## Stochastic Modelling of Insurance Business with Dynamical Control of Investments

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The results of development of a pilot program system for stochastic simulation of insurance business with dynamical control of investments SMIB (Stochastic Modelling of Insurance Business) are presented. The basic idea of the system is to involve Monte Carlo method for producing multiple time scenarios of the behaviour for the capital of an insurance company. The capital can be invested into different types of assets. Each type of investment has its own profitability and risk. The insurance business and the investment process are simulated with the use of the multi-parameter non-linear dynamical model. Premiums, claims, and profits of different types of investments are described by equations of autoregressive type. Non-stationary in time threshold strategies are used to control investments and insurance business. Analytical methods do not work here, but Monte Carlo simulation does. The results of simulation studies show that non-stationary character of investment and insurance strategies sharply impacts capital distributions that can be highly non-symmetric and multi-modal. Experimental results related to estimation of extremely small ruin probabilities are presented as well as results obtained in studies of ruin mechanisms, in particular, those concerned influence of heavy tail claims on proportion of catastrophic and accumulation ruin cases. The possibilities to include in the model and in the program system various schemes of reinsurance are also commented. The results are partly presented in [1].

Key words: stochastic modelling, insurance business, dynamical control, investment strategy, ruin probability.

## References

[1] Silvestrov, D., Malyarernko, A., Silvestrova, E. Stochastic modelling of insurance business with dynamical control of investments. *Theory Stoch. Process.*, **10(26)**, 1-2 (2004), 198–220.