Enhancing Insurer value using Reinsurance and Value-at-Risk Criterion

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Abstract: The quest for optimal reinsurance design has remained an interesting problem among insurers, reinsurers, and academicians. An appropriate use of reinsurance can reduce the underwriting risk of an insurer and thereby enhances its value. This paper complements the existing research on optimal reinsurance by proposing another model for the determination of the optimal reinsurance design. The problem is formulated as a constrained optimization problem with the objective of minimizing the value-at-risk of the total risk of the insurer while subjecting to a profitability constraint. The proposed optimal reinsurance model, therefore, has the advantage of exploiting the classic tradeoff between risk and reward. Under the additional assumptions that the reinsurance premium is determined by the expectation premium principle and the ceded loss function is confined to a class of increasing convex functions, explicit solutions are derived. Depending on the risk measure's level of confidence, the safety loading for the reinsurance premium, and the expected profit guaranteed for the insurer, we establish conditions for the existence of reinsurance. When it is optimal to cede the insurer's risk, the optimal reinsurance design can be in the form of pure stop-loss reinsurance, quota-share reinsurance, or some combination of them.