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Pareto-optimal reinsurance arrangements under general model settings

Jun Cai*, Haiyan Liu[†] and Ruodu Wang[‡]

Abstract

In this paper, we study Pareto optimality of reinsurance arrangements under general model settings. We give the necessary and sufficient conditions for a reinsurance contract to be Pareto-optimal and characterize all Pareto-optimal reinsurance contracts under more general model assumptions. We also obtain the sufficient conditions that guarantee the existence of the Pareto-optimal reinsurance contracts. When the losses of an insurer and a reinsurer are both measured by the Tail-Value-at-Risk (TVaR) risk measures, we obtain the explicit forms of the Pareto-optimal reinsurance contracts under the expected value premium principle. For the purpose of practice, we use numerical examples to show how to determine the mutually acceptable Pareto-optimal reinsurance contracts among the available Pareto-optimal reinsurance contracts such that both the insurer's aim and the reinsurer's goal can be met under the mutually acceptable Pareto-optimal reinsurance contracts.

Key-words: Pareto optimality, optimal reinsurance, comonotonic-semilinearity, comonotonic-convexity, Tail-Value-at-Risk

JEL: C60; C710.

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