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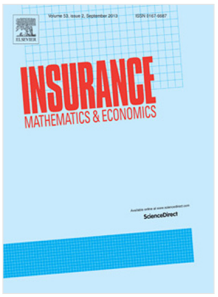

The dual risk model with dividends taken at arrival

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The dual risk model with dividends taken at arrival

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Abstract

We consider the dual risk model with special dividend or tax payments: If an arriving gain finds the surplus above a barrier b or if it would bring the surplus above that level, a certain part of the gain is paid as dividends or taxes. We obtain expressions for the joint Laplace-Stieltjes transform of the time to ruin and the amount of dividends paid until ruin, and for the expected discounted dividend paid until ruin. We consider the case where the dividend paid from each gain is a general function of the gain. More explicit results are obtained when the dividend is a given percentage of the gain amount.
Keywords: dual risk model, time to ruin, dividend, $M/G/1$ queue, busy period

1 Introduction

This paper is devoted to the analysis of dividend policies in the compound Poisson dual risk model. Since the pioneering work of De Finetti, many types of dividend policies have been studied for the classical Cramér-Lundberg model, i.e., for risk processes modeled as a Lévy process without positive jumps. In the barrier dividend strategy all the premium inflow received while the process is above the barrier is paid as dividends. Under some conditions, this policy was proven to be optimal for the classical risk model. Another dividend policy is the threshold strategy, where dividends are paid at a fixed rate smaller than the premium rate, when the surplus is above a given horizontal threshold. This policy was proven to be optimal under some conditions when the dividend rate is bounded from above. For a comprehensive review on the dividends strategies, see [5] and [2].

Another process that has been studied in the actuarial literature is the dual risk model. This is a Lévy process without negative jumps. It describes the surplus of a company with fixed expense rate and occasional gains. Examples are pharmaceutical, petroleum, or R& D companies. Since Avanzi et al. [3] various performance measures of the dual risk model have been studied. Avanzi et al. [3, 5] considered the optimal dividend policy for the compound Poisson dual risk model with and without perturbation of Brownian motion and proved that the policy that maximizes the expected present value of the dividends is the barrier strategy, i.e., all the overflow above a barrier is paid as dividends. The barrier strategy is proven to be optimal for the more general spectrally positive

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