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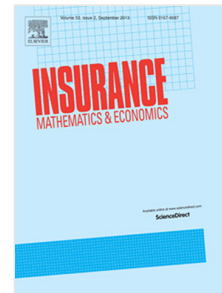
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# Optimal reinsurance and investment strategies for insurers with mispricing and model ambiguity <sup>☆</sup>

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## Abstract

We discuss optimal proportional reinsurance-investment problems for an insurer with mispricing and model ambiguity under a complex stochastic environment. The surplus process is described by a classical Cramér-Lundberg (C-L) model and the financial market contains a pair of mispriced stocks, a risk-free asset, and a market index. The insurer is ambiguity-averse and has specific modeling risk aversion preferences for the financial market's diffusion term and insurance model's jump term respectively. The statistical arbitrage opportunities which are afforded by our mispricing model feature are particularly timely in the insurance investment context for markets in Hong Kong and mainland China. Similar to Maenhout (2004), we incorporate the ambiguity aversion and formulate an optimal robust reinsurance-investment problem. By employing the dynamic programming approach, we derive the explicit optimal robust reinsurance-investment strategy and optimal value function. We provide numerical illustrations to analyze the behavior of our formulas and make practical recommendations. By studying our portfolio allocation sensitivity to various parameters, among other things, we uncover and analyze complex behaviors resulting from asymmetry between the mean-reversion rates of the mispriced stocks. We also define and analyze various utility losses which explain the importance of ambiguity aversion, surplus-jump, mispricing, and reinsurance in our model. Some of our findings include: the importance of taking advantage of mispricing for medium and long-term investment strategies, whereas decisions with a one-year horizon or less can usually ignore mispricing arbitrage opportunities; a recommendation not to ignore jumps in the surplus model; and an analysis of how crucial it is to incorporate ambiguity aversion, especially for moderate time horizons.

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