

Uniform asymptotic estimates in a time-dependent risk model with general investment returns and multivariate regularly varying claims

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Abstract

We consider an insurer with d lines of businesses, who is allowed to make risk-free and risky investments. The price process of the investment portfolio is described as a general càdlàg process. We assume that the claim sizes from different lines of businesses and their common inter-arrival times form a sequence of independent and identically distributed (i.i.d.) random pairs and each pair obeys a certain dependence structure. Under this dependence structure, the claim sizes from different lines of businesses are distributed according to the multivariate regular variation. This paper proposes conditions that are satisfied by many important stochastic processes such as Lévy process, Vasicek model, Cox-Ingersoll-Ross model, Heston model, etc. Subsequently, we derive, under these conditions, the uniform asymptotic expansions of ruin probabilities, which hold uniformly for the whole time horizon. Numerical examples are provided to illustrate main results.

Keywords: Stochastic return, Multivariate regular variation, Risk model, Ruin probability, Càdlàg process

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