Asymptotics for a nonstandard risk model with multivariate subexponential claims and constant interest force

Dimitrios G. Konstantinides [*1], Charalampos D. Passalidis [†1], and Hui Xu [‡2]

[1]Dept. of Statistics and Actuarial-Financial Mathematics, University of the Aegean, Karlovassi, GR-83 200 Samos, Greece

[2]School of Statistics and Data Science, Shanghai University of Finance and Economics, Shanghai, China

Abstract

In this paper, the asymptotic behavior of the entrance probability of discounted aggregate claims of a certain family of rare sets is studied, considering the finite and infinite time horizons. This multivariate risk model, driven by a common counting process, has a constant interest rate and allows the interdependence of claim vectors. For the finite time horizon, the multivariate subexponential distribution of the common claim vector and the weak dependence structure of regression dependence are used. For the infinite time horizon, the claim vector is taken from a smaller distribution class, and the weak dependence structure is more general. Both results are derived under some additional assumptions on the moments of the counting process, which is fulfilled by all inhomogeneous renewal processes and many quasi-renewal processes, respectively. Moreover, the results are specialized to the multivariate regularly varying case, where more explicit results on the asymptotic behavior of the entrance probability of the discounted aggregate claims are derived. At the end of the paper, the results obtained are used to study the finite and infinite time horizon ruin problems of a risk model with eventual Brownian perturbations.

Keywords: multivariate nonstandard risk model; discounted aggregate claims; ruin probability; interdependence; finite and infinite time horizon; Brownian perturbations

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[*]E-mail address: konstant@aegean.gr

[†]E-mail address: sasd24009@sas.aegean.gr

[‡]E-mail address: xuhui@mail.shufe.edu.cn.

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