Capital Motivated Reinsurance under Solvency II

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Introduction

Capital Motivated Reinsurance is RGA's preferred label for reinsurance where the insurer's primary buying motivation is to optimise the amount of traditional capital that it must raise, or to improve its return on that capital. Capital Motivated Reinsurance arises in those circumstances where reinsurance is cheaper than debt or equity, or when an insurer encounters certain constraints in using traditional capital and access to reinsurance is faster or more flexible.

Historically, Capital Motivated Reinsurance has most often arisen where an insurer is required to hold reserves and capital in excess of a true economic requirement, where such an economic requirement reflects all aspects of the risk and full diversification benefits with other risks. A reinsurer who is able to hold a level of capital closer to that economic level – for the exact same risk – can create value from this difference. A successful Capital Motivated Reinsurance transaction shares the savings from this capital difference between the insurer and the reinsurer, making them both better off than prior to the transaction.

The presence of such differences and the opportunity or need to share them will change as we move from Solvency I to Solvency II. Simply because the insurers' capital requirement will change, the difference and savings of the prior paragraph will change. More specifically, under Solvency II the solvency margin requirements should move towards a more economic level. This will eliminate some types of Capital Motivated Reinsurance, but others will move to the forefront for the first time.

Reinsurance can be an important source of capital in addition to equity or debt capital, and it will continue to be so in the future, even if the circumstances under Solvency II are different.

This document outlines RGA's current expectations about how that transformation will unfold under Solvency II.

Solvency I

Solvency I, which is now almost 40 years old, defines the capital required by an insurer with a small number of factors, most of which are applied to balance sheet numbers. For example, 4% of reserves and 0.3% of sums at risk are the main components of the requirement. With the benefit of 40 years experience in a world that has changed tremendously in that time, there is wide agreement regarding the need to replace Solvency I with a new system. The risks borne by an insurance company simply cannot be embodied in so few factors, and balance sheet numbers are not designed to measure risk.

For example, Solvency I doesn't give a different answer if you alter the riskiness of the assets held by a company, and it doesn't distinguish between reserves for fixed annuities and reserves for life contingent annuities. Given examples like these, the solvency requirements for some products were understandably in excess of economic levels.

Solvency II

Although Solvency II is not yet finalised in many detailed respects, it is already sufficiently clear what its goals are and that there is sufficient political will to implement it. One might liberally summarise the philosophy behind Solvency II as follows:

1. Identify the risks,
2. Understand the risks, and
3. Reflect the risks in the level of capitalisation.

These risk-focused principles are, however, already familiar to most companies due to their own internal Economic Capital (EC) bases and measurement systems, due to the existing Swiss and UK regulatory capital regimes, or due to the prolonged industry discussions around Solvency II.

Correlation Adjustments

Under Solvency I, the capital requirement for any given risk can be determined in isolation of all other risks underwritten by the insurer. It is also independent of any risk-mitigating actions taken by the insurer. The 4% and 0.3% factors, for example, are simply multiplied by their respective bases and the result is added to the tally. Increasing the amount of business on the books changes the required capital by exactly 4% or 0.3% times the respective change in base value.

Solvency II, however, recognizes that Solvency I and its simple additivity do not reflect the true correlation between risks. To ensure the safety of a company up to a given level of confidence (e.g. 99.5% per Solvency II), the amount of capital needed is not the sum of capital requirements to separately protect each product or line of business at that same level of confidence. Total company capitalisation at that level would imply a greater degree of safety than intended (e.g. 99.9% instead of 99.5%) because the various worst cases are unlikely to all take place simultaneously. Some risks are uncorrelated (e.g. mortality and asset default) while others might

Factors versus Scenarios

Solvency II mostly abandons Solvency I's oversimplified factors for determining underlying capital charges and instead uses scenarios. For example, where Solvency I might say to use "4% of reserves", Solvency II will say to use "change in net value of assets for a permanent 25% decrease in mortality" for longevity risk. This is a more complicated calculation, but it is a calculation that captures the true nature of the risks. In keeping with Solvency II's economic foundation, these scenarios try to replicate how a market assesses value.

even be negatively correlated (e.g. mortality and longevity). Solvency II therefore makes assumptions about correlations between each risk, and applies correlation matrices and 'square root of sums of squares' calculations to arrive at a total Solvency Capital Requirement (SCR).

For example, the following correlation assumptions are defined in Solvency II's Quantitative Impact Study #4 (QIS4) for the relationships between some of the risks within the life 'module':

	Mortality	Disability	Longevity	Lapse
Mortality	1.00			
Disability	0.50	1.00		
Longevity	-0.25	0	1.00	
Lapse	0	0	0.25	1.00

The underlying capital charges for these four life risks (see box "Factors versus Scenarios") get aggregated as follows:

$$SCR(Life) = \sqrt{\begin{aligned}&[(Mortality)^2 + (Disability)^2 \\ &+ (Longevity)^2 + (Lapse)^2 \\ &+ 0.5x(Mortality)x(Disability) \\ &- 0.25x(Mortality)x(Longevity) \\ &+ 0.25x(Longevity)x(Lapse)]\end{aligned}}$$

The zero in the table above at the intersection of disability and longevity means that these two risks are assumed to move completely independently of one another. They aren't biased towards working in the same direction, or in the opposite direction. They therefore have no combined term in the formula above. Disability and Mortality, on the other hand, have a +0.50 correlation per the table above and a corresponding combined factor in the formula. These two risks are thereby assumed to be biased towards moving in the same direction (e.g. both adverse or both benign are more likely than the opposite combinations).

Solvency II will also use a correlation matrix to define the relationship between each risk module:

	Market	Default	Life	Non-Life
Market	1.00			
Default	0.25	1.00		
Life	0.25	0.25	1.00	
Non-Life	0.25	0.50	0	1.00

$$SCR(Basic) = \sqrt{\begin{aligned}&[(SCRmarket)^2 + (SCRdefault)^2 \\ &+ (SCRlife)^2 + (SCRnonlife)^2 \\ &+ 0.25x(SCRmarket)x(SCRdefault) \\ &+ 0.25x(SCRmarket)x(SCRlife) \\ &+ 0.25x(SCRmarket)x(SCRnonlife) \\ &+ 0.25x(SCRdefault)x(SCRlife) \\ &+ 0.5x(SCRdefault)x(SCRnonlife)]\end{aligned}}$$

The basic SCR goes through further adjustments before reaching the final SCR.

Correlation Deciphered

Despite all the complicated formulae, there are a few simple truths that can be drawn from this system.

1. You can only determine the incremental impact of adding or removing risk from an insurer's portfolio by redoing the whole calculation for all the risks.

2. If you have one dominant driver of required capital (e.g. 50% of solvency requirement is from disability), you will get a higher incremental capital requirement for adding another unit of that risk than if the total for that risk was less dominant (e.g. only 25% of solvency requirement from disability).

3. When adding an incremental unit of any risk, you add less required capital when that risk has as low or as negative a correlation with the other risks as possible.

Using these principles and their respective converses,

you can discover an optimal mix of risks for an insurer. This is the theoretical point at which natural hedging properties implicit in the correlation factors are fully exploited. Capital Motivated Reinsurance will, therefore, become the quest for that optimal risk point under Solvency II.

Case Study #1

Imagine a life insurer who has two dominant risks in its portfolio: longevity and investment risk. These greatly exceed their risk exposures to mortality and persistency, and their Solvency II Solvency Capital Requirement (SCR) calculation captures this fact via the correlation matrices. Adding incremental amounts of either of these risks, therefore, adds the maximum capital requirement for this risk (due to #2 under "Correlation Deciphered"). Conversely, removing some of either longevity or investment risk via reinsurance will result in a large reduction in required capital.

When is arbitrage a good thing?

Arbitrage is simply the practice of taking advantage of price differentials between two markets. It is a normal economic phenomenon that works well when all parties who rely on the financial statements are fully aware of the intent and impact of a Capital Motivated Reinsurance transaction. Those parties generally include regulators, rating agencies and investors.

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One type of Capital Motivated Reinsurance under Solvency II will be when this company cedes annuity business (i.e. longevity and investment risks) to a reinsurer who is not similarly heavily weighted towards those risks. The insurer will thereby reduce its capitalisation by a relatively large amount, and will therefore measure its benefit from the reinsurance against the prior cost of servicing that large amount. The reinsurer will be able to accept this business and only have to add a relatively smaller amount of capital, and will reflect the cost of this smaller amount in the price that it requires to participate in the transaction. It is the difference between these 'small' and 'large' capital amounts (the 'economic capital gap'), and the foregone cost of servicing this difference, that will lead to a Capital Motivated Reinsurance transaction. The two parties would split these savings and each end up with an improved return on economic capital (ROEC) or other relevant measure after the reinsurance.

Case Study #2

Solvency II reflects diversification in many dimensions, but it doesn't recognize all commonly accepted economic effects. Geographical diversification, for example, is not fully recognized as a source of risk mitigation. Even though Solvency II is clearly based on economic and risk principles, it does have to make certain approximations and simplifications in order to arrive at a manageable model. Those pragmatic shortcuts will, however, introduce uneconomic elements.

For example, a multinational life insurer with a high concentration of business in Europe could create and exploit an "economic capital gap" by ceding European business to a reinsurer who is not already similarly overweight in that area. This would, however, need to be a reinsurer whose own capital requirement is determined by a requirement that does recognize the diversification benefits of spreading life risk geographically. This could either be a reinsurer outside the EU or one inside the EU who has an approved internal model that captures this element.

Similar to the logic in the first example, the insurer will achieve a greater reduction in required capital than the reinsurer's increase in required capital, and the cost of servicing this difference will be available to be shared between the insurer and reinsurer.

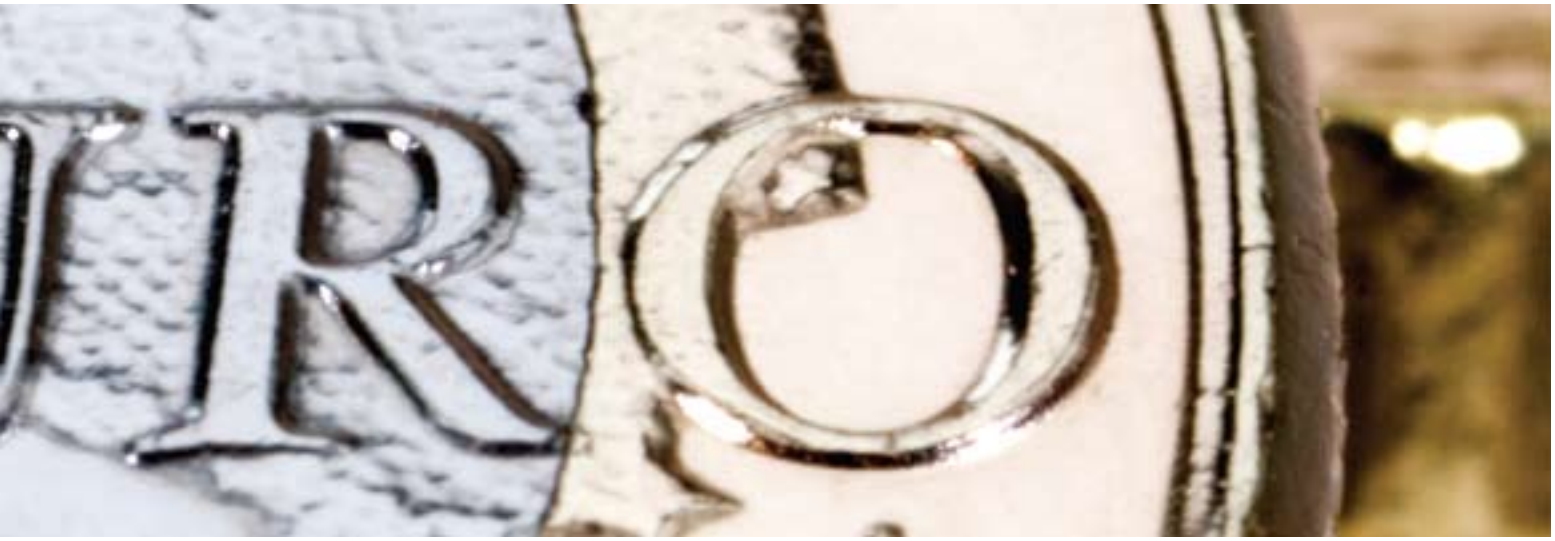
Different Costs of Capital?

It is often implied that reinsurance, especially Capital Motivated Reinsurance, takes place because a reinsurer has a lower cost of capital than an insurer. As in the examples above, it is the amount (and resulting total cost) of capital that is key, and not the unit cost of that capital. It is seldom the case that a reinsurer will have a unit cost of capital (e.g. ROE target %) materially lower than an insurer. It may, however, be able to carry a risk for less capital and therefore for lower capital servicing costs. This might look like a lower cost of capital when you take the total capital servicing costs of the reinsurer and divide it by the higher amount of capital that the insurer would have had to hold itself, but this is an illusory calculation.

Reinsurer as Capital Management Expert

The above examples focus on the insurer's portfolio composition and portray the reinsurer's role as a rather passive one. The reality with Capital Motivated Reinsurance is actually exactly the opposite.

At a first level of action, a reinsurer should identify areas where it is relatively underweight, and not



just areas where it is not similarly overweight to the insurer. (A reinsurer could be underweight in an area for different reasons: new to a product line, made use of retrocession opportunities, or others.) The viability of the examples above is based on the size of the economic capital gap and its corresponding savings, so a reinsurer being underweight in an area where the insurer is overweight makes a transaction more viable and increases the savings benefit to be shared between the two parties.

The next level of action sees the reinsurer using its expertise in capital management to draw on other capital sources to create and maximize the value of Capital Motivated Reinsurance transactions. One example is the issuance of catastrophe bonds to the financial markets.

This essentially matches a capital market appetite with an insurer need on a scale that the insurer could not have created independently. This is a specific – and modern – form of retrocession.

A second example would be entering into two simultaneous reinsurance contracts with the same insurer where the insurer plays the role of the reinsurer in one of the contracts. Such an extension of Case #1 would see the reinsurer ceding mortality and lapse risk to the insurer in addition to the reinsurance of longevity and investment risk from the insurer to the reinsurer. An extension of Case #2 would see the reinsurer ceding non-European business to the insurer at the same time as the insurer cedes European business to the reinsurer.
In the ultimate implementation of these ideas, reinsurers would become clearing houses for risks, shifting those risks between insurers and capital markets so as to find the best home for each block.

Conclusion

That last thought highlights that a reinsurer's natural role is to globally manage the economic combination of risk and capital. Now that Solvency II will make these same principles of primary importance to all EU insurers, the role of reinsurance can only expand.

Reinsurance will remain an important source of capital in addition to equity and debt.

The effective application of Capital Motivated Reinsurance requires a tailored discussion reflecting the unique attributes of your company. With its global experience and expertise in this field RGA would be an ideal partner.

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