Optimal prevention strategies for insurers

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Master thesis in Mathematics

Insolvency represents the main financial risk faced by insurance companies. To be able to meet the commitments made to their clients at any time, insurers must manage this risk appropriately. Self-protection, referred in this work by prevention, is a risk management approach which consists in reducing the probability of claims occurrence. This thesis aims to investigate prevention strategies in the framework of a classical risk model distinguishing between small and large claims. First, we assume that the insurer invests a fixed amount per unit of time in prevention in order to reduce the number of large claims. In our model, we motivate and take into account the fact these prevention measures can simultaneously increase the number of small claims. In this context, we identify conditions on the model that guarantee the insurer a reduction of its risk by investing in prevention and we seek for the optimal prevention amount. Second, we enlarge the model by allowing the amount spent for prevention to vary over time and we determine the best prevention strategy. We also prove that the corresponding optimal survival probability is solution of a so-called Hamilton-Jacobi-Bellman equation, which we then solve numerically. Throughout the work, we illustrate our results with examples that take into account several types of claims distributions.

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