Calculation of cost-of-capital and risk margin by Solvency II.

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Epitome

General insurance companies have to take reserves for their outstanding loss liabilities and protect against possible shortfalls by building up appropriate reserves for the runoff of their liabilities. The runoff of the liabitity cash flows usually takes several years. One of the main task of an actuary is to predict these reserves in order to keep solvency of an insurance company. Premium calculations are based on these predictions as well. Taking insurance technical reserves consists of two steps: calculation first of the *best estimate reserves* and second of the so called *risk margin* according to Solvency II. Best estimate reserves correspond to liability cash flows and a risk margin corresponds to non-hedgeable risks. The amount of insurance technical reserves is then equal to the sum of the best estimate reserves and the risk margin.

The purpose of the thesis is to give a comprehensive description of these insurance technical reserves by presenting the most important models for calculation of best estimate reserves and showing two widely used but different ways of risk margin approach. The first way is the most commonly used *cost-of-capital approach* and the second one is an *economically based risk margin approach*. After presenting these methods it provides a case study for four general (non-life) insurance products of MKB Általános Biztosító Zrt. Then it compares and analyzes the results. It also shows the points when these models can not be used and gives own suggestions what kind of adjustments can be done in these cases to make these models applicable.

Organization of the thesis is the following. Section 1 gives an introduction about Solvency II Framework Directive and describes some basic definitions of insurance mathematics. Section 2 describes two important models for best estimate reserves in a Bayesian chain ladder framework namely the Bayesian gamma-gamma chain ladder model and the Bayesian lognormal chain ladder model. Section 3 shows two different kinds of interpretation of risk margin and describes two kinds of approaches due to these two kinds of interpretation, namely the so called cost-of-capital approach and an economically based risk margin approach. Within the cost-of-capital approach I presents the comprehensive *Multiperiod risk measure approach*, which is rather complex, and I show three proxies for it as well. Then a case study is presented in Section 4. I calculate the best estimate reserves and the risk margin for the products using the models and approaches given above. I show some cases when these models can not be used and suggest a solution for these cases. I also show a so called one-year check for the payments. Finally I interpret and compare my results.

References

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