Updating the Risk Margin Calculation

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At an AAE Risk Management Committee Webinar on 8 December 2020, Malcolm explored how best to recognise multi-year risk dependencies in the Solvency II risk margin calculation. This blog summarises the material covered in his presentation.

The Solvency II risk margin is an integral part of the capital structure of EEA insurers. It is included in the Solvency II review currently being undertaken by the Commission. It also features in the UK Government review of how UK insurers should be regulated after Brexit.

The methodology underpinning the current risk margin calculation is an 'exit' valuation, focusing on what a third party reference undertaking might charge to take over the risks present in a book of insurance liabilities. It is calculated by adding up the expected present values of capital servicing costs in each future year over which the liabilities extend.

The 2019 AAE Commentary Paper "A Review of the Design of the Solvency II Risk Margin" highlighted that if *multi-year risk dependencies* exist then an *attenuation factor*, $\lambda(t)$, should ideally be included in the risk margin calculation. The factor $\lambda(t)$ should *decline* further into the projection if risks exhibit *negative autocorrelation* but *increase* if they exhibit positive autocorrelation.

Originally, EIOPA proposed recommending no change to the Solvency II risk margin calculation. However, in its March 2020 Holistic Impact Assessment specification it requested firms include an attenuation factor of $\lambda(t) = \max(0.975^t, 0.5)$ in their risk margin calculation. The same factor was included in its 17 December 2020 final Opinion on the 2020 review of Solvency II. For very long dated liability books this could reduce the risk margin by nearly 50% and reduce its interest rate sensitivity.

My paper, "The potential impact of Multi-Year Dependencies on the Design of the Solvency II Risk Margin"[1], considers what $\lambda(t)$ might be theoretically appropriate for different risks. It assumes retention of the current market consistent focus for Solvency II and of the exit valuation approach for the risk margin. Using option pricing theory and a binomial tree approach, three main cases are identified, depending on how the size of an unexpected loss at a given point in time is influenced by unexpected losses that have arisen previously in the relevant tree branch. Each results in an attenuation factor $\lambda(t) = (1 - CoC \cdot S)^t$, where CoC is the (unadjusted) cost of capital rate (set at 6% p.a. in the current risk margin calculation) and S depends on the case in question. The three cases are:

(1) Prior occurrence of an unexpected loss has no impact on the absolute size of a future unexpected loss (i.e. the risk exhibits zero autocorrelation). The relevant S to use in this case is $S = 0$, i.e. $\lambda(t) = 1$, in line with the current risk margin calculation.
(2) The unexpected loss is a specified proportion of the assets and/or liabilities at risk. The relevant S to use is then the fraction of the assets and/or liabilities that disappears whenever an unexpected loss occurs. For example, the Standard Formula mass lapse stress

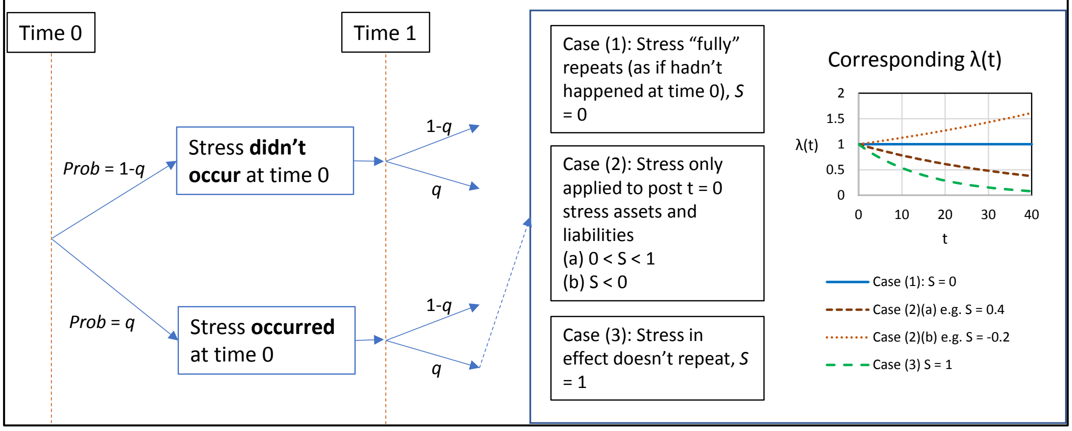
[1] Available at: http://www.nematrian.com/docs/MultiYearDependenciesRiskMargin20201130.pdf

normally involves applying a 40% decline to affected assets and liabilities. Each time such a mass lapse stress arises, the book exposed to mass lapse risk declines by 40% more than previously expected. The most suitable attenuation factor is then $\lambda(t) = (1 - CoC \cdot 0.4)^t$, i.e. 0.976^t for the current cost of capital rate. Risks that are negatively autocorrelated have $S > 0$, whilst risks that are positively autocorrelated have $S < 0$ (leading to a rising $\lambda(t)$).

(3) The unexpected loss can only occur once. The relevant S to use in this case is $S = 1$, i.e. $\lambda(t) = 0.94^t$.

Figure 1 summarises these cases.

Figure 1: Potential path dependency characteristics of stresses



Source: Kemp (2020). The Potential Impact of Multi-Year Dependencies on the Design of the Solvency II Risk Margin. *Nematrian*

One way to estimate S is to refer to how the relevant standard formula SCR stress is worded. As noted above, for mass lapse S would normally be 0.4. The standard formula stress for expense risk involves a shock applied to all future years as well as the current one, which we might argue is close to Case (3), i.e. $S = 1$. Conversely, the wording of the standard formula SCR specification for operational risk seems close to Case (1), i.e. $S = 0$. Using this guide, S is never above 1 and is rarely negative.

Focusing on the intrinsic characteristics of the risk in question probably reduces to some extent the theoretically appropriate S to use. For example, for a non-life liability risk like asbestos it would likely imply a negative value for S. Life insurers probably face risks that on average have higher values of S than non-life insurers. The majority of the EEA industry-wide risk margin calculation also comes from life insurers, given their longer average liability durations. Averaged across the whole industry, we can probably justify an average S between 0 and 1, i.e. a $\lambda(t)$ somewhere between $\lambda(t) = 1^t = 1$ and $\lambda(t) = 0.94^t$ given the current cost of capital rate. This is compatible with the EIOPA Opinion, if the floor of 0.5 were to be removed.

If a common $\lambda(t)$ is not adopted, insurers using internal models to determine their SCR might be allowed to include an attenuation factor in their internal model. Equivalent undertaking-specific parameters could be introduced for other firms. Firms might then be expected in their ORSA to assess the appropriateness of their risk margin calculation alongside the appropriateness of their SCR calculation.

This blog is written in a personal capacity.
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