name of the unit:	symbol:
THE DIVISION OF INSURANCE AND CAPITAL MARKETS Institute of Mathematics, Lodz University of Technology	I-73 http://www.im.p.lodz.pl

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scope of activities:

Research activities are carried out in two directions:

1. The first one concerns modeling of insurer's solvency in switching models, evaluation of ruin probability, time to ruin, deficit size, etc., as well as estimation of model's parameters.
2. The second direction is related to interest rate risk in long-term insurance, methods of pricing and hedging against this risk.

graphic material

present activities:

Ad. 1. Both numerical and theoretical approaches are being developed to investigate switching models. The main theoretical tool is the risk operator approach introduced in Gajek (2005). Based on the properties of the risk operator, we evaluate ruin probability, time to ruin, deficit size, etc.

Ad. 2. New evaluations of the VaR measure of the change in portfolio surplus due to the change of the term structure of interest rates are investigated. The bounds are supposed to be products of two terms: the one depending on the portfolio structure and the second depending on the interest rate change measure. The measure is related to the L_P-distance in the space of financial instruments. We investigate its relationship with other measures, like M^2. Explicit formulas for some life insurance products are obtained. Optimal streams of assets are investigated under several restrictions imposed on e.g. duration, M^2 or other parameters of the asset flow. The influence of the lack of short sale on the efficiency of the interest rate risk protection is investigated.

$$\Psi(u) \leqslant e^{-ru}$$

$$\Psi(u, yu) \leqslant e^{-ryu}$$

Future activities:

We plan to investigate the risk switching models in the uncertain environment when the switch's parameters are partly known and partly unknown. This approach will be also useful when life-insurance products are analysed from a long time perspective and we plan to explore it in this context as well.

Keywords:
insurer's solvency; risk switching models; ruin probability; time to ruin; deficit size; estimation of model's parameters; term structure of interest rates; VaR ; M^2-measure; portfolio optimization

List of internship proposal in this research team:

Risk management in insurance.