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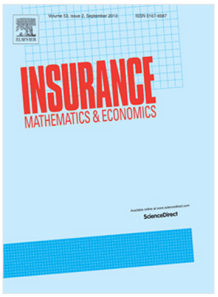

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Minimizing the Probability of Ruin: Optimal Per-Loss Reinsurance

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Abstract

We compute the optimal investment and reinsurance strategy for an insurance company that wishes to minimize its probability of ruin, when the risk process follows a compound Poisson process (CPP) and reinsurance is priced via the expected-value premium principle. We consider per-loss optimal reinsurance for the CPP after first determining optimal reinsurance for the diffusion that approximates this CPP. For both the CPP claim process and its diffusion approximation, the financial market in which the insurer invests follows the Black-Scholes model, namely, a single riskless asset that earns interest at a constant rate and a single risky asset whose price process follows a geometric Brownian motion. Under minimal assumptions about admissible forms of reinsurance, we show that optimal per-loss reinsurance is excess-of-loss. Therefore, our result extends the work of the optimality of excess-of-loss reinsurance to the problem of minimizing the probability of ruin.

JEL Classification: C58, C61, G22, G11.

AMS 2010 Classification 49K10, 49K20, 49L20.

Keywords: Probability of ruin; optimal reinsurance; stochastic control; compound Poisson; diffusion approximation.

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