there were clear signs that, lacking 'consolidated' data, the whole aggregation results were wrong.

Qualitative insight provided by these submissions was nevertheless included in the report.

[25] Following the subsequent figures the numbers provided for the whole aggregation SCR and consolidated SCR do not disclose significant differences in diversification effects.

Table 31: Alternatives for SCR group calculations

Name of alternative	Ref. in Tech. Specifications	Explanation
Whole aggregation	I.6.5	Required group capital should be calculated by applying the SCR standard formula to the group as a whole, but adjusted to allow for non-transferability of assets between group entities.
Group as if solo (consolidated)	I.6.6	The SCR standard formula is applied directly to the group's statutory consolidated accounts, but adjusted by a positive amount which reflects the participants own estimate of restrictions on transferability.
Sum of solo	I.6.7	This is the sum of the solo SCRs of individual EEA group entities, adjusted to eliminate intra-group transactions and, where necessary, to include EEA holding companies.

13.2 QIS3 at group level – assessment of quantitative results

Other than the solo analyses, the group analysis of national QIS3 data was hampered by the naturally small samples. For several ratios the samples had to be broken down to even smaller pieces. The following obstacles arose: (1) several cells of the country report tables could not be reasonably filled for the lack of answers by the groups; (2) the relevant groups did not calculate a particular module (or parts of it); or (3) the data suffered from confidentiality restrictions because too few entities were concerned and results might thus be attributable to specific groups.

As a result many ratios were non-existent or could not be used, which considerably narrowed a detailed analysis of group data at European level. This disadvantage was overcome to some extent by setting up a centralised database, which benefited from the voluntarily submitting a larger truly European sample consisting of 29 entities in comparison to 1 to 12 entities in the databases of the

national supervisors, whereby the number of databases with only one or two entities preponderates[26].

To overcome this situation, groups that agreed to submit their data to CEIOPS, were centrally analysed (as well). However, CEIOPS acknowledges the importance of the expertise of group supervisors to elaborate the analysis of the results.

The subsequent Table 32 names the ratios that were requested, explains the purpose thereof and refers to the usability of the data retrieved. The column on usability gives preliminary hints on the main difficulties and possible challenges for the forthcoming QIS4.

Table 32: Ratios retrieved from country reports

Ratios requested	Explanation / Intention behind	Usability
Capital requirement by type of activities with Solvency II rules	Ratios show the share of the groups' capital requirements in EEA, non-EEA and cross-sector business. Groups are differentiated according to their types.	1. scarce provision of data by firms 2. most cells cannot be matched with a relevant group 3. confidentiality restrictions
Capital requirement by sub risks as a % of the sum of solo SCR	Each sub risk calculated according to the four methods (sum of solo, consolidated, SCR group and internal model) is related to the sum of solo SCR (total). Comparing the sum of solo results with those of the other aggregation methods the diversification effect becomes evident.	Data in many cases available, however, scarce provision of internal model data possibly resulting in biased results.
Ratios of Alternative approaches for Group SCR and MCR to Standard Group SCR	Different proposals on group SCR and sum of solo MCR (as explained in I.6.5 – 7 and I.6.19) are related to the standard group SCR	Groups with available data widely reflect the overall sample in each national database

[26] See section on representativeness.

Composition of Group SCR by Type of Business or Geographical Area	Table shows how much sector capital requirements contribute to group SCR. Additionally, each geographical area's contribution is calculated.	Hardly any results due to lack of data and for confidentiality reasons
Composition of Group SCR by Component	Table shows the contribution of each component of the SCR to the group SCR	Sufficient data, in some cases questionable results
Ratio of Group SCR components to Sum of Solo SCR components	Each component of the SCR is related to the respective sum of solo SCR component to show diversification effects within each component	Sufficient data, in some cases questionable results
Ratio of Group MCR to Group SCR	For each size class and type group MCR1 and 2 are related to the three different group SCR calculations in order to assess the approximate level of the MCR	Most cells cannot be matched with relevant groups. Based on the sample reasonable data only for small, medium sized groups and national groups
Ratio of Group Internal Model SCR to Group SCR	Ratio of Group Internal Model SCR to Group SCR	Little information can be retrieved due to small sample size
Ratio of Internal Model to SCR components of Group SCR	The internal model's risk component is related to the respective component of the group SCR	Information mostly only available for a small number of participants, data are to a large part unusable
Evolution of available surplus	The ratios represent the Solvency II surplus with respect to the solvency I surplus. Groups are segmented according to group size or type	Many blank cells due to lack of data, too granular segmentation and for confidentiality reasons
Composition of Group Capital by Component	The average share of all three tiers and the components thereof to the overall capital is assigned to each group type	1. scarce provision of data by firms 2. most cells cannot be matched with a relevant group

Ratios of Available group capital to Alternative approaches for Group SCR and MCR	Available group capital is related to different proposals on group SCR and sum of solo MCR (as explained in I.6.5 – 7 and I.6.19)	Sufficient data, large variations by country possibly due to different sample sizes
Composition of Group Capital by Component	All three tiers and the components thereof as a share of overall group capital	Many blank cells due to lack of data provision
Transferability adjustment in % of Group SCR	Transferability adjustment in % of Group SCR, breakdown by size and type of group	1. scarce provision of data by firms 2. most cells unusable (blank)

Table 32 very well shows the restrictions on the data request: Essentially, they stem from a shortage of available information due to the sample size combined with the requested level of detail. Sub-samples very often covered no or only one group. Therefore, also the supervisors' interpretation of the results obtained could only be vague or could not be provided. There is also a chance that data from insurance groups that did not participate might significantly deviate from the results shown in the tables.

Naturally, in the central database more cells of the tables could be filled, simply because more groups were concerned. The level of detail asked for was, however, too high in some cases. Since most of the groups were also incorporated in the national analyses, the data quality was comparable.

13.2.1 General findings

It has to be stated that it is difficult to draw general conclusions from the group results due to the different structures that can be found or the diverse nature of the business written by each group. Difficulties in interpreting the specification and spreadsheet thus resulting in different interpretations are another argument.

Generally, the minimum and maximum values of the ratios show that in many cases the range is relatively significant. Thus, the assessment of smaller clusters (according to size, type, markets penetrated, etc.) does not add much value to the assessment that is based on all groups. Given the information provided, it is almost impossible to detect particularities in the results, which can be referred to, for instance, the group type or the group size.

Mostly, no general conclusions can be drawn as the variations between the different groups are too high. Averages, therefore, have to be taken with caution and do not allow universally valid conclusions. Additionally, there are several groups that only included a fraction of all their activities, meaning that for these groups figures may still change significantly.

Problems that emerged at solo level, such as negative life MCR, difficulties in assignment of eligible capital, etc. logically also emerge at the group level.

Several submissions were only filled out partially. Any change in the scope of coverage might thus have a (considerable) impact on the output and eventually on any conclusions made.

There were several data anomalies that cast doubt on numbers submitted by the groups concerned. However, it is not always possible, in particular with respect to the national reports, to source a wrong figure. Incorrect figures can have several causes, among other things missing data that provoke wrong calculations in the database. Different bases of consolidation are another example that can induce questionable results. One obvious error is a 'sum of solo' figure that is lower than its 'consolidated' counterpart or the respective group SCR figure.

It is interesting that all groups classified as 'European' have all their business within the European Economic Area. The 'national' groups in the sample have an average exposure to non-EEA countries of 8.1 percent. This unreckoned result is due to two national groups with a share of 15.8 and 16.6 percent respectively. The other national groups are not present in these markets. Adding the results from the national databases the overall share would fall far below 8% because in these samples no national group had any exposure to countries outside EEA.

In most cases there are large variations in the results, making any conclusion or interpretation at least difficult. This situation does not change much if extreme outliers are excluded. Moreover the sample size mostly does not allow any exclusion of any data point. Although the sample sizes are higher for the centralised database, this particular argument is valid for both the national and the central analysis.

13.2.2 Available surplus

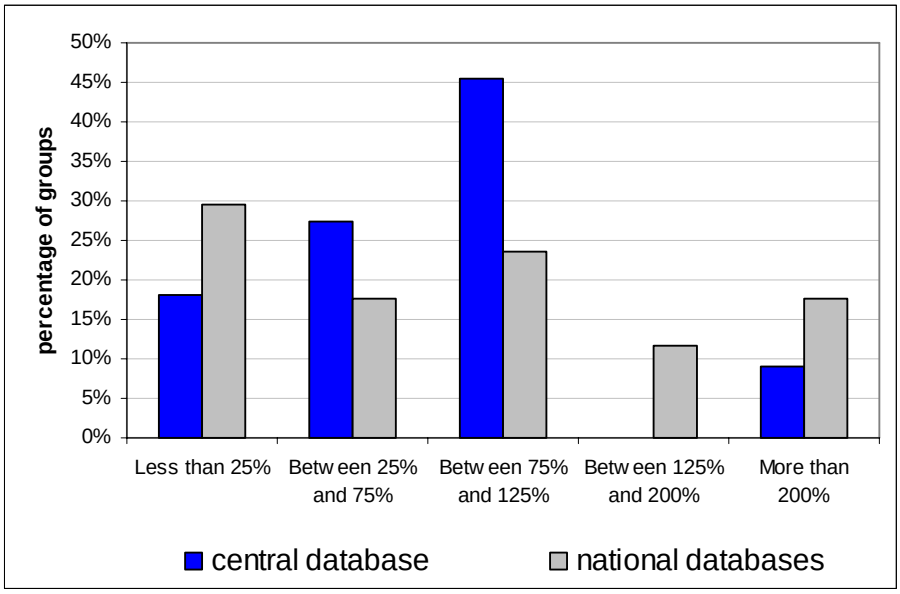
No clear conclusions can be drawn whether size has an impact on the evolution of available surplus. The sample is too small to obtain meaningful results after breaking down the sample into size classes and group types. Therefore, Figure 68 represents the entire sample without consideration of any sub-categories. Since the central database, which is to a large extent a sub-sample of the national records, deviates from the national databases' data, it was included as well.

Overall, the majority of groups had a surplus of between 75 and 125 percent, i.e. for these groups there are no significant changes with respect to Solvency I because 100% means unchanged surplus with respect to Solvency I. Nonetheless, there is a non-negligible number of outliers in both directions. The approximately 50 percent of all groups whose Solvency II surplus is less than 75 percent of the Solvency I surplus are a matter of concern. Nonetheless, these data have to be taken with caution due to the different level of integration of Solvency I in national regulations and for the subsequent arguments:

It is noticeable, that for groups that are predominantly engaged in the life business capital requirements generally decrease, although the treatment of unrealised gains and losses and the inclusion of future profits can impact differently the eligible elements of capital under the current system and under QIS3 rules and eventually the capital surplus. For those groups that are mainly in the non-life business capital requirements generally increase. Due to differences in the eligibility of assets in Solvency I and II, changes in capital requirements do not represent a clear indication on the evolution of the available surplus. In other words, a increase in capital requirements does not necessarily require a decrease in available surplus.

These findings are largely in line with the results at solo level[27].

Figure 68: Evolution of available surplus



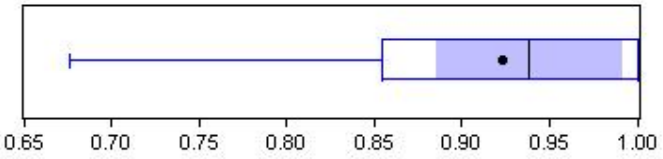
[27] For more details refer to chapter 5.2

13.2.3 Composition of group capital

The results reflect the comments by the participants and naturally provide the same picture as at solo level. On average, between 81 and 92 percent of capital were assigned to Tier 1, dominated by retained earnings and called up equity. In some countries Tier 1 reflected even 100 percent. Between 6 and 18 percent were assigned to Tier 2. Many categories of capital are (still) unused.

The following figure shows the contribution of Tier 1 capital to the entire available capital for central database groups. The box plot[28] is based on the data from 19 groups taken from the central database. The shade represents the median 95 percent confidence interval and the dots are symbols for the arithmetic mean. The data were capped at 100 percent because one group delivered Tier 1 capital slightly above 100, which according to the definition provided in the Technical Specifications is not feasible. The average is around 92 percent, with a median slightly above. The minimum is 67.5 percent of the available capital and there are several cases that allot all eligible capital to Tier 1.

Figure 69: Contribution of Tier 1 to available capital



[28] The boxplot is a convenient method to summarise the distribution of a set of data by displaying the centring and spread of the data using a few primary elements. The box portion represents the first and third quartiles (middle 50 percent of the data). The median is depicted using a line through the centre of the box. The mean is drawn using a dot. Whiskers and staples show the values that are outside the first and third quartiles but within a certain range (first quartile minus 1.5*interquartile range and third quartile plus 1.5*interquartile range). Datapoints outside this range are characterised as outliers. The shaded region displays approximate confidence intervals for the median.

Figure 70: Available capital to alternative group SCR

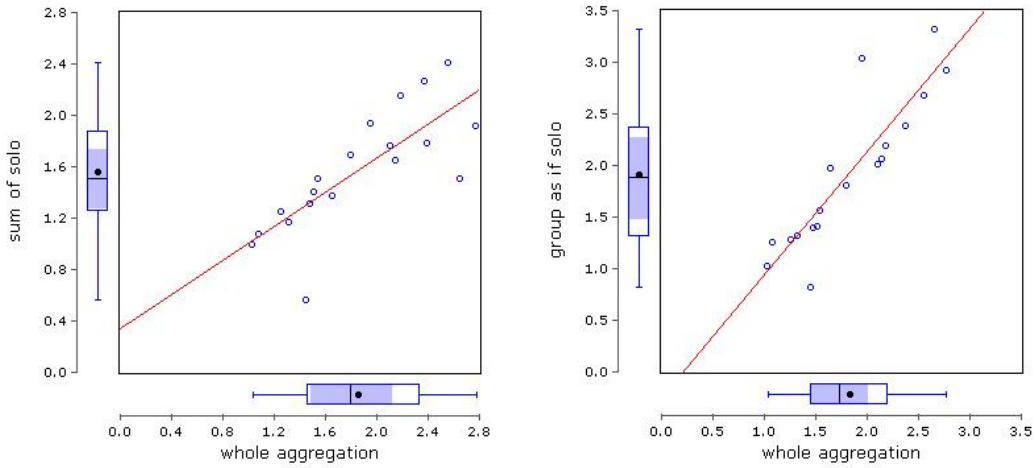


Figure 70 compares the distribution of group SCR according to the three different alternatives (cf. I.6.5 to I.6.7 in the QIS3 Technical Specifications, i.e. whole aggregation, 'as if solo' and 'sum of solo' respectively). In any case, almost all dots are above 100 percent, meaning that there is hardly any group whose capital available insufficiently covers the capital requirements[29]. Hence, most groups have a capital surplus available. Assuming a virtual 45 degree line, the comparison of available capital under the whole aggregation approach and the 'sum of solo' method shows that whole aggregation in many cases delivers considerably lower results. However, given the fact that all dots are close to the regression line also implies that there are hardly any distortions between the two different approaches, such that neither group in the sample is particularly advantaged or disadvantaged under a regime change.

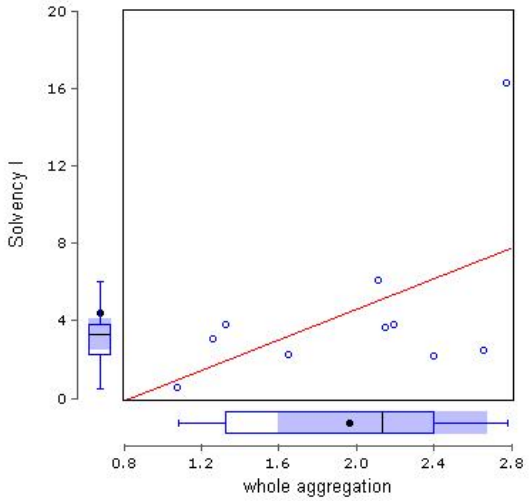
The comparison of whole aggregation and group 'as if solo' shows that the differences are almost negligible, i.e. all dots lie close to the identity line, with 'as if solo' results being slightly lower. This is mainly due to the particular design of the whole aggregation method in the QIS3 Technical Specifications.

As we can see in Figure 71, the available capital under the Solvency II regime is in most cases considerably lower than under Solvency I; a result that is consistent with those in Figure 68. The comparability is, alas, limited by the significant difference in computation.

The ratios and percentiles taken from the national databases support the general perception from the central database in this respect.

[29] One company applying the 'as if solo' (consolidated) approach and two cases for sum of solo.

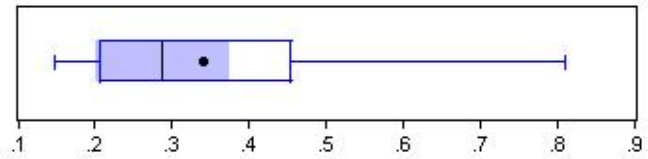
Figure 71: Available capital under Solvency II and I



13.2.4 Diversification effects[30]

The group results show that compared to the sum of solo SCR[31], the reduction due to diversification is on average 18.7 percent, whereby the minimum ratio is 61 and the maximum 100 percent. The results of the groups analysed are spread across the whole range. With respect to the consolidated SCR two main observations can be made: (1) the results are mostly slightly lower than those for the group SCR and (2) different bases of consolidation result in sometimes questionable results with capital requirements being higher than the sum of solo requirements. There were far less internal model results reported that could be analysed. Nevertheless, the results are in line with some results seen for the group SCR.

Figure 72: Whole aggregation – diversification effects at BSCR level

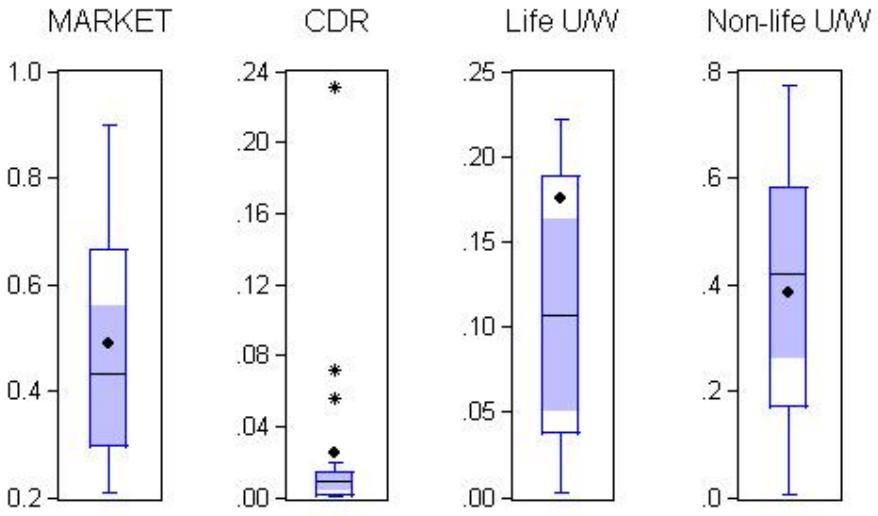


[30] For comparison with results at solo level, refer to chapters 8.1.5 and 8.2.

[31] The comparisons made are, unless otherwise stated, based on the whole aggregation method. First, it is considered the main approach of QIS3 and second, as observable in Figure 70, the whole aggregation and the consolidated method only show minor deviations, which do not impact the results.

Figure 72 shows the distribution of the diversification effects at BSCR level[32], compared with the sum of the submodules, i.e. market risk, counterparty default risk, life and non-life underwriting risk in Figure 73. The range is between 15 and 81 percent reduction in capital requirements after taking account of diversification. 95 percent of all submissions show capital savings between 20 and 38 percent.

Figure 73: Whole aggregation – contribution of modules to diversification at BSCR level



The diversification effect as it was determined at BSCR level can be broken down to the various modules by relating the share of each module to the overall diversification effect. According to the figure above, the most pronounced reduction in capital requirements comes from the market risk module, followed by non-life underwriting and life underwriting. The least contribution comes from the counterparty default risk module. However, this module also shows particularly extreme variation and numbers have to be taken with caution. In some cases the CDR module was not completed, which can additionally explain the resulting boxplot for CDR.

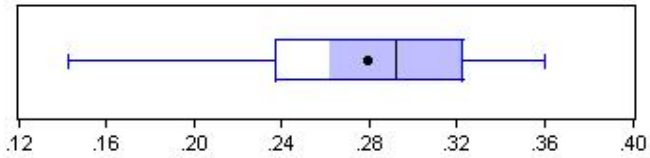
With regard to the sub-risks, the savings on capital requirements are far less pronounced. More in-depth analysis given the information provided is, however, hardly feasible.

The market risk, consisting of several sub-risks, was analysed in a similar way as the BSCR in total. Again, the extent of diversification within this module is presented and the main triggers for this effect are analysed by comparing each

[32] Source: central database

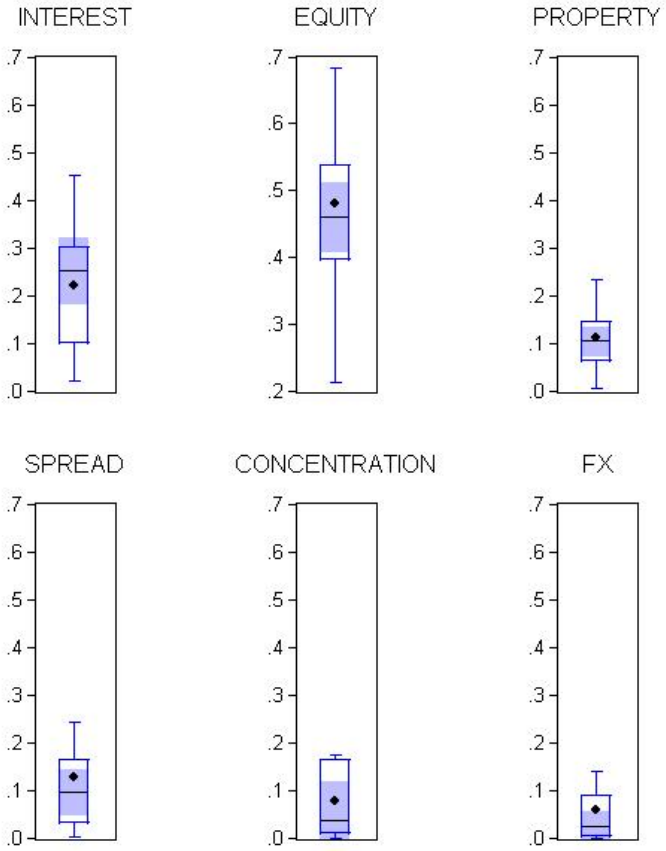
sub-risk's contribution to the overall market risk. The basis in each example is the whole aggregation method.

Figure 74: Whole aggregation – market risk diversification



According to figure above, the diversification effect within the market risk module lies in the range of 14 to 36 percent; with an average of 28 percent. The equity and interest rate risk submodules carry the largest effects, followed by the other three categories that contribute almost equally to the diversification effect within the market risk module.

Figure 75: Whole aggregation – contribution to market risk diversification



13.2.5 Interplay of SCR and MCR

Due to negative MCR in several cases a comparison of ΣMCR and SCR at group level is generally of no value.

The comparison of the group internal model SCR and the group SCR showed the following results:

- The results cannot be generalised as there was too little input from groups on internal models.
- The international group has the largest effects, with internal model SCR being less than 50 percent of group SCR.
- The two national groups reach an average of about 80 percent of the groups SCR calculated with the standard formula.
- For the European group the internal model SCR is even higher than the results from the standard model.
- Large differences in savings in each SCR component between groups.

13.2.6 Factors that impact group capital requirements

In order to assess the factors that can best explain the changes or deviations in group capital requirements, a principal components analysis was exercised in order to detect the most important components that can explain variations in capital requirements. According to CEIOPS analyses, size, as for instance explained by gross provisions for the life sector, gross premiums for non-life business, number of activities, diversification etc. seems to be the dominant factor.

Nevertheless, it still remains open, what factors can best explain the evolution of capital requirements in groups. There is, however, a weak indication that diversified groups seem to be less impacted by capital requirements. The results from the analysis are not as clear-cut. Unfortunately, the overall sample consists of very diverse groups, which largely confines the assessment. There are true life groups, true non-life groups, monoliners, groups that do business only nationally, groups that have a large non-EEA exposure, etc.

From an overall perspective, it is difficult to find any commonalities that allow further conclusions given the information provided in QIS3. In order to improve any analysis, additional information is necessary in several respects: attribution of LoB to solo entities and geographical areas, detailed information on non-EEA and cross-sector entities, good quality data etc.

13.3 QIS3 at group level – assessment of qualitative remarks

Both the stakeholders' arguments and the national supervisors' comments are reflected in the subsequent section, which is split into several chapters resuming the main arguments for each topic. It has to be emphasised that this chapter only covers responses on the group questionnaire although answers may show similarities to those made to the solo questionnaire.

As to some questions only a few groups provided responses, the sample can be very small, meaning that the opinion of those that responded gets a rather high weight. A correct interpretation of non-responses is, however, difficult. Nevertheless, some further conclusions can be drawn from the spreadsheets received.[33]

Where, necessary, undertakings' responses are particularly highlighted, such that they can be differentiated from supervisors' comments. In those cases where insurers' remarks are clearly inconsistent with QIS3 and its modules, this discrepancy is immediately explained. The information therein will feed back to the final conclusions.

13.3.1 General questions

13.3.1.1 Resources needed

Apparently, both for the development of appropriate group systems and for the completion of the group aspects of QIS3 the level of resources needed strongly varies between the responding groups. The time effort, to a large extent, depends on how far the groups already progressed in their preparation for Solvency II. To develop appropriate group systems, the groups need an investment in the range of almost zero to 18 person months. To carry out a valuation each year of the group SCR in accordance with the methodology proposed in QIS3, groups estimate a resource requirement of about one person month on average. In order to complete the group aspects of QIS3, an approximate judgement shows a resource need of 1 - 2 months in general. In some cases it is even lower. However, there was an outlier that indicated a requirement of approximately 32 person months. This particular group indicates that the resource requirement is composed of the following tasks: producing solo results wherever feasible, gathering data from other entities, merging the data on the group level.

[33] This possibility is restricted to the documents sent to the central database.

13.3.1.2 Reliability and accuracy of data

There was hardly any input on this point. Most respondents, however, argue that their quantitative input data was primarily based on accounting data, audited year end balance sheets in particular. Some also stated that due to time and people constraints they had to apply some approximations and data simplifications. Others explained that they used a bottom up approach and used data from solo entities. Nevertheless, CEIOPS is aware that is exercise has been performed under time constraints, what can have an impact on the accuracy of the results.

13.3.1.3 Views on suitability and appropriateness

Basically, this information is covered in the respective chapters. There was hardly any additional information.

13.3.1.4 Scenario and factor-based methods for groups

There seems to be a strong tendency towards the use of scenario-based methods. It is also highlighted that the choice is as relevant for groups as for solo entities. Very important for most respondents was the recognition of the diversification between different solo entities within individual solo computations.

It has to be highlighted that there is a larger number of undertakings that seem not to have made up their opinion on this particular point or that they consider it as a solo issue. This is reflected in the low response rate on this question.

13.3.1.5 Ratings by groups on prescriptive rules, guidance and simplification of methodology

The subsequent tables show the results from the responses taken from the centralised group database. In order to get meaningful information out of the responses made, the ratings chosen were ranked according to the sum of each participant's rating[34]. The rankings reflect the responses of 17 groups, with higher values showing a larger necessity for CEIOPS to work on a particular subject. According to the table the guidance on eligible capital, the calculation of the SCR and possible simplifications on the technical provisions aspect play the most important role. This is followed by the guidance for calculation of technical

[34] Each aspect could get a rating of 1 (less) to 5 (more); indicating the expectations from CEIOPS regarding the different subjects shown. One group did not assign a rating on technical provisions and two other groups left blank the cells on the calculation of MCR. For these groups the median of the other participants was assumed as proxy.

provisions, etc[35]. It is remarkable that the lowest ratings were assigned to the prescriptive rules.

Table 33: Overall rating of QIS3 by groups[36]

Rank total	Technical provisions	Value of assets	Assessment of eligible capital	Calc. of SCR	Calc. of MCR
Prescriptive rules	2	1	4	2	7
Guidance for calculation	12	6	13	13	10
Simplification for methodology	13	4	8	10	9

Table 34 shows the ranking within each category. For instance, there was a large interest in simplifications of the technical provisions module (in comparison to the other modules). The valuation of assets seems to necessitate the least amendments. According to the averages, the results do not deviate significantly from the results seen in the individual country reports.

Table 34: Comparison by type of module

Rank with respect to module	Technical provisions	Value of assets	Assessment of eligible capital	Calc. of SCR	Calc. of MCR
Prescriptive rules	2	1	4	2	5
Guidance for calculation	3	1	4	4	2
Simplification for methodology	5	1	2	4	3

13.3.2 Higher priority arguments by industry

The following sections cover the points that were commented on by a large number of groups. Several arguments went in the same direction. Nevertheless,

[35] These results are more or less clearly reflected in the remarks to the respective modules.

[36] The results are in line with those from the national reports.

it has to be highlighted that some comments were very similar, limiting the diversity of arguments.

13.3.3 Diversification effects

When deciding on correlation factors, several arguments had to be taken into account, such as the weakness of normality assumptions or the tendency of risks to show high dependence in extreme scenarios, while keeping the standard approach sufficiently simple. Nonetheless, this leaves some room for critique on the approach finally chosen.

There are several arguments on the limited consideration of diversification. It was noticeable that many groups that did not provide 'as if solo' data complained about the lack of diversification at group level. However, this was in fact a property of the Technical Specifications. Whenever consolidated group data are not available, the fallback option has to be the sum of solo entities. A similar argument applies to the statement on the diversification across risk types. Diversification effects as foreseen in the Technical Specifications are calculated in the respective sheets filled with consolidated (as if solo) data.

The comments can be separated into different arguments:

- Some question the accuracy of the correlation factors, criticise them as arbitrarily chosen and would like to see calibration documents on this issue. In most cases the correlation factors are said to be too high. However, no alternative analysis was provided.
- Several respondents argue on the limited consideration of diversification
    - Some miss geographical diversification, predominantly with regard to life.
    - After QIS2 operational risk was taken outside the BSCR calculation because it was argued to be unrelated to the other risks. Some respondents, however, criticise exactly this fact, as thus the consideration of diversification is not possible.
    - The absence of recognition of any diversification benefits from non-EEA or cross-sector entities is criticised (cf. transferability).
    - The different treatment of subsidiaries and branches is often criticised.
    - No calculation of diversification across risk types.
- There are concerns regarding the inability to allow for diversification benefits between life insurers when assessing the group SCR. Such an assumption is deemed incorrect and overly conservative by some groups. One respondent gave an explanation saying that the profits and losses

arising from non-profit sharing and unit-linked business written in subsidiaries are, other things being equal, just as transferable as profits and losses from non-life business. Moreover, it is mentioned that, it is often possible to transfer shareholder capital to and from profit sharing subsidiaries in which case the diversification benefits associated with this should also be recognised.

13.3.4 Group-specific risks

There is consent between the industry and supervisors that group-specific risks are particularly difficult to quantify. Nevertheless, these group externalities cannot be neglected. The argument is similar to the one that justifies the consideration of diversification benefits in insurance groups. As such, the group has to take account of both negative and positive effects on group affiliates.

Some argued that they cover those risks (to a large extent) in their assessment of operational risk. As several respondents already address those risks in their solo operational risk calculations, they consider that any group level requirements would result in double counting.

There have been arguments that group-specific risks should be subsumed under the umbrella of business risk and therefore should not be addressed by neither MCR nor SCR.

The suggestions regarding this risk type do not show any deviations from the suggestions made in the questionnaire. Concentration risk is seen as the most important risk type. Other risks mentioned cover reputation risk, legal risk, accountability risk, contagion risk.

Since group-specific risks are difficult to quantify, many respondents argued to address them in Pillar II. Furthermore, one participant highlighted that it is important to give those risks clear definitions.

There are also arguments that the complexity/lack of transparency and conflict of interest, moral and legal risks should not be considered by a capital model since any capital charge will be absolutely arbitrary and these issues are better managed through appropriate corporate governance solution.

Another remark stressed that these issues are common to all business sectors and, if introduced, the insurance sector would be the only one having put aside capital for these risks.

13.3.5 Operational risk

Some respondents focus on the diversification aspect of risks and claim that a correlation of 100 percent with other risks denies potential diversification effects, for instance with market risk.

Some mention that the approach is too simplistic and lacks incentive compatibility with respect to the undertakings' risk management.

One group presented an anomaly of the operational risk module. The operational risk calculation when treating the group as a solo company can give a higher result than the sum of the solo company op risk SCRs. This appears to be a peculiarity of the formula when the 30% BSCR ceiling applies to some but not all of the solo companies.

This particular raises some argument on amendments to the formula. However, it has to be emphasised that this fact does not impact the results because group operational risk is calculated on a sum of solo basis.

The subsequent table shows the progress of groups in the establishment of a working operational management system. The percentages in parentheses show the results from the central database based on a sample of 14 groups.

Table 35: Operational risk policy of group respondents

Management of operational risk - qualitative questions	Number of firms responding		
	Yes	No	Planned
Does your group have an approved (by the board of directors or management board) operational risk strategy?	56% (64%)	29% (14%)	15% (21%)
Has the board of directors (or management board) defined your group's appetite and tolerance for operational risk as part of this strategy?	42% (50%)	33% (21%)	25% (29%)
Does an Operational Risk Policy exist in your group?	71% (93%)	18% (7%)	11% (0%)
Are there any policies/guidelines explaining and supporting Operational Risk Policy?	75% (93%)	20% (0%)	5% (7%)
Does your group have an operational risk management structure/organisation with clearly defined roles and responsibilities?	82% (86%)	13% (14%)	5% (0%)
Are these roles and responsibilities documented in policies/guidelines?	71% (86%)	20% (14%)	9% (0%)
Is there an independent operational risk control/management function?	82% (79%)	4% (21%)	14% (0%)
Given that there is no independent operational risk control/management function in your group, is it the internal audit who manages/controls operational risk?	57% (25%)	7% (50%)	36% (25%)
Are there any committees (e.g. Operational Risk Committee) involved in operational risk management?	69% (71%)	9% (21%)	22% (7%)

Is the board of directors or management board involved in work of such committees?	78% (71%)	10% (14%)	12% (14%)
Is there a clear operational risk reporting structure in your group (e.g. local contact person - central operational risk function - committee - management board)?	78% (71%)	11% (21%)	11% (7%)
Are there any regular operational risk reports delivered to senior management?	62% (86%)	16% (7%)	22% (7%)
Are there any means (training session, workshops, newsletters) to increase employees' operational risk awareness?	68% (79%)	20% (14%)	12% (7%)
Does your group use risk mapping as an operational risk management tool?	60% (79%)	18% (14%)	22% (7%)
Does your group use risk/self assessments as an operational risk management tool?	84% (93%)	11% (7%)	5% (0%)
Does your group use risk indicators (key risk indicators) as an operational risk management tool?	40% (57%)	33% (21%)	27% (21%)
Does your group collect historical data on operational risk losses and incidents?	40% (36%)	31% (36%)	29% (29%)
Are operational risk management tools (e.g. risk indicators, risk/self assessment) subject to correlation analysis based on actual loss data?	11% (7%)	31% (64%)	58% (29%)
Has your group joined any operational loss data sharing consortium (e.g. Operational Risk Insurance Consortium - ORIC)?	11% (7%)	18% (79%)	71% (14%)
Does your group use scenario analyses as a part of operational risk management?	47% (64%)	22% (14%)	31% (21%)
Does your group use quantitative methods (internal models) for the operational risk management purposes?	22% (36%)	22% (43%)	56% (21%)
If yes: Is the quantitative method comparable to those applied in banking supervision (e.g. AMA)?	38% (43%)	5% (57%)	57% (0%)
Does your group carry out a validation process for all applied operational risk methods and tools?	36% (54%)	27% (38%)	37% (8%)

Overall, the majority of groups that answered the questionnaire seem to recognise operational risk as an area that requires special attention. A comparison of the answers of groups and solo undertakings shows that groups are already further advanced in all sectors concerned. The results from the internal database go in the same direction but are even more pronounced, which may be referred to the dominance of large groups in the sample.

13.3.5.1 Theoretical foundation for operational risk management in groups exists; in some areas more work seems necessary

85% of the respondents already operate or plan to operate with an operational risk strategy approved by the board of directors; this leaves a chunk of 15% groups which do not consider an operational risk strategy necessary at all. Of those having already implemented a strategy still 25% regard it as unnecessary to define their risk appetite for operational risk in their underlying strategy.

An interesting point might be that the number of groups currently operating with an operational risk policy is much higher than those operating with an operational risk strategy. 11% of the groups do not regard an operational risk policy as necessary. One answer could be that those policies might have developed by the needs of day to day business.

13.3.5.2 Operational risk management structure nearly completely applied with good implementation at all levels

82% of the groups have an operational risk management structure/organisation with clearly defined roles and responsibilities and 13% plan to implement one. Overall 71% (20% planned) have documented it in policies or guidelines. Concluding, only 5% of the groups have no operational risk management structure/organisation at all.

82% (4% planned) of the respondents currently use an independent operational risk management function in a further 8% of the cases the internal audit function is used for managing and controlling operational risk.

78% of the respondents prefer to use or plan to use a committee structure for operational risk management, in 88% of these cases the board of directors will be involved directly in the committees work.

13.3.5.3 Operational risk reporting is often implemented but bypasses senior management quite often

11% of the respondents do not have an operational risk reporting structure and over 22% do not forward any operational risk report to the senior management level.

13.3.5.4 Operational risk management has already reached a high standard

Only 12% of the groups do not have any means for increasing employees' operational risk awareness.

Self assessment is the most popular tool for operational risk management, followed by risk mapping and key-risk-indicators. Roughly 47% of the undertakings already use scenario approaches for operational risk management and a further 22% are planning to do so.

40% of the respondents do currently collect historical loss data and 31% are planning to do so. Currently only 11% of the respondents use operational risk management tools subject to correlations analysis based on actual loss data but 31% intend to do so in future.

Operational risk sharing consortia are still not widespread: only 11% of the respondents use them and 18% intend to do so in future.

13.3.5.5 Interest for validating operational risk methods and tools could be higher

44% of the respondents indicate they are using or planning to develop quantitative methods (e.g. internal models) for the management of operational risk. 43% of the approaches will be equivalent to the ones used for banking supervision.

Finally 37% of the undertakings do not see a need in validating their used methods and tools for operational risk management.

13.3.6 Transferability of surplus

Transferability is a major concern for QIS3 as it is a substantial argument for supervisors to allow for diversification effects in insurance groups[37]. Basically, it is decisive whether the capital is available in times of distress. Obstacles that prevent the fungibility of capital were an argument to prevent the consideration of diversification effects.

The non-consideration of diversification effects between the insurance group and its non EEA group entities, cross sector participations or non-regulated group entities, as set out in the Technical Specifications I.6.17 through I.6.23, is a frequent point of discussion. Transferability cannot be necessarily guaranteed from a supervisor's perspective. Nevertheless, I.6.17 also clearly states that the extent to which surplus assets are transferable between EEA and non-EEA parts of the group should be taken into account.

There have been several arguments on transferability, which can be split in two main categories: (1) the question of how to deal with this issue and (2) the judgement upon the issue itself.

One group suggested adjusting some of the correlation factors for non-transferability in extreme cases (e.g. within extreme event risk for mortality).

Another group made the following suggestion for taking the aspect of fungibility into account, which however is based on the deduction aggregation method and thus is not in line with the principle of diversification: The starting point was that

[37] For the argument on diversification refer to chapter 8.3.6

the amount of non-fungible capital in an entity is lower than the total required capital. In this case non-fungible capital can be deducted from both required and available capital when performing the group solvency calculations. In the case that non-fungible capital is higher than required capital, required capital should be set at zero for the solvency calculations, while the complete non-fungible capital should be deducted from available capital.

There have been different points of view on the transferability of capital or the limitation thereof.

'Capital held in separate sub-funds by life insurers should be seen as transferable as long as the only restriction to its transfer is the need to carry out a full valuation of the assets and liabilities, and as long as the rights and interests of with-profit policyholders are taken into account.'

One respondent considered that the treatment of non-transferable items could lead to odd results where different entities are exposed to risks moving in opposite directions (e.g. interest rate risk) or risks not present in the group calculation (e.g. intra-group counterparty risk).

One group commented that in the event of capital support being needed by the parent company, it might decide to sell one of its subsidiaries. Questions of transferability are therefore largely irrelevant, and the key issue is the price that could be obtained. In their experience, this could be expected to be in excess of net asset value and therefore, it would be appropriate to assume full capital fungibility.

'In general we believe that transferability can be achieved by legally enforceable arrangements between the holding and the legal entities. As a result, we believe that full diversification benefits should be reflected at all levels.'

13.3.7 Capital

The results of the third quantitative impact study show that the eligible elements of capital was one of the QIS3 parts that caused most difficulties for the respondents both on a solo and a group level. Many respondents had difficulties in assigning capital to the right tiers and categories. As a result capital was not assigned appropriately and there were hardly any participants that showed Tier 2 or 3 capital.

As the tables on capital illustrate as well, there was hardly any feedback on this particular issue. This is mainly due to the fact that participants did not fully understand the Technical Specifications, as the sparse comments demonstrate. Some wondered about the treatment of capital or the counterparty risk limits that considerably deviate from Solvency I. A major difficulty encountered in the calculation of available group capital was the adjustment of net asset value with regard to non-EEA and cross-sectoral entities.

There has also been confusion regarding the qualification of capital to the respective tiers. For instance, one respondent noted that it had a considerable amount of innovative hybrid capital with step ups. This currently qualifies as innovative Tier 1 but in QIS3 it is Tier 3. Another respondent requested that existing recognised hybrid capital should be grandfathered. One respondent noted that clearer definitions were needed for classifying contingent items as Tier 2 or Tier 3. Also the definition of unpaid shares was not clear (issued but not yet paid or authorised but not yet issued?)

One respondent claimed that the eligible elements issued by the head of the group have to be considered eligible for Solvency II purposes even if the head of the group is no insurance entity. Nevertheless, the Technical Specifications state that the capital of an insurance holding company clearly counts toward group capital.

13.4 Internal Model

This point is composed of several sub-chapters which are treated separately due to the relatively large number of responses to this question. From the central database we know of six full and one partial model. According to the national reports, at least eleven internal models data were submitted[38]; a precise answer is not possible due to the confidentiality argument in some reports.

It is to be mentioned that the extent of answers to these questions does not coincide with the extent of data provided in the spreadsheets. Furthermore, several comments on risks and risk modules are treated in the corresponding chapters.

13.4.1 Risk measure used for internal model

Most respondents use the Value at Risk approach on a one year horizon. The confidence level lies in the range of 99.5 and 99.97 percent. Some of those that use a high confidence level (corresponding to AA rating by S&P for example) explain that for QIS3 purposes they (also) applied the 99.5 percent level in order to allow comparisons with the standard model.

[38] Mind that most of the internal model submissions to the central database are also included in the national reports. Therefore, the numbers do not sum up.

13.4.2 Scope of the internal model

Most respondents argue that their model covers all group entities. Some, however, confine their assessment to material entities or to operating entities. One respondent argued that the group model essentially consists of a sum of solo internal models.

13.4.3 Treatment of minority participations

Most respondents included their participations, in which case group SCR is limited to the proportional share that is owned by the group.

One respondent mentioned that no credit was taken for surplus within group calculations but deficits are taken into account.

13.4.4 Other financial services activities

With regard to other financial services activities the results are not as clear-cut. There are groups that take those activities into account although most of them are not very informative with regard to their approach. Others still do not consider other financial services activities but, if applicable, plan to include them in the future.

13.4.5 Treatment of non-regulated entities

There is a wide variety of how groups include non-regulated entities in their model. It mainly depends on the structure of the group and the kind of non-regulated entities they contain, e.g. holding companies, special purpose vehicles (SPVs), etc. Hence, there are some groups that do currently not take account of any non-regulated entities in their calculations.

One respondent simply adds a surcharge for operational and business risk. Another one includes SPVs in case they include or transfer insurance risk. A third one gives a detailed explanation of how it treats such entities. As such, the assets and liabilities of its holding companies were allocated to insurance companies and stressed according to the standard ICA methodology, while pension fund activity was taken into account by splitting it into national and non-national schemes.

13.4.6 Material risks covered in the internal model

As expected, all groups more or less completely cover all material risks, albeit the classification of risks and the focus may vary. For instance, operational risks may also cover group specific risks, interest rate and equities volatilities are

covered in the market risk module, etc. Moreover, the approach is not necessarily consistent with that of the standard model. For instance, one respondent stated that its internal model took into account all risks of the standard formula except revision risk which was said to be inapplicable. Another respondent did not take into account catastrophe risk. One respondent did not take into account concentration risk but contended that it was not material since its model covered default risks, and concentration risks are regularly monitored at group level. It added that it was unlikely that the threshold for any single counterparty would exceed the QIS3 limit.

13.4.7 Aggregation method at group level for internal model

The use of the correlation approach seems to be common industry standard although it has to be mentioned that the description strongly varies with respect to their degree of detailedness. Moreover, the correlation assumptions need not necessarily coincide with those of the standard model. They are defined on the basis of statistical tests of historical data or on best judgement.

Furthermore, the models vary in their concrete design. In one case this approach was not used at group level, the solo internal models were summed instead. Others also took account of non-linear relationships between risk factors and extreme scenarios. Two groups explicitly use tail correlations within correlation matrices. There are also different approaches with respect to the steps of aggregation.

For instance, one respondent started by assessing the geographical diversification benefits at the lowest level of risks (e.g. interest rate risk); it then combined its aggregated VaR stresses for one year using a single covariance matrix. This respondent assumed no diversification between EU participating fund and other operations; and between operations in the same country (though it thinks both should be allowed).

Another was of the view that there was no explicit correlation between risk types though regional variables were correlated. This group also applied correlated ‘inflation shocks’ across business lines for both underwriting and reserving. The internal models assumed that credit risk was independent of other risk types (and operational risk is added on as a standalone amount).

A third one explained that they use several correlation matrices to aggregate risk at group level. First they aggregate the entities per risk type using a specified correlation matrix between the entities. Subsequently, they aggregate the different risk types using a specified correlation matrix between the risks. They also use a factor in order to correct for violations of the normality assumption when this is needed.

In another example a bottom up approach is followed, i.e. each business unit submits a capital requirement which is then aggregated together to calculate the group internal model capital requirement. Allowance is made, via a simple add-on, for any situation where the largest single risk faced by the business unit was greater than the overall capital requirement. However, at the group level, this is not reflected in the data used and is instead applied as an add-on to the group capital requirement.

13.4.8 Allocation of diversification benefits to solo entities

Basically, we see two approaches. Many respondents keep the diversification benefits at group level. In emergency cases the capital is then downstreamed to the respective entity. Those that redistribute the diversification benefits to the subsidiaries use a proportional allotment. This proportional approach is mainly used due to its simplicity (not only on a computational point of view but also for internal communication, planning and target setting).

13.4.9 Data used to feed the internal model

Below is a synopsis of the responses:

- Consolidated data were used to feed the models.
- Calculations at solo level were combined using correlation matrices at group level.
- Group internal model was based on the sum of the solo internal models.
- Aggregation was performed simultaneously at entity and group levels.
- Group aggregated the components of the solo SCRs.
- Group result was calculated by combining the outputs from the regional standalone models. Each model was linked to a tying variable, ensuring that the combined results were calculated using consistent economic assumptions.

13.4.10 Treatment of internal reinsurance

There is no industry-wide opinion on how to treat internal reinsurance. Many respondents do not apply a capital charge for internal reinsurance because they argue that internal reinsurance is simple a vehicle for relocating risk from one business unit to another within the same group. One respondent argues that internal reinsurance is included in the sense that entities are considered with their internal reinsurance and that the difference between external and internal reinsurance is quantified and allocated to the internal reinsurer in the internal model. One respondent sets aside capital for internal reinsurance at the level of

the ceding entity (exposure treated on an arm's length basis for the purposes of solvency requirements). At group level, internal reinsurance cancelled out and there was no additional requirement.

On the other hand there are also cases that charge the internal reinsurer for the embedded credit risk. In that sense there is not made a distinction between external and internal reinsurance.

There is an example where individual business units calculated their internal model capital requirement using the net position in relation to risk ceded to the captive reinsurer. It added that the exposures to the captive were subject to the reinsurance credit risk stress test.

13.4.11 Barriers to transferability

The general consensus seems to be that barriers to transferability of capital between entities were not considered in any significant sense. The main exception to this was with-profit funds where it was broadly assumed that capital was not transferable within the groups. However, the reasons for not paying much attention to possible barriers to transferability of capital varied widely.

In fact, some respondents assumed that there were no particular barriers to transferability of capital. One group which had experienced stress chose to sell the subsidiary and claimed that the value realised by the sale was significantly greater than net asset value. It therefore felt that the key issue was the price that could be obtained for the sale of an entity. This effectively negated any need to think about possible barriers to transferability and enabled the group to assume full capital fungibility.

However, that situation is hardly concealable with a perspective in an ongoing situation. In fact, from a supervisory perspective, it can also be expected that the group will try to solve the problems while keeping its unity. Furthermore, the Solvency II framework is built on diversification Thus for example, because of diversification the sale of one entity reduces the group SCR by less than the solo SCR of the subsidiary that is sold.

14 Areas for further work

The third quantitative impact study has been a success in terms of participation. The number of participants doubled and that of small enterprises almost tripled in comparison to QIS2. Overall, the feedback from the industry is positive. Nevertheless, during the process several questions have arisen which merit to be answered to improve the specifications in view of the next quantitative impact study.

Please find below a non-exhaustive list of issues that have been raised by participants during the exercise:

14.1 General

- Tax issue: During QIS3, the question arose as to how to deal with taxes under Solvency II as in practice this may strongly influence the comparability of results. It has been stated that Solvency II is neutral and agnostic with regard to any accounting or tax issues, but as this is an issue that would exceed the scope of Solvency II, a political decision may need to be taken on this.

14.2 Technical provisions

- A need for more guidance on the calculation of the best estimate and risk margin has been expressed by many participants, especially for the value of future discretionary bonuses and for the value of options and guarantees in life insurance policies, and for the value of premium provisions for non-life policies. Simplifications for the calculations seem to be needed. Proxies have been used throughout the exercise to make up for the lack of data. The methodology and the practicability of the calculation of the risk margin was questioned by smaller firms.
- The loss absorbing capacity of future profit sharing has been identified as a critical issue. Modelling discretionary benefits is a complex task.
- Non-life premium provisions: Participants criticised the fact that the treatment was too principle-based and would leave too much room for different interpretations.

- Future premiums: It was unclear to some participants whether future premiums should be included in the calculation of the best estimate. This could have a large impact on life undertakings' results.

14.3 Solvency Capital Requirement

- Some participants have asked CEIOPS to simplify the SCR standard formula.
- Segmentation: Due to the specificities of some Member States in the protection insurance/workers' compensation business, participants could classify claims to include in life and non-life modules with differing results. This proved to be a difficult task for some participants.
- Fund structure: The assessment of segregated funds proved to be difficult where many funds exist, pointing out to a need for a simplification.
- Non-life underwriting risk: Calibration of this module should be reconsidered in order to make sure that it does not overestimate the capital charge. Some concerns were raised by participants about both the methodology and the evidence for the calibration for this component of the SCR. In addition, it was observed in several countries that more than 25% of participants would have a solvency ratio below 100%, and the justification for this needs to be examined further
- Mortality / longevity risk: Participants criticised the correlation between both risk modules and the difficulty to unbundle insurance products.
- Life catastrophe risk component: In a number of cases the large contribution by this risk component to the overall SCR of life undertakings could not be justified by the actual risk exposure. Some methodological shortcomings of the risk module were noted.
- Life underwriting risk: The application of the lapse Cat risk component for linked business was viewed as problematical by many firms.
- Equity risk: The granularity of the equity shocks has been criticised by various participants as not adequately reflecting the equity risk. Some proposed to include additional risk buckets.
- Treatment of unrated entities: The treatment of unrated entities in the spread risk and concentration risk module has been commented to be inconsistent. While the former assigns a weight close to a BBB rating, the latter treats unrated entities similar to CCC rated ones.
- Concentration risk: This module was perceived by many firms as being quite complex. There were also concerns in some smaller countries that it

was difficult for their undertakings to spread their investments due to the limited size of the available investment markets in the local currency.

- Counterparty default risk: Many firms requested clarification of the 'replacement cost' in this module. Intragroup reinsurance presented a number of problems for firms, given that that individual group entities may be unrated. It was also suggested that the scope of this module in QIS3 was fairly limited.
- Expected profits: Some participants criticised the fact that QIS3 did not include expected profits/losses in the calculation of the SCR.
- Excluding free assets from the SCR market risk module: Many participants questioned the rationale for this exclusion of free assets.

14.4 Value of assets

- Value of participations: There needs to be clarification of how firms should value their participations in other insurance undertakings e.g. should this valuation be performed on a look-through basis, or by making some estimate of the 'market value' of the participation?

14.5 Minimum Capital Requirement

- The various approaches that have been tested in QIS3 should enable CEIOPS to thoroughly analyse the various approaches to the MCR.

14.6 Own funds

- The results from QIS3 show that participants had difficulties in classifying their eligible elements of capital under the three tiers. They would welcome guidance on this issue.

14.7 Groups

The assessment of group capital requirements seemed to have caused some misunderstandings among participants, which have led to different

interpretations and eventually the delivery of non-comparable data. Some clarification would be needed:

- Scope of consolidation: group calculations could not be compared because of different bases of consolidation. For example: the consolidated group SCR was sometimes higher than the sum of solo SCR.
- Different group SCR calculations: All three calculation methods (SCR group, SCR as if solo and SCR consolidated) have to be exercised in order to allow a complete set of analytical derivations, such as the group diversification effects.
- Group coverage: Any derivations from the results – in particular with hindsight to Solvency II – are only sensible if the whole group and not only parts of it are covered.
- Internal models: Solvency II supports the use of full (or partial) internal models. Nevertheless, in order to be in a position to assess the effect of applying such models, the EC and the supervisors have to have a basic understanding of the model vis-à-vis the standard approach. Therefore, groups are strongly encouraged to provide figures for both the standard approach and the internal model, along with qualitative information about the model.
- Consideration of cross sector and non-EEA entities: To prevent misunderstandings, it should be made explicit where local rules are accepted as equivalent to Solvency II and to which extent surplus assets are assumed transferable between EEA and non-EEA or cross-sector parts of the group.
- Composite undertakings: According to the Directive Proposal composite insurers are to be treated in the same way as insurance groups taking into account increased transferability. Therefore, it will be indispensable to extend the guidance to these companies, which in QIS3 were often treated as single entities and not as groups.

14.8 Practical issues

- Participants indicated some difficulties with keeping up with the various (revisions) of spreadsheets. More guidance in the completion of the spreadsheets and the inclusion of worked examples were being mentioned as potential tools for helping in the completion of the spreadsheets.
- Increased contact with the industry was mentioned as an additional opportunity for improving the understanding of the exercise and the corresponding technical specifications and spreadsheets. The clear

expression of the rationale of the QIS and the expectations from the exercise would help participants in focusing their efforts. This would further improve participation to and outcome of the exercise.