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ORTEC FINANCE

Insurance Risk Management:

Solvency Testing

ORTEC FINANCE

Solvency Testing

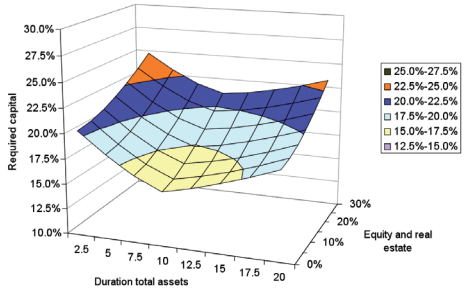
Risk Management Solutions for Insurers

The upcoming Solvency II guidelines will have a profound influence on capital budgeting and risk management for insurers. For example, under Solvency I the investment policy has no impact on the solvency ratio. This picture will change completely under Solvency II. The investment policy in terms of the asset allocation and asset duration will therefore have a large impact on the capital requirements. It may also be the case that by reducing the short-term risk (as measured by the required capital) the long-term expected return also decreases. Insurers should therefore perform additional multi-period calculations for different stochastic scenarios to truly optimize their risk / return tradeoff in terms of setting the appropriate investment policy.

Required capital

Solvency II will solve a number of serious shortcomings of the current (Solvency I) regulations. Under Solvency I, only liability-driven risk is taken into account (and also in a rather simplified way). Investment risk is completely ignored: the required capital for an 80% equities and 20% bonds asset allocation is the same as for a 20% equities and 80% bonds asset allocation, while the corresponding balance sheet risks are obviously completely different. Due to these shortcomings, local regulators already tend to emphasize the importance of matching the insurance liabilities with proper financial instruments. For example, in the Netherlands the Dutch Central Bank (DNB) imposes additional solvency requirements in case insurance risks are not matched adequately.

The figure below shows, as an example, the dependency that can exist between the required (Solvency II) capital, the allocation to equities and real estate in the investment portfolio and the duration of the assets.

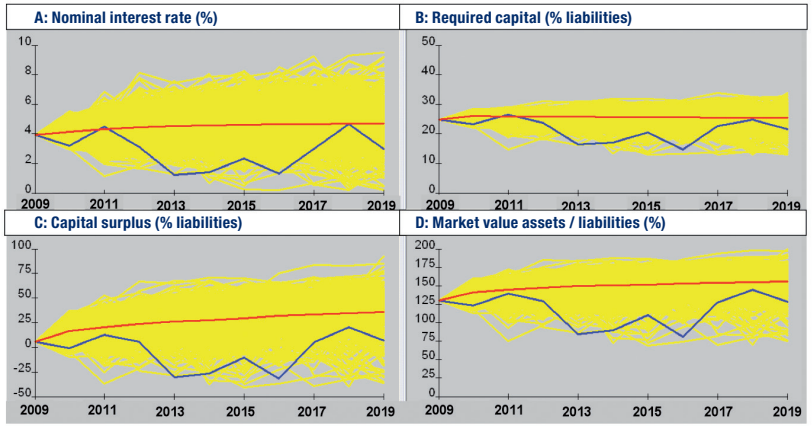


Required Solvency II capital as a function of the duration of the assets and the percentage of equities and real estate. The required capital is expressed as a percentage of the market value of the liabilities. Note that the required capital is minimized when the duration of the assets is approximately equal to 10. In this case the interest rate risk, due to a duration mismatch with the liabilities, is minimized. The required capital associated with equities and real estate obviously decreases when the allocation to these categories becomes smaller.

The previous figure shows that we can minimize the required Solvency II capital by matching the duration of the liabilities and reducing the allocation to risky assets like equities and real estate. This approach may however lead to an underperformance in the long run, since a low risk investment portfolio typically also generates a mediocre return. This tradeoff between minimizing the required capital and optimizing the long-term return is further explored below.

Long-term implications

We start by considering the current situation (30% equities and real estate and an asset duration of approximately 3). When we evaluate the evolution of the required capital for different economic scenarios the following picture emerges in this case.



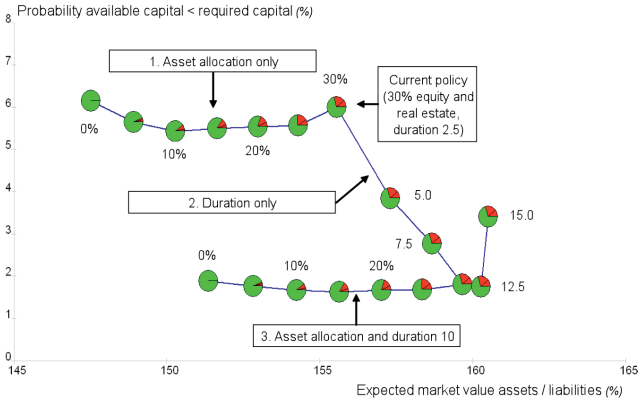
Monitoring the solvency position for different stochastic scenarios. The blue line marks one selected scenario; the red line indicates the average value over all (500) scenarios. Panel B shows the required Solvency II capital for all scenarios. Initially, the available capital is just sufficient to cover the required capital (see Panel C). After a couple of years, the probability of a capital shortage (available capital < required capital) becomes large, however. These risk scenarios are mainly caused by the duration mismatch between the assets and the liabilities: for low interest rates (see Panel A) the market value of the liabilities increases more than the market value of the liabilities (see Panel D).

Notice that the probability of a capital shortage in future years is large for the current asset allocation. In order to reduce this probability it is useful to analyze the effect of several alternative investment strategies. A summary of the long-term effect of these policies is shown in the figure below.

This figure clearly shows that reducing the percentage of equities and real estate in the portfolio is less efficient than changing the duration of the assets. After all, for the same level of risk a higher expected return can be obtained by optimizing the asset duration and keeping the asset allocation fixed. In fact, more efficient strategies can be found on the third (lowest) line, where the asset allocation is changed given an optimal duration (of 10). Hence, in this example one of the investment policies on line no. 3 could be selected, depending on the level of risk one is willing to take.

The above case study shows that the investment policy, in terms of for example the asset allocation and asset duration, will have a large impact on the capital requirements under Solvency II. It may well be the case that by reducing the short-term risk (as measured by the required capital) the long-term expected returns will also decrease. Other issues can be studied as well, for example the added value of alternative investments like hedge funds, private equity and commodities.

Insurance companies should therefore perform additional multi-period calculations for different stochastic scenarios to truly optimize their risk / return tradeoff in terms of setting the appropriate investment policy. Ortec Finance's Asset Liability Management (ALM) model for insurers is a powerful tool for this purpose. It not only gives insight in the current effect of a certain asset allocation but also sheds light on the future consequences.



Impact of the asset allocation and duration policy on long-term risk and return. The current investment policy consists of 30% equities and real estate and an asset duration of approximately 3. Besides the current policy there are also three other lines in this figure. The policies on the first (top) line indicate investment policies where the percentage of equities and real estate in the portfolio is reduced (stepwise) from 30% to 10%, leaving all other variables unchanged. The second line indicates a change in the asset duration from 3 to 17, again leaving all other variables unchanged. Finally the third line presents a combination of reducing the percentage of equities and real estate in the portfolio and setting the asset duration equal to 10.