Preparing for Solvency II

Points of debate in the Standard Model

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1. Introduction and general considerations

With the adoption of the Solvency II regulations, the European parliament has started a process that will bring about change in paradigm for the insurance industry. Until now, most managerial decisions have been taken on the basis of accounting considerations. By introducing the measurement of risk and capital, Enterprise Risk Management (ERM) should replace the traditional accounting-based focus, which will facilitate a stringent economic and holistic approach to the management of risk.Success will have to be measured in terms of return on risk capital rather than in terms of combined ratio and investment income. We consider this development as a decisive step in the right direction. It should help our industry to better cope with the evolution of markets and the demand of society for more adapted protection against risks. In this context, the internal model developed by companies or the standard model (SM) proposed by the regulators, which are supposed to assess the risks of a company and compute its solvency ratio, will play a central role. It is therefore important that theyaccurately reflect the reality of the risks taken by companies in order to provide a sound basis for management decisions. However, some new developments in the Solvency regulations in the aftermath of the crisis could present a danger to its efficiency.

Originally, Solvency II was supposed to push companies to develop their own internal risk assessment models. With all the criticisms directed towards models since then, the regulators' reaction has been to attribute to the insurance industry a high potential for systemic risks that does not actually exist and did not materialize during the crisis. The troubles experienced by AIG and Swiss Re were due to their credit business and not their insurance business. The tendency has now shifted towards the application of a more stringent standard model and reluctance to approve anycompany internal model. Defending the way in which models performed during this crisis would be beyond the scope of this paper, but let us just remind ourselves that extreme value theory has existed for more than twenty years and was able to accurately model the probability of the recent crisis. In our view, the problem was more to do with the reluctance of bank management to use models that would have put them out of a very competitive market by asking for a much higher price to take those risks onto their books.

With the most recent Quantitative Impact Study, QIS5, the regulators want to pinpoint the approach for the standard model. This study comes just after the most severe financial crisis of the last few decades. Although counter-productive (see Besson *et al.*, 2010) in such circumstances, the natural tendency is to tighten the rules for computing risk-adjusted capital. For the same risks, QIS5 requires even more capital than the previous exercise of QIS4, partially in accordance with the ideas presented by the CEIOPS in 2009 (CEIOPS, Level 2 Draft consultation papers, 2009). SCOR has taken part in the exercise and delivered its results on time. Based on this experience, we would like to review some points that are still problematic from our point of view. We concentrate on the model proposed in QIS5 because it will undoubtedly constitute the basis of the SM to come, and we would like its final version to reflect the risks of our own company and of others as accurately as possible. For many years SCOR has had its own internal model, which we call the group internal model (GIM). Building on this wealth of experience, we believe it reflects our risks very well. In principle, we would not need to add a standard model to it. However, in the process of having this model validated by

the regulators, we will inevitably be asked to compare our results to those produced by the SM. The SM is bound to become a benchmark against which other approaches to risk will be measured. We would thus like to discuss elements of the SM that should be adapted to a more realistic view of the underlying risks involved.

There are many open points concerning the treatment of risks in the SM. At the height of the financial crisis,the CEIOPS issued a series of level 2 consultation papers (CEIOPS, consultation papers 26 to 35, 2009) that should have taken on board the lessons of the crisis in order to propose changes to the SM. In view of the latest developments, it is important to examine the issues that are still under discussion and the weaknesses that we see from SCOR's point of view. We would like to contribute to the current discussions based on our own experience of modelling risk. SCOR has been using internal models in its business decisions for many years and has devoted considerable resources to building a sophisticated model (SCOR, 2009). We welcome the current developments in terms of risk-based solvency regulations and consider this paper as another element contributing to a better understanding and handling of risks in insurance.

First of all, it should be stated that the SM is not particularly geared towards reinsurers. After all, reinsurance represents only a very small portion of the market around 5% of the overall insurance premiums. Nevertheless, reinsurance companies, because they are used to taking peak risks, are the companies that have developed the most sophisticated internal models and have traditionally put a strong emphasis on their own risk assessment. QIS5 is essentially a factor-based model, in the sense that, given a certain exposure, the capital needed to support this risk is calculated by a factor multiplying the exposure. This factor is calibrated on industry standards that naturally mostly reflect insurance risks. For the reinsurer, this means the risk taken on via quota share contracts (proportional contracts) since the contract is simply to share a fixed proportion of the claims; however reinsurers also take non-proportional risks through excess of loss contracts. A non-proportional contract will only start to pay after a certain amount of claims have already been paid by the insured and up to a defined amount. As such, they differ significantly from proportional contracts in the sense that they react non-linearly to losses and usually have higher capital intensity (risk adjusted capital per unit of risk exposure) than proportional treaties, because their probability of payment is lower than those of the insured but the amount is higher (low frequency, high severity). Such differences, if not properly taken into account, will create serious distortions in the computation of a company's required capital. This is true both for direct insurers who use those contracts to protect their capital as for the reinsurers who sell them and have many in their portfolio. Later on in this document, we will discuss a point relating to this question when we present the issue of hedging insurance risks.

The issue of group support control has still not been clarified. The regulations are currently based on a solo approach, which increases the burden on international, well-diversified groups. Group support control has been pushed back to a second phase. This incites group restructuring and increased internal retrocession. The regulations should be neutral with regard to the organisational structure of a company, provided the capital fungibility between a group's various entities of the group is ensured and modelled by them (Filipovic and Kupper 2008). To our knowledge, the only regulation that is currently using this approach is the Swiss Solvency Test (SST), which is currently successfully applied by big Swiss groups like Zurich Financial Services (ZFS), Swiss Re and Swiss Life. It is a particularly important point for reinsurers. Their value proposition is their internationally diversified portfolio, which allows them to offer their customers good conditions in which to take their peak risks. If they are forced to immobilize large portions of their capital in order to satisfy regional regulations, it will diminish their ability to serve the insurance market well, which is what they have done until now.

The time horizon of the SM or the internal model is another limiting factor for a realistic assessment of insurance risks. It is currently set at one year from the last end-of-the-year balance sheet. Clearly, the one-year horizon is not in line with the duration of insurers' commitments to their policyholders. This is particularly true for life policy contracts. Such a horizon is considered reasonable by most regulators because it gives them time to react and if necessary to take measures to protect the policyholders. That is why the perspective chosen is a runoff perspective after one year. However, a focus on a one-year time horizon, particularly where liabilities are concerned, could, from the point of view of insurance management, result in an inappropriate capital allocation for long-tail risks in comparison to short-tail risks in P&C, or a too-high capital for the life business since the possibilities for adapting the premium over time or for taking investment measures are very limited. Multi-year modelling is beyond the current capabilities of mathematical theories. In particular, we do not have at our disposal a good mathematical risk measure that can be applied for a multi-step assessment of risks. Moreover, this would imply the inclusion of stochastics in stochastics for Monte Carlo simulations, the precise modelling of management responses to extreme events and the possibility to modulate certain risk factors according to changing market conditions. Nevertheless, special attention should be given to this limitation when conducting internal model use tests. Management must look beyond a one-year horizon when taking important strategic decisions.

The solvency computation contains various elements. An important one that qualifies the solvency state of the company is the coverage ratio (CR). This is the ratio between available and required capital. It implies the computation of both forms of capital. The available capital is defined as the difference between the economic value of the assets minus the economic value of the liabilities at time t and the solvency capital requirement (SCR), also called required capital, and computed at time tplusone year. In principle, the SCR is defined as the VaR at 99.5% of the distribution of the change of available capital during the year. In practice, in the SM, it is computed through the aggregation of standalone distributions of the underlying risks (underwriting risks, market risks, counterparty risks and operational risks) with a correlation matrix, whose calibration is not easy to achieve and should in principle differ from one portfolio to another.

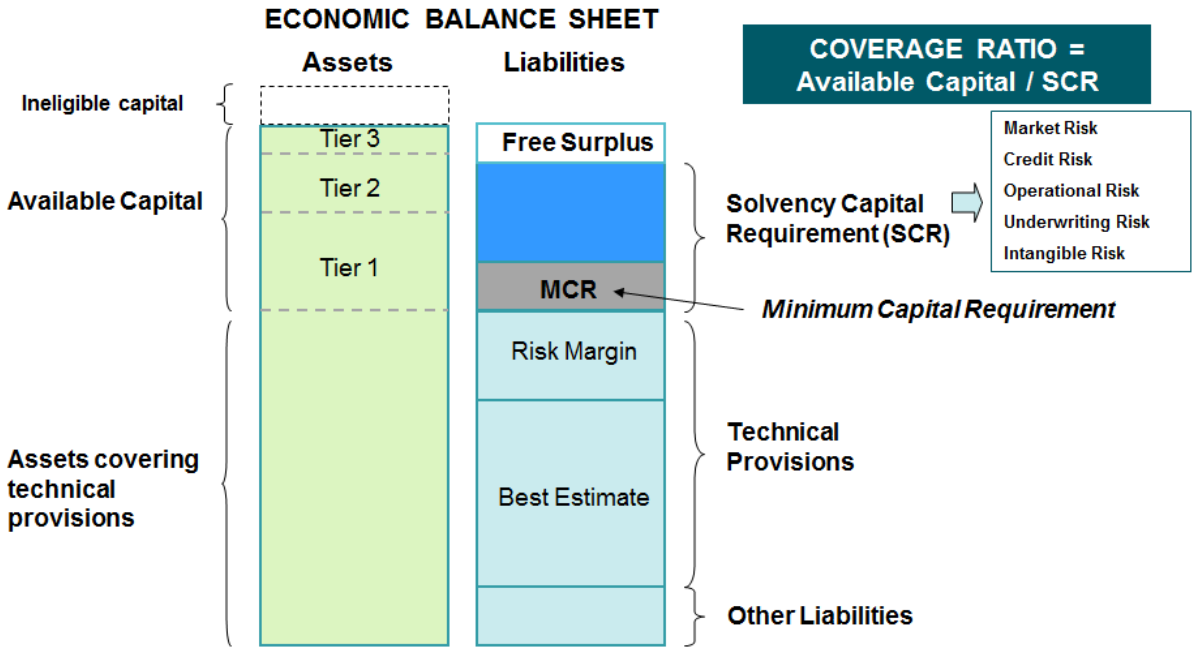

Figure 1 The various components of the Solvency II capital computation

In Figure 1, we show the various components of the solvency calculationschematically. Both quantities must be computed to examine the CR. In the following, we will discuss problems linked firstly to the available capital and then to the SCR before concluding our analysis.

2. The Available Capital

The definition of available capital in Solvency II requires the economic valuation of assets and liabilities. This means that the available capital differs from the IFRS equity in that all the future profits are added and the risk margin (RM) of the liabilities is subtracted. In fact, one of the major problems in QIS5 is related to the computation of the RM. This quantity is computed as the cumulated cost of capital of the non-hedgeable part of the liability risks. The reserves constituted for a particular risk can be backed by a portfolio of assets presenting a similar payout pattern. This portfolio of assets is called the replicating portfolio because it "replicates" the expected liability cash flows. Besides the expected cash flows, there is a risk of paying more linked to the stochastic nature of the liabilities. To cover this risk, insurers / reinsurers are required to hold capital. Valuing the liabilities economically means adding the cost of capital carried to cover this liability to the market value of this replicating portfolio (see Figure 2 for a schematic explanation of this concept).

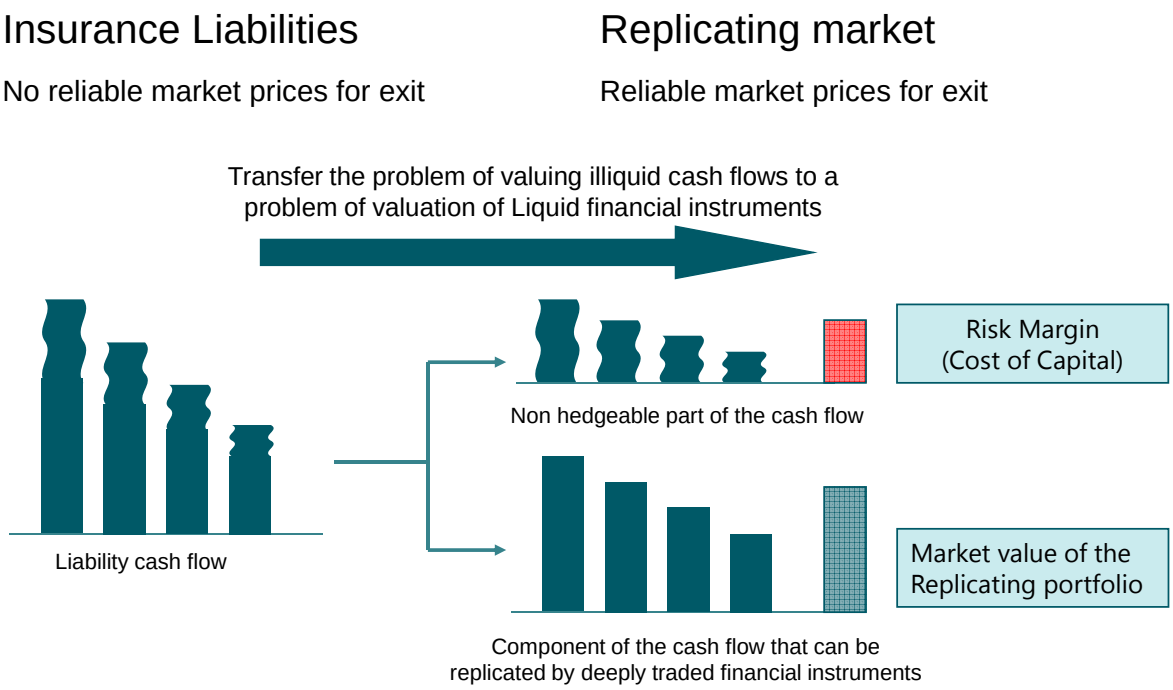

Figure 2Schematic representation of the economic valuation of liabilities

For the computation of the risk margin relevant for the available capital, the issue becomes the portfolio of liabilities that should be used. The capital required for the entire portfolio at the group level is of course much smaller than the capital required for covering single risks, as it clearly contains strong diversification benefits. Using this approach, as requested in the Swiss Solvency Test (SST), would considerablyreduce the risk margin as compared to the QIS5 requirements. QIS5 requires the calculation of the risk margin for each legal entity without diversification effects. The choice of course depends on the assumptions used for the transfer of liability portfolio. One can assume that it would not be possible to transfer the whole portfolio, which would justify summing up the entire RM for the various legal entities, or one can assume that it would be possible to sell

the entire company and thus take the RM of the overall portfolio. This would considerably reduce the RM to be taken out of the available capital. In our own QIS5 exercise the difference between the diversified group RM and the sum of solo RMs' was an increase of 24.3% of the charge. The choice of no diversification benefit will penalize companies like SCOR that are very well diversified and that have spent time and money to achieve such benefit.

Concerning the risk margin, there is another assumption that could be legitimately questioned. In Figure 2, we see that the risk margin can be computed from t_0, the time at which the available capital is estimated, or at t_1, the time at which the SCR is evaluated. Arguably, since the SCR is here to guarantee payment in the first year, it would be double counting to subtract the cost of capital for the first year. In any case, it forms part of the computation of the dividends assumed for the first year. Since in the SM, the point of view is that the stress applied to the balance sheet happens instantaneously this difference is not taken into account. In fact, there is no time notion in the SM contrary to what we explained few paragraphs above where the logical way of computing the AC and the SCR is to look at a certain time horizon. In the SST the time horizon is explicitly mentioned and discussed (see SST-technical document 2006). Consequently, the RM is computed at t_1, while QIS5 requires it from $t_0$following the approach of "instantaneous" stress. The difference is non-negligible; in the case of SCOR we computed an additional 17.4% for the first year. We believe that the SST approach is more realistic and respects the fact that the SCR is here to cover the risk of the first year. Again, this is a matter of point of view since there is no liquid market for most of the insurance liabilities[1] and it is somehow artificial to compute a market value for them. However, there is no reason to systematically choose assumptions that will charge the capital, without considering reasonable mitigating effects.

In Figure 1, the available capital is divided into three tiers corresponding to various forms of capital held by the companies. One form, which is quite popular among insurance companies, is the hybrid debt. For the moment, it is classified as tier 2 capital, but it could be rendered ineligible to cover SCR if grandfathering[2]is applied too strictly or is not adopted. Although currently accepted in QIS5, the latest CEIOPS proposals (see CEIOPS consultation paper 29, 2009) would drastically reduce the amount of hybrid debt that could be considered as capital. Hybrid debts are used to reduce the cost of capital for companies because their cost is generally lower than the cost of equity. They constitute an important instrument of capital management. It would reduce the financing flexibility of the industry, if management were not allowed to use them because they would not be considered as a valid source of capital. For instance, rating agencies allow for a certain amount of hybrid debt in the capital. It is clear that too much debt would harm the financial credibility of insurance companies, but a certain amount delivers much needed flexibility in accessing the capital market.

There is another issue concerning the elements constituting the available capital: the value in force (VIF) of the life business. In QIS5, the VIF is recognized as Tier 1 capital, which makes sense from an economic point of view. Since, economically, this is the value that will materialize over the years and can be sold to other market participants. It is consistent with the economic valuation of assets and liabilities. Some suggest that it should be forbidden or only partially allowed. Not considering the VIF in the available capital would strongly penalize life business, which is already subject to more stringent requirements through the SCR and whose business model is based on the embedded value calculation.

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[1]The notable exceptions are the CAT bonds for insuring natural catastrophes and few securitizations of other insurance liabilities. Overall, they represent only a very small amount of the risks.

[2]Grandfathering means when rules are changed, allowing actions taken before a certain date to remain subject to the old rules.

3. The solvency capital requirement

On the other side of the available capital, Solvency II demands the computation of the capital required to guarantee the liabilities on the balance sheet. Once again there are points here that should be discussed and decided concerning the treatment of certain risks within the SM. One of the major issues linked to life business is the question of contract boundaries. There is some uncertainty over how to treat these. A common market practice seems to be the modelling of premium reviewability rather than contracts boundaries. Whatever technique is used, taking into account the peculiarities of certain life contracts has a strong impact on their solvency requirements. Those features were introduced to reduce the risk of certain types of contracts. That is why contract boundaries should be maintained and their definition clarified.

The P&C Cat methods provided in QIS5 technical specifications are inadequate for reinsurance and do not properly reflect the exposure to natural catastrophes (CAT). A first method is scenario-based and only concerns European exposures for proportional contracts and therefore is not adapted to international well diversified players. For these players, the second method applies, and it is factor-based. The factors are multiplied by the P&C premiums which are considered as representative of the company's exposure. This approach does not take into account the specificities of the firms' portfolios. Reinsurers, in particular, take great care to manage their CAT exposure in order to achieve maximum diversification and reap the benefits of this in terms of risk-adjusted capital. They are assuming the highest risks in this field and need to be as diversified as possible. For this purpose, they have traditionally invested heavily in CAT models and IT solutions to manage their exposures. Recognizing this fact, rating agencies use the results of the company's own models to assess capital needs for CAT. By using a purely factor-based method, QIS5 is penalizing reinsurers on this subject. For SCOR, the QIS5 result for the CAT risk standalone is 59.1% higher than the VaR(99.5%) of our own CAT model. According to the directive, final standard formula should allow the use of partial internal model for P&C Cat risk and the benefit of mitigation schemes as long as they are fully modeled by the company. This is allowed by the directive and should also be allowed in the QIS. We believe that the SM should fully recognize the non-proportional risk mitigation instruments used by the industry as well as the use of Insurance Linked Securities (ILS) to hedge CAT risks as long as they have been carefully modeled by the reinsurers or the brokers. Both techniques have served the industry well over the past few years (Cummins and Trainar, 2009).

A regular practice of insurers / reinsurers is to reserve at the maximum remaining exposure if the risk has aged or if it is covered by a reinsurance treaty. This means in practice that there is no uncertainty left with regard to the amount to be paid[3], since they have already reserved to the maximum of the exposure. If there is uncertainty it is in the positive direction: it can turn out that the company will end up paying less than it reserved. QIS5 does not explicitly state that reserves can be capped when risk is capped, i.e. limited to a certain level (reinsurance, maximum exposure, etc.). When evaluating the risk remaining in the reserves, this practice should be taken into account as it reduces the uncertainty of the downside risk. In the case of SCOR, it represents a bit less than 1% of the reserves but would contribute significantly to the risk if taken into account. Final specifications of the SM should explicitly state the possibility of capping reserves.

On the investment side, equity investments are considered to be more risky than debt instruments. We can agree on this assessment for a one year time horizon and on a standalone basis. It is very different when looked at in a well diversified portfolio of both assets and liabilities. For SCOR, for instance, equities represent only 11% of the investment portfolio, whereas, in our QIS5 exercise, they constitute36% of capital requirement after diversification (see Figure 3). In light of this, we think this risk should be considered in its full perspective: as a long-term investment and as a means

[3]Up to the counterparty risk of the reinsurer.

of diversifying the risks in an insurer's portfolio. In times of high inflation risks, equity shares can provide much better coverage against inflation than fixed-income instruments. Moreover, the financial market risks are not fully correlated to liability risks, natural catastrophes in particular are only correlated in extreme cases to the financial markets (Tokyo earthquake). They constitute a way in which to diversify the risks of the portfolio considered from an asset and liability management perspective. By using a correlation matrix, the diversification benefit of equity is partially recognized in QIS5. However, because the dependence model is linear, the calibration is too conservative most of the time and probably not enough conservative in times of stress (for a discussion on dependence modelling in times of stress see Bürgi *et al.* 2008).

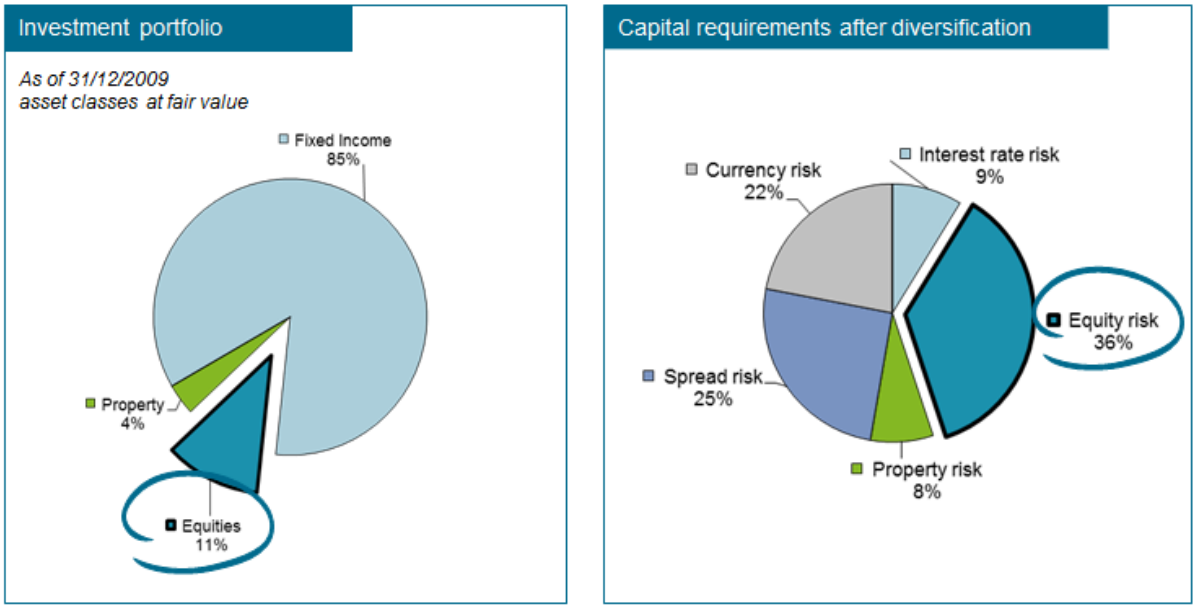


Figure 3 Overweight of the equity risk in QIS5

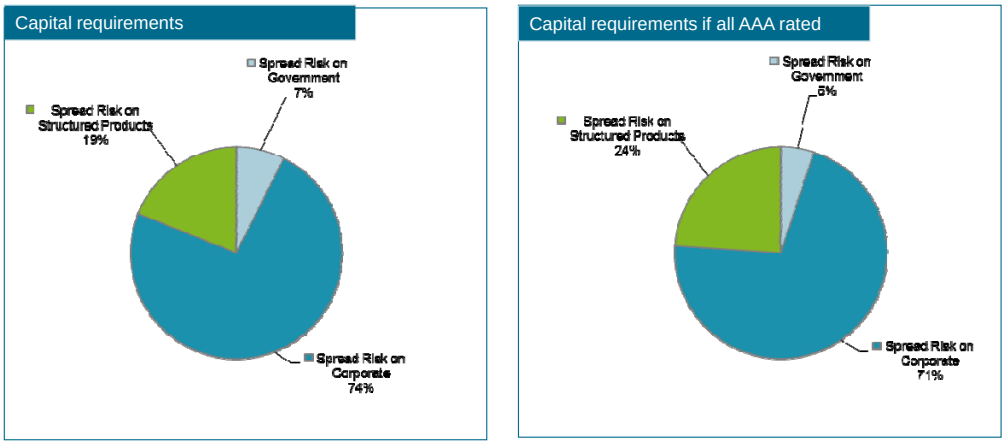
In practice, the capital allocated to equity after diversification in SCOR's portfolio is much reduced, even though the standalone capital intensity is close to the non-diversified capital intensity of QIS5. We find a diversification benefit of more than 80%, while the standalone risk is actually even higher than that required by QIS5 (see Table I for precise numbers). It is thus important to correctly assess the dependence between the various risks (Bürgi *et al.* 2008) to ensure that the capital allocated to equity investment is not too high, while making sure that the extreme risks are correctly accounted for. Moreover, when optimizing the amount of equity in the investment portfolio, the internal model would give a portion that is always smaller than the accounting capital of the company. This shows that the model is using the equity exposure as a way to diversify the risks and to obtain a better risk / return profile for the entire portfolio.

Table 1 Comparison of the capital consumption (capital / market value) for equity between QIS5 and GIM

Equities Capital Consumption	Standalone Risk	Diversified Risk	Diversification Benefits
QIS5	30.8%	15.1%	51%
GIM	62.4%	11.8%	81%

When estimating counterparty risk, most insurers would rely on the judgements of rating agencies. They are encouraged in this approach by the CEIOPS documents relating to the estimation of counterparty risk (see CEIOPS, 2009, consultation paper no. 28). As confirmed by the recent financial crisis, such an attitude increases systemic risk. It could lead to the paradoxical situation of increasing

counterparty risk capital charges for reinsurers meeting SCR criteria. Such an approach is highly questionable because it places the assessment of credit risk in the hands of just a few agencies. In Figure 4, we can see that the rating has a strong influence on the capital charges required for assets. This would also be true for reinsurance assets in the balance sheet of insurers. Moreover, it is questionable to add a credit charge based on rating agencies judgements to reinsurance companies that would have already satisfied the Solvency II criteria of solvability. At least, their solvency ratio, which would be recognized by the regulators, should be allowed to be used for computing the counterparty charge to the capital.



Capital Reduction when assets AAA rated			
Gov.	Corp.	Struc.	Total
-65%	-51%	-35%	-49%

Figure 4 The effect of counterparty risk on the capital intensity in QIS5 for SCOR

Overall, we believe every company should be allowed to estimate counterparty risks using their own method as long as this is approved by the regulators. The default frequencies could then be used in both the SM and the GIM. The diversity of judgement on the credit worthiness of firms would avoid the constitution of a general view on the subject that could be completely biased. Another aspect of counterparty risk that should be considered is the absence of credit risk for sovereign debt issued by OECD countries. The recent problems with Iceland, Greece and Ireland show that it might not be appropriate to consider those debts free of counterparty risks. The Swiss regulators have already asked companies to include such risk for certain countries. It seems that the European Commission is aware of this problem and will advise in the same direction. We are very supportive of this improvement of the counterparty risk model.

An important aspect of the SCR calculation is constituted by the loss absorbing effect of Deferred Tax Assets (DTA) even though this effect is not directly linked to the underlying risks. Currently, the assessment of the recoverability of DTAs under Solvency 2 closely resembles the international accounting standard rule, IAS 12. Final rules should not be over burdensome (for example by limiting DTAs to 12 month recoverability as recommended by CEIOPS) and should be aligned to local tax legislation. It is especially important to reach a consensus regarding the treatment of this subject as it is not directly related to the underlying risks and would only serve as a correction to the size of the claims. Only such a unified treatment would enable different SM results to be benchmarked and compared.

Finally, the calculation of SCR and MCR does not make enough provisions to its methodology based on the economic environment. Given the increased risk during times of financial crisis, the solvency

regulations could play a pro-cyclical role and thus deepen the crisis (see Besson *et al.* 2010), while failing to ensure a good survival rate for regulated entities. Moreover, the probability of a double dip is lower than that of a single dip – the capital requirements should therefore be higher at the peak of the cycle than at the bottom of the cycle. Based on QIS5, the SCR and MCR cannot play the role of macro-economic shock absorber that should ideally be theirs. Some measures should be taken to accommodate the solvency requirements in a transparent way (Besson *et al.* 2010), while ensuring a reasonable level of solvency ratio for insurances.

4. Conclusion

The systematic use of SM will definitely change the way in which companies have assessed their risks until now. However, as with every model, it needs improvements and developments that will render it even fitter for the job at hand. Nevertheless, it is also clear that for risks, a "one size fits all" approach is not the solution. Companies should be encouraged to develop their own risk assessments as recommended by Pillar 2 based on sound quantitative models. The original spirit of Solvency II was to encourage firms to develop their own internal model. This spirit should be kept and even reinforced in view of the latest financial crisis. Provided that the regulatory authorities are in a position to approve them, internal models are the best way to assess the risks of an insurance company. People who are dealing every day with the risks are in a better position to develop the techniques to cope with them. They have the means to do it and regulation should provide the right incentives to push them to do it.

Insurance regulators are under pressure to take on more of the rules and regulations of banking. However, it may well be that the underlying philosophy of the latter haveactually contributed to the crisis rather than mitigating its effects, by placing too muchemphasis on the auditability and control of all risks rather than on their assessment. The way in whichinsurance solvency regulations are implemented does not just involve specific rules and regulations, but is also largely about thestyle of supervision involved. How will politics support principle-based regulation? Will rules andregulations be mere fig leaves and stay unenforced due to lack of political will? Will foreignsubsidiaries be treated equally as local players or will regulation and supervision be used asa tool for protectionism and economic war? Will the supervisory authorities have the freedomto employ sufficient staff to implement principle-based supervision? Good regulation andsupervision are expensive and at times painful, but the costs of bad or inappropriateregulation are potentially much higher.

Historically, every important financial crisis has reshaped the architecture of the financial system. This one will undoubtedly also do it. We are in times of questions and formation of a new landscape. We are convinced that the introduction of risk based solvencies like Solvency II will help the insurance industry to better weather the crises to come and to provide more efficient services to their customers.

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