Moving forward with the fourth Solvency II quantitative impact study (QIS4)

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As followers of the Solvency II project and readers of Milliman's commentary on the subject will be aware, the project is now entering a key phase with crucial developments on the Pillar 1 capital requirements framework planned for this year. In particular, the fourth and latest quantitative impact study (QIS4) is now underway and the results are due to be published in November.

In our last publication ("Summarizing the third Solvency II quantitative impact study"), we identified several challenges that arose from the results of QIS3. This also informed our submission to the Committee of European Insurance and Occupational Pensions Supervisors (CEIOPS) on the draft technical specification for QIS4.

In this paper we look at the QIS4 technical specification in the light of our submission and make some related comments.

COMMENTARY ON THE QIS4 TECHNICAL SPECIFICATION

The extent of the calculations required of companies for QIS4 has increased significantly in comparison with those of QIS3. In particular, additional Solvency Capital Requirement (SCR) calculations will put pressure on the resources of participants. We appreciate the desire of CEIOPS to enhance their insight into the likely impact on companies, but we are somewhat concerned about the administrative burden that is implied and the potential for this to lead to a reluctance to participate, especially among smaller companies.

The sections below follow the general order of the QIS4 technical specification and bring together some of the views and observations of Milliman's international team of Solvency II experts.

VALUATION OF ASSETS AND LIABILITIES

Technical provisions

General principles

One of the key general principles in the technical specification is the use of the probability-weighted average of future cash-flows. In the case of a non-symmetrical distribution of cash-flows around the mean, such as for options, a separate methodology should be used to value the option. For non-life business it seems there is a movement towards stochastic reserving.

Best estimate – Life

The best-estimate value of life liabilities is defined in QIS4 as the probability-weighted average of all future potential cash-flows, taking account of the time value of money. The best estimate is based upon current and credible information. In particular, entity-specific assumptions should be used only where they reflect the portfolio characteristics of participants better than non-entity-specific assumptions. However, we believe it is important to note that, except for economic data, reliable non-entity-specific assumptions reflecting the specific characteristics of a portfolio are rarely available.

In life insurance, except in respect of economic parameters, very few statistical distribution functions are available for the type of parameters used in projections of the future cash-flows. For example, the impact of lapse rates and their correlation with the economic environment can be very important and difficult to measure. Much research and analysis must be carried out on the various correlations and relationships between the different parameters to enable the projection of realistic cash-flows. Milliman has gathered experience of the dynamic lapse behaviour of policyholders and its relationship with the economic environment that enables more accurate modelling of policyholder behaviour with regard to guarantees.

Under QIS4, contractual recurring premiums are allowed for, together with some consideration of expected renewal premiums outside the current insurance contract. We would note that renewal rates often depend on economic conditions, but sound statistical information on this aspect is rarely available. Management of a company will need to provide expert opinion on the pricing and underwriting policies that will apply under the different economic conditions.

Best estimate – Non-life

For non-life business, QIS4 requires that, in general, valuation of the best-estimate provision for claims outstanding and for premiums be carried out separately.

The use of homogenous groups of data in the calculation of the best estimate of the claims-outstanding provision is encouraged (which may be more granular than the segments listed in the specification). As segmentation can result in groups that are too small to analyse in isolation, we suggest that any decision that further segments the data be balanced with consideration of credibility (which generally increases with volume).

Techniques compatible with standard actuarial methods, such as the chain-ladder method and the Bornhuetter-Ferguson technique, are to be used where practicable, and adjusted for factors that would have a material impact on the results. Typically

this will require the use of claims data on an occurrence-year (or accident-year) basis or an underwriting-year basis for the run-off triangles. Descriptions should be given of the methods and approaches used and goodness-of-fit tests applied to all statistical methods considered.

The calculation of the best estimate of the premium provision relates to all future claim payments arising from future events that are insured under existing in-force policies, corresponding future administrative expenses, and all expected future premiums.

Risk margin

QIS4 states that the risk margin should be derived via the use of an annual cost-of-capital factor of 6% above the risk-free interest rate. The level of the cost-of-capital factor is still under discussion and there is a possibility that it will be reduced.

Technical provisions – Life

QIS4 requires the cash-flow projections underlying the liability valuation to take account of the proportion of policyholders expected to take up options. Dynamic policyholder behaviour will therefore be incorporated within the best estimate, influencing the time value of options and guarantees. Adverse policyholder behaviour (increasing the value of options) should be recognised, as should behaviour that is potentially beneficial to the company. Uncertainty over the assumptions made for such behaviour should be reflected in the SCR calculation (for example, with respect to extreme movements in lapse rates).

QIS4 notes that implied volatility is the relevant volatility measure for financial instruments used within the valuation of technical provisions. As stated in the technical specification, we would note that total-return (as opposed to price-return) financial instruments should be used where insurers will receive the total return achieved on their underlying assets, with price-return instruments being used where no income or dividend will be received on the underlying assets.

As a simplification, QIS4 allows the time value of an investment guarantee to be calculated via a Black-Scholes framework. We would note, however, that use of the Black-Scholes framework is not always appropriate, for example in the case of modelled management actions and policyholder behaviour. Here stochastic simulations are required to arrive at the best estimate.

The formula specified within QIS4 for simplifying the best-estimate calculation for Italian-style with-profits life insurance does not allow well for the risks of the guarantee. In other words, it could give the same result for both a high and a low guaranteed interest rate. This does not appear to us to meet the objective of achieving a best estimate of the liability. We also note that it creates some bias by discouraging equity investment without giving any disincentive to invest more in corporate bonds (although this would partially be picked up by the credit-risk element of the SCR).

In general, we believe it is important to have a sufficiently sophisticated system for calculating life technical provisions, otherwise we may achieve precision in terms of deriving the SCR and then lose it in the definition of the available capital.

Technical provisions – Non-life

Best-estimate premium provisions substitute current unearned premium provisions and unexpired risk provisions.

Best-estimate outstanding-claims provisions relate to the settlement period between claims incurred and claims settled, and should include claims-handling expenses.

- Annuities arising from non-life insurance contracts, which are certain both in timing and amount, are to be treated as life-insurance obligations.

- For claims with low uncertainty, both in timing and amount, either individual case-by-case or statistical methods may be assumed as reasonable proxies of their best estimate, provided the entity has completed back-testing to verify the reasonableness of the proxy.

- For claims with significant uncertainty, in either timing or amount, the best estimate should in principle be valued using standard actuarial methods based on run-off triangles. In order to control for model and parameter error, at least two methods should be used that are considered reliable, relevant, and suitably different (i.e., based on different assumptions and techniques). Judgment should then be used to select the most appropriate method.

- Where credible data is not available, the user should attempt to adjust the historical data using objective and verifiable criteria. If such an adjustment is not possible or reliable, a case-by-case approach is deemed preferable.

Interestingly, the Amended Solvency II Framework Directive (article 76, paragraph 2), released in February 2008, states, *"The best estimate shall be equal to the probability-weighted average of future cash-flows, taking account of the time value of money (expected present value of future cash-flows), using the relevant risk-free interest rate term structure."* Whereas this sentence may have been drafted in the spirit of the anticipated IFRS Phase II principles, taken at face value it may be interpreted as meaning that stochastic reserving will be a requirement for all portfolios. While this approach appears to be inconsistent with QIS4, whose guidance is segregated by level of uncertainty, we are aware of one major regulator that is presently interpreting article 76 as meaning stochastic reserving will be a requirement for all portfolios.

OWN FUNDS

Principles

The final QIS4 technical specification (issued 31 March 2008) contains considerably more material on 'own funds' than the draft technical specification issued in December 2007. This includes a specific section on ring-fenced funds.

These changes are necessary and meet a number of significant concerns with the original draft. We note further that at a number of points in the document the European Commission (EC) requests more information about fund structures and the transferability of capital between funds. This is an acknowledgement by the EC that further debate and discussions are necessary in order to provide a framework that makes sense across the wide range of existing product types and company structures.

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List of tiers

QIS4 requires that for a promise to provide own funds to be included within tier 2 capital it must be 'certain.' A question remains about how to determine that a promise to provide funds is 'certain.' In our opinion, it would be helpful to provide some specific examples, e.g., a board minute, enshrined in the company capital policy (although sometimes this can be a changeable policy document), a change to articles of association, etc. In general, we assume that the point here is to make this legally watertight, in which case that should be stated.

QIS4 gives some examples to illustrate the tiering of basic own funds. However, these assume that preference shares are always subordinate to policyholders, and we would note that this may not be the case and so should be stated. Also, we would question the significance of the '10-year' criterion used for including certain elements within tier 1. Recognising that these liabilities should be subordinate to policyholders, we note that if the duration was instead, say, five years, the funds would still be loss absorbing.

QIS4 considers that hybrid capital instruments should in general be classed wholly within one tier, though optionally a split between capital and debt components is also possible. Our view is that, from a theoretical standpoint, hybrids should be split. This may be difficult in practice, but we note that it is something to aim for and believe it could be useful to analyse the feedback of those companies providing information on the basis that hybrids are split across the various tiers. If the feedback is that this is too onerous, or the information received involves too much estimation, or the splitting methods are not sensible, then this requirement could be dropped from subsequent impact studies.

SOLVENCY CAPITAL REQUIREMENT (SCR): STANDARD FORMULA

SCR general remarks

Undertaking-specific parameters

The QIS4 approach to the use of undertaking-specific parameters in the SCR standard-formula calculation is that undertaking-specific parameters for the SCR life risk module are not to be used but will be considered in the future. We assume that the rationale behind this is that companies provide comparable QIS4 results that consider the same tests and stresses in the SCR.

Adjustments for the risk-mitigating properties of future profit-sharing

The QIS4 specification allows for management actions to be taken account of in the calculation of the reserves, and for the effect of the variation of future bonuses paid to policyholders to be allowed for in the SCR calculation. It is not clear, however, whether other management actions can be allowed for in the scenario testing for the SCR. For example, the action of switching asset classes under certain investment conditions or raising charges in other scenarios.

SCR calculation structure

SCR_{op}: Operational risk

QIS4 specifically excludes strategic risks from its definition of operational risk. We would note, however, that strategic risks can be operational risks and it would therefore make sense to take account of these within the SCR_{op} operational-risk module.

SCR market risk module

Introduction

As an alternative calculation the QIS4 correlation of interest-rate risk with equity risk could be split into: (a) the risk of increasing market interest rates positively correlated with the risk of falling equity markets, and (b) the risk of decreasing market interest rates negatively correlated with the risk of a fall in equity markets. Due to the convexity of liabilities, the total market risk of an increase in the market interest rate plus the effect of a fall in the equity market could have a higher impact on net asset value than the uncorrelated effect of market interest rates going down and equity markets falling.

Mkt_{int}: Interest rate risk

QIS4 specifies that the relative change for the 'up' stress, $s^{up}(t)$, is always positive, while the relative change for $s^{down}(t)$ is always negative. We would note, however, that this is not always the case for life insurance and can depend on the nature of the portfolio.

Mkt_{sp}: Spread risk

We note that QIS4 does not include explicit modelling of the default risk of mortgages, and in particular we would have some concerns over the correlation between this risk and property prices. For example, there is a risk that in the case of a fall in property prices there are then increased losses on mortgages (in case of default) and the security backing the mortgage can therefore lose an important part of its value.

SCR life risk module

SCR_{life}: Underwriting risk module

We note that agreed claims arising from non-life business and payable in the form of an annuity, such as disability or workers' compensation, should be treated similarly to life business.

$Life_{long}$: Longevity risk

We note that QIS4 takes no account of the fact that the development of longevity risk can be distinct for differing groups, with for example the longevity risk of disabled people likely to be lower. Also, the older that people are the less time they are likely to have to benefit from developments of health and medical care. A longevity stress that is a simple flat reduction in mortality rates does not recognise this effect.

SCR non-life risk module

NL_{pr}: Premium risk / NL_{res}: Reserve risk

The capital charge for the premium risk reserve is a linear function of the volume measure for premium risk, meaning that a growth in volume will lead to an increase in the capital charge. However, a growth in volume could just be the result of an increase in the number of policies and/or the result of a rate increase (aimed at reducing losses or increasing profitability). In the latter case, if a company wants to try to increase its profits by raising premium rates it seems odd that this should lead to an increase in the capital requirement. Similarly, a reduction in premium volume due to lowering rates shouldn't automatically lead to a decrease in

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the capital requirement (e.g., a company is not making profits but wants to protect its market share by lowering premiums). As it stands, the capital requirement does not take into consideration the effects of the underwriting cycle. There is therefore a need to introduce a measurement of expected profit/loss.

QIS4 states that the premium risk relates to future claims arising during and after the period until the time horizon for the solvency assessment. QIS4 further states that the premium risk relates to policies to be written (including renewals) during the period and to unexpired risks on existing contracts. QIS4 then ignores the unearned premium reserve as it specifies that the volume measure for premium risk should be defined as follows:

V_{prem} = max(expected net written premium during the period, expected net earned premium during the period, 1.05 x net written premium from the previous year)

Here it is unclear whether we need to consider written premium from the current period plus unearned premium reserve (unexpired risks on existing contracts) from the previous period, or only written premium from the current period. If we consider a shrinking portfolio or a dramatic increase in ceded premium, then net written premium from the current period may lead to an underestimation of the premium risk.

The addition of geographical diversification is a welcome improvement, but the split by region may need to be refined–for example, taking Asia (excluding Japan and China) or the United States as a single region may not be optimal as these are rather wide areas.

Dutch health insurance

The premium risk should in our opinion also include the risk of setting insufficient premiums for multiple years.

MINIMUM CAPITAL REQUIREMENT (MCR)

For the MCR, we agree with the concept of having simplified rules but we note that, as they stand, the QIS4 rules may lead to a material capital requirement for some types of products. Since companies will be concerned not to breach the MCR limit, they will always be aiming to be well above the minimum limits.

For example, for a block of with-profit business close to retirement it seems that the MCR could be 2.5% of reserves for the guaranteed part of benefits (which would be most of the reserve for some types of products close to retirement). This could be significantly above what would result from the SCR-type calculations for a fairly "non-risky" product.

OTHER COMMENTS

We believe that it is important for companies to conduct a root-cause analysis to identify the events that have led to risks occurring. Analysing operational risks in silos is unlikely to yield useful information that can be used to mitigate similar risks in future. Unless the organisation can demonstrate that they understand how the event occurred it is likely that a similar event could still occur in future.

We believe that for an operational risk management system to be effective it must capture the connections between the various risks identified. The connectivity between different risks is what gives rise to the complexity that underlies significant risks. If insurers are not considering risks as part of an overall connected-risk exposure, it is unlikely that they will be successful in avoiding large risks.

QIS4, QIS5, AND BEYOND

QIS4 takes the European insurance industry further down the path towards finalisation of the Solvency II framework. QIS5 has already been announced and there are still a number of technical issues that need further consideration, such as group supervision, proportionality, internal models, and calibrations. We therefore expect that future quantitative impact studies will be likely to focus on more specific topics.

Previous quantitative impact studies have prompted a growing mobilisation of the insurance industry on the issues of Solvency II. We applaud these initiatives and expect this effect to continue with a further increase in the number of companies participating in QIS4.

Contact your local Milliman consultant for more information. Alternatively, life insurance-related inquiries should go to Dominic Clark (dominic.clark@milliman.com) and non-life inquiries should go to Gary Wells (gary.wells@milliman.com).

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