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DYNAMIC HYBRIDS UNDER SOLVENCY II: RISK ANALYSIS AND MODIFICATION POSSIBILITIES

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Abstract

In this study, we investigate the new and standardized European system of supervisory called Solvency II. In essence, asymmetric distribution of information between policyholder and insurer triggered this new regulation which aims at better protecting policyholders. Its three-pillar model is about to challenge both, insurers as well as policyholders. The first pillar includes quantitative aspects, the second pillar contains qualitative aspects and the third pillar comprises market transparency and reporting obligations. Underwriting risks, the default risk of a bank and market risks can be identified for the dynamic hybrid. Solvency II covers all these risks in the first pillar and insurers shall deposit sufficient risk-bearing capital. In our analysis, we first identify the dynamic hybrid specific risks under the Solvency II regime and then develop product modifications to reduce this risk.

Keywords: Dynamic Hybrids, Solvency II, Risk Analysis, Reallocation Process, Solvency Capital Requirement, Collateral, Modification

1. Introduction

Since January 1 2016, Solvency II, a new and standardized European system of supervisory, has come into force. Solvency II is inspired by Basel III, has a three-pillar model and will challenge both, insurers as well as policyholders. The new regulation provides additional protection for policyholders due to the asymmetric distribution of information between policyholder and insurer. Figure 1 illustrates the three elementary constituent parts: The first pillar includes quantitative aspects, whereas the second pillar covers qualitative aspects and the third pillar incorporates market transparency and reporting obligations.

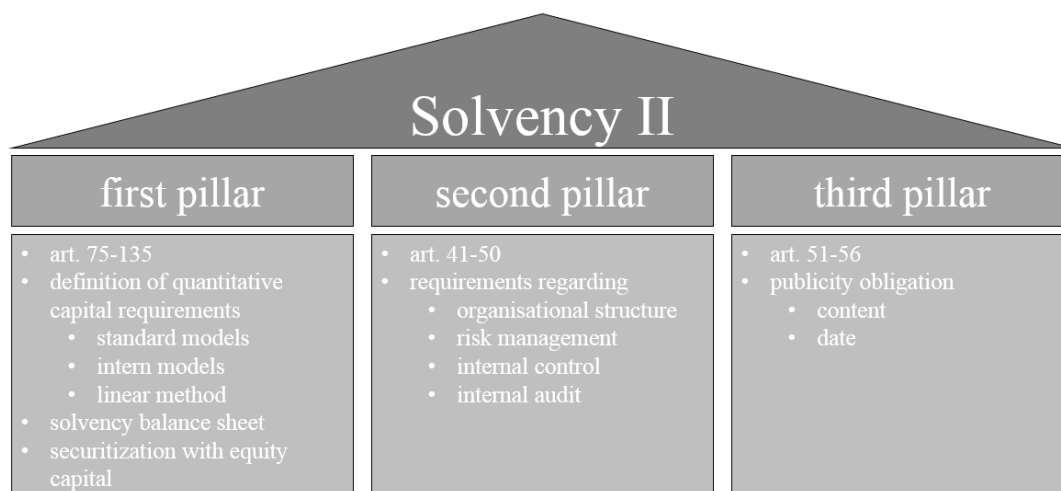


Figure 1. The Three Pillars of Solvency II
Source: Authors' preparation based on Just (2014).

Solvency II aims at achieving a risk-sensitive valuation of the insurance business. Contrary to Solvency I, the risks of the current low-interest phase are easier to analyze because of the economic approach. The guaranteed interest has been declining for years. As in the past, contracts with a guaranteed interest rate of over 4% p.a. have been made; it is hard to reach this rate with a risk-free investment today. According to Omnibus II, for those old contracts there exists a transition period of 16 years, before the equity requirements have to be adapted to Solvency II rules. However, this applies not for contracts, which have been signed after 01/01/2016. For these contracts, the equity requirements of Solvency II must be fulfilled right away. As a result, insurance companies switch from classic products to fund-linked products, for example dynamic hybrids. Therefore, Solvency II supports dynamic hybrids, because selling them has become more attractive for insurers.

Hybrid products generally consist of a classic part and a unit-linked part. By the guaranteed return, the classic or conventional part shall ensure the basis of the investment. In the unit-linked part all remaining savings contributions are invested into an investment fund. It can be differed between a static version, a dynamic version and a CPPI-model. The static hybrid is a mix of conventional and unit-linked insurance and always secures the minimum guarantee, even if the unit-linked part, which is comparatively very small, drops to zero. The CPPI-model, which is based on the papers of Perold (1986), Black and Jones (1987) and Black and Perold (1992), includes an ongoing reallocation process between risky and risk-free investments, without customizing the model. Only the dynamic hybrid is being customized and provided with the reallocation process.

The aim of this paper is to analyze the effects of Solvency II on the product development of the dynamic hybrid and to examine the capital requirements for the insurance companies, which result from the identified risks. Subsequently, possible product modifications are introduced. First, we focus on the greatest hazard, the market risk. Afterwards, the default risk of the banking sector and the actuarial risks are regarded. Hence, the focus is on the first pillar of Solvency II, because it contains these risks. The resulting development of an appropriate risk management process (second pillar) and reporting (third pillar) is not in the center of this paper's interest. For the insurers, especially the capital requirements, which must be deposited as collateral for each risk position, are crucial. Whether and how this is processed, is explained hereafter.¹

¹ The further explanations of the market risk follow inter alia the presentation of Reuß and Ruß (2010).

2. Previous Research

Fix and Käfer (2008), who first analyzed dynamic hybrids, conducted previous research activities. Kochanski and Karnarski (2011) developed the first models on dynamic and static hybrids with a partial internal model to assess the corresponding solvency capital requirement (SCR). Bohnert and Gatzert (2013) contributed the fair valuation and risk assessment of an insurer offering dynamic hybrid and traditional participating life insurance contracts with focus on the risk situation of the insurer and the NPV (net present value) of the policyholder. Bohnert (2013) analyzed the characteristics and contract variations of dynamic hybrid products in the German market. The papers of Menzel (2008) and Siebert (2008) cover the various options in dynamic hybrids, such as the possibilities of an adequate risk management with this product.

3. Hybrids and Solvency Capital Requirement

3.1. Risk Identification

Solvency II determines new valuation standards. This also applies to reallocation strategies, which is included in the standard model. Basically, reallocation strategies can be taken into consideration at the valuation and projection of future cash flows – regarding common management rules, inter alia duty of truthfulness, objectivity and realism. Furthermore, it is determined, how the reallocation of a dynamic hybrid must be considered at the calculation of the SCR. In this case, a stress test (e.g. assuming a certain stress scenario with -x%) is carried out covering a simulated period (one year) and then transferred to products with a reallocation mechanism. The same is done for the SCR equity risk, the SCR interest rate risk and for further risks. For example, the stress factor utilized in the stress test is applied for the stock portfolio on a reference date. Afterwards, a fund performance is developed, which takes the maximum possible loss, e.g. 20% of the total investment excluding the stress factor, into account. Finally, the fund value/cash value-ratio determines, whether a reallocation is carried out at the next reference date. Thereby, the reallocation risk should be considered in accordance to the standard model of Solvency II. Further risks must be included, for example the interest rate risk. This is more successful in an internal model, because the valuation principles can be designed more appropriately.

The capital requirements, which should cover the interest rate risk, are different in two scenarios. Depending of an interest rate increase or decrease the yield curve is shifting. Therefore, there exist two different calculation methods. They are put in relation to the risk neutral market value and as a result, the change of the net asset value (NAV) is calculated. The worse result of both scenarios is then used for the standard formula. This means for the dynamic hybrid, that there exists a strong dependence of the long-term interest rate level. The decrease of the interest rate level is the greater risk.

The capital requirements for the equity risk is based on the change of the NAV at the shock scenario opposite to the risk neutral market value scenario. Therefore, the valuation of the dynamic product depends on the relation cash value guarantee and fund value. Insurance companies have to make liquidity stress tests to determine an adequate liquidity reserve. Unfavorable events in assets (e.g. changed convertibility of previously liquidly estimated investments because of changed market conditions) and liabilities (e.g., unexpected cash outflows) have to be considered. This could be relevant for the dynamic hybrid, so the capital requirements of Solvency II have to be considered for this identified risk.

The bank's default risk is part of the counterparty risk in the first pillar. Although the counterparty is primarily responsible for its solvency and the legislator tries to regulate this for the banks by Basel III². Nevertheless, Solvency II includes this risk and forces the insurers to deposit capital, even if only at a small value (The value in relation to SCR is at 4% of the total amount). However, this sector is very complex, as it requires a high level of transparency from the partners and a constant, high-quality exchange of data. Underwriting risks are also included in Solvency

² For the estimation of Liquidity Adjusted Value at Risk of banks under Basel III see Uslu and Evren (2017).

II. Regulatory requirements for the insurance companies are given by life-insurance-SCR and the non-life-insurance-SCR.

Overall, it can be summarized, that all identified risks of the dynamic hybrid are included in the Solvency II regulatory and that the SCR-risks contained in the first pillar are sufficient for the dynamic hybrid. The capital requirements of the not contained risks, like the reallocation risk, can be indirectly calculated. Another result is that the intern model is superior to the standard model. It is also important, that risks are often linked which is included in the standard model by developing a total SCR at the end of the process.

3. 2. Solutions

Following Ruß (2014), a possible solution to this are product modifications of dynamic hybrids adapting more robust and more specific to the actual market situation. Especially reallocations may involve a high risk for insurers, which can be reduced by modifications of the product design. In particular, the actuarial interest is important from the customer's perspective. First, three possibilities of the modification, which deal with the handling of the current low-interest phase in conjunction with the dynamic hybrid, are going to be explained. One option is to provide the guarantee funds with a higher guarantee level. Instead of the regular 80% guarantee level, an increase to 85% or even 90% was possible. Therefore, the maximum permissible loss of the funds drops to 15% or 10% and the dynamic hybrid investments in the funds rise by a leverage effect. However, contrary to the increasing funds rate the share quota drops, because less capital can be invested. Because of the higher proportion in the guarantee funds, a similar guarantee level to the 80% guarantee level can be reached despite lower interest rates. Additional positive effects on the reallocation frequency and intensity can be achieved by an adequate implementation.

Another possibility to achieve the guaranteed returns despite the low-interest environment is the reduction of costs. At the beginning, premium payment and risk costs are subtracted from the premium. If the company is economically able to impose reduced costs on the customers without suffering a loss, this could be an option and the customer's surplus capital can be invested. Theoretically, it also holds that despite of low interest rates the guaranteed returns can be achieved by increased capital. However, this is unusual because most companies do not tend to drop their profitability for the benefit of their customers. One possible solution would therefore be an optional cost reduction, if it is determined, that the guaranteed returns cannot be achieved. This means, that only in this case costs for the customer are reduced, but only within a certain limit. This possibility requires a legal examination beforehand.

The third possibility is to use a second floor. As a result, a second minimum portfolio value is implemented. The reallocation between collateral pool and fund-linked investment is based on the floor - the funds rate rises. The second floor can be calculated with an interest rate, which is higher than the actuarial interest rate. For example, the current actuarial interest rate can be used for the following year, even if the interest rate drops. However, the idea of a second floor is also associated with risks for the insurance company. If the overall interest rate declines below the estimated interest rate, the insurance company must finance this gap from its own resources. Therefore, this third possibility is interesting for the customer, but it is doubtful if companies put it into practice because of the higher risk.

To reduce the frequency and the intensity of the reallocations and the so called 'problem of the nose'³ of the dynamic hybrid's opportunities/risk profile, specific product design modifications can be made. One potential modification is a NPV adaption of the guaranteed returns at coverage. This has the effect, that the discount rates can be reduced as much as possible. In general, it would be useful to reconsider, how to proceed with surpluses and coverage. In the 3-pot-hybrid, which is a further development of the 2-pot-hybrid, a first potential solution was developed through the possibility to invest surpluses in free investments. Furthermore, it was possible to design the hybrid completely dynamic to allow a quicker reallocation. However, this reduces the period duration time to seconds, which is contradictory to

³ Compare presentation of Ruß (2014), especially slides 6 and 13.

the idea of reducing the frequency of the reallocations. Another solution to invest usefully surpluses is to develop a separate surplus-pot, which can be seen as a fourth pot.

A completely new modification possibility is to adapt continuously the guaranteed return during the regarded period. Especially at long-term investments, one can react more independently to e.g. changes in the economic conditions. Reallocations can be avoided by current adaptations of the guaranteed return and this reduces the risk. One last modification possibility is to make a minimum investment in the conventional deposit premium, so that a certain percentage of the NPV of the guaranteed return is invested. Therefore, the determination of an appropriate interest rate⁴ is indispensable.

4. Concluding Remarks

Overall, it can thus be concluded that Solvency II covers all risks, which are relevant for an insurance company, which deals with dynamic hybrids. The insurers have to deposit capital in accordance with the Solvency II directive for the actuarial risks, for the default risk of the bank and for the market risks. The first pillar, including a wide range of risks, covers these risks as well. Nevertheless, there is still a substantial need for research regarding further risk valuation within the risk management process or transparent reporting, which have not been discussed in this paper. Even if Solvency II is criticized because of its complexity and its extensive content, it covers the risks coming along with dynamic hybrids.

Adjacent research questions appear due to the short period, since Solvency II and dynamic hybrids have entered the market. Scientific literature on this topic is still rather scarce, but based on Kochanski and Karnarski (2011) more research concerning the risks, like the equity risk, and their use under Solvency II should be executed. Furthermore, all dynamic insurance products should be analyzed in depth within the next years, when first experiences and data will be available.

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⁴ For some remarks on the current interest rate system, see Kallianiotis (2014).

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