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OPTIMAL PROPORTIONAL REINSURANCE AND INVESTMENT UNDER PARTIAL INFORMATION*

XINGCHUN PENG[†] AND YIJUN HU[‡]

A . In this paper, we study the optimal proportional reinsurance and investment strategy for an insurer that only has partial information at its disposal, under the criterion of maximizing the expected utility of the terminal wealth. We assume that the surplus of the insurer is governed by a jump diffusion process, and that reinsurance is used by the insurer to reduce risk. In addition, the insurer can invest in financial markets. We give a characterization for the optimal strategy within a non-Markovian setting. Malliavin calculus for Lévy processes is used for the analysis.

Key words: Reinsurance, Portfolio, Partial information, Malliavin calculus

2010 Mathematics Subject classification: Primary 60K05, 60K15, 91B30
Secondary 60G70, 60J55

1. I

In recent years, optimal reinsurance and optimal investment problems for various models have been attracting interest from many researchers. As is well known, reinsurance is an effective method to reduce insurance risk, while investment is also a very important element in the insurance business. There are many studies on optimization of proportional reinsurance and investment for an insurer. Maximizing the utility and minimizing the probability of ruin are the two main optimization criteria in the literatures.

For utility optimization problems, see Zhang et al. (2009), Cao and Wan (2009), Liang et al. (2011) and the references therein. For minimizing the probability of ruin, see Promislow and Young (2005), Luo et al. (2008), Schmidli (2002) and the references therein. It is worth mentioning that Bai and Guo (2008) showed that in some special cases, the optimal strategies for maximizing the expected exponential utility and minimizing the probability of ruin are equivalent.

The HJB equation method was used in all of the papers mentioned above to derive the optimal strategy and the optimal value function. That is a quite effective method since the surplus processes with proportional reinsurance and investment considered in those papers are all Markovian diffusion processes. By solving the HJB equations, detailed expressions for the optimal strategies and the optimal value functions can often be derived.

On the other hand, optimal portfolio problems with partial information in financial markets also present a very active research area in recent years. It was firstly systematically studied by Di Nunno and Øksendal (2009). They considered an optimal portfolio problem for a dealer

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