

Bayesian modelling of financial guarantee insurance

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The losses in financial guarantee insurance may be fatal during economic depression (i.e. deep recession). The number of claims and the proportion of excessive claims can be extraordinary high during that time. This indicates that economic business cycle, particularly depression periods, must be taken into account when the claim size distribution of financial guarantee insurance is modelled. Since depression is an exceptional event and usually not enough data is available on the phenomenon, it is difficult to model it with standard actuarial or credit risk models.

In this research our goal is to model the claim process and to predict the premium and the required amount of risk capital needed for the claim deviation. Even though the used data is from the Finnish economy and from the financial guarantee system of the Finnish statutory earnings-related pension scheme, we suppose that it could be widely used in similar cases elsewhere. A Markov regime-switching model is used to predict the number and length of depression periods in the future. The prediction of claim amount is done by a transfer function model where the predicted business cycle is an explanatory variable. The initial risk reserve is evaluated by the use of predictive distribution. Bayesian methods are used throughout the modelling process, more specifically Gibbs sampler in the estimation of the business cycle model. Simulation results show that the required amount of risk capital is high even though depression is an infrequent phenomenon.

Keywords: Business cycle, Credit risk, Depression, Gibbs sampler, Markov regime-switching model, Risk capital, Risk theory, Solvency.