Optimal reinsurance minimizing the absolute value of the difference between the profit of the insurer and the profit of the reinsurer

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Abstract

Most of the papers on optimal reinsurance have only considered the insurer point of view. However, there are two parties to a reinsurance contract. The aim of the study is to contribute to the analysis of the optimal reinsurance from the point of view of the insurer and the reinsurer. A reasonable compromise between their interests is desired. Then, we consider the problem of finding the optimal retention that minimizes the absolute value of the difference between the insurer's and the reinsurer's profits under stop-loss, excess-of-loss and quota-share reinsurance arrangements. In our stochastic model of a non-life insurance company's profit, the stochastic nature of the aggregate loss is incorporated by a non-negative random variable. Exponential distribution, Pareto distribution and lognormal distribution are used for aggregate loss. In calculation of reinsurance premium, the expected value and the standard deviation premium principles are investigated. The results of optimization studies from the insurer point of view, from the reinsurer point of view and from the joint point of view of the insurer and reinsurer are compared. Our findings can be helpful for the insurer and reinsurer in their decision making process. We use the Matlab program which incorporates a simulation optimizer.

Keywords Stop loss, excess of loss, quota share, optimal joint reinsurance, optimal retention, expected profit, minimizing the difference between profits, simulation optimization.