Accepted Manuscript

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PII: S0167-6687(17)30375-X
DOI: https://doi.org/10.1016/j.insmatheco.2018.02.004
Reference: INSUMA 2450

To appear in: Insurance: Mathematics and Economics

Received date: August 2017
Revised date: February 2018
Accepted date: 19 February 2018

Please cite this article as: Noba K., Pérez J., Yamazaki K., Yano K., On optimal periodic dividend strategies for Lévy risk processes. Insurance: Mathematics and Economics (2018), https://doi.org/10.1016/j.insmatheco.2018.02.004

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ON OPTIMAL PERIODIC DIVIDEND STRATEGIES FOR LÉVY RISK PROCESSES

KEI NOBA∗, JOSÉ-LUIS PÉREZ†, KAZUTOSHI YAMAZAKI‡, AND KOUJI YANO∗

ABSTRACT. In this paper, we revisit the optimal periodic dividend problem, in which dividend payments can only be made at the jump times of an independent Poisson process. In the dual (spectrally positive Lévy) model, recent results have shown the optimality of a periodic barrier strategy, which pays dividends at Poissonian dividend-decision times, if and only if the surplus is above some level. In this paper, we show the optimality of this strategy for a spectrally negative Lévy process whose dual has a completely monotone Lévy density. The optimal strategies and value functions are concisely written in terms of the scale functions. Numerical results are also provided.

AMS 2010 Subject Classifications: 60G51, 93E20, 91B30
JEL Classifications: C44, C61, G24, G32, G35
Keywords: dividends; spectrally negative Lévy processes; scale functions; periodic barrier strategies.

1. INTRODUCTION

In the classical de Finetti’s optimal dividend problem, the expected total discounted dividends accumulated until ruin are maximized. To model the surplus of an insurance company that increases by premium and decreases by insurance payments, a compound Poisson process with downward jumps or more generally a spectrally negative Lévy process is used. Nowadays, fluctuation theory and scale functions are known to be useful, particularly if the optimal strategy is guessed to be a barrier strategy reflecting the underlying process at an upper barrier. Numerous computations are possible for the reflected Lévy process, and these can be used to solve the problem in a straightforward manner.

Despite the analytical tractability of the classical continuous-time model, the barrier strategies are unfortunately not implementable in practice. On the other hand, while the models with deterministic discrete payment times are ideal, they lack analytical tractability, and numerical methods are required to solve them. Recently, with the aim of developing a more realistic yet analytically tractable model, random discrete payment times were considered. For example, in the research by Albrecher et al. [1, 2], if

This version: February 27, 2018.
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