Taxation and reflection in a Lévy risk model

Jevgenijs Ivanovs*

University of Lausanne, Switzerland
jevgenijs.ivanovs@unil.ch

Abstract

A tax payment scheme of a loss-carry-forward type for a Lévy insurance risk model was studied in [1, 2, 3], where the tax rule is to pay a certain proportion of the premium income, whenever the surplus process is at its running maximum. Various quantities of the resulting process, such as the ruin probability and the net present value of tax paid until ruin, can then be expressed through simple formulas.

In this work we discuss and analyze taxation jointly with reflection from below, where the latter can be interpreted as a continuous minimal injection of capital required to keep the surplus process non-negative. We characterize the first passage time over an arbitrary level and the cumulative amount of injected capital up to this time by their joint Laplace transform, and show that a simple power relation also holds in this case. This can be further used to compute, e.g., the net present value of tax collected before the cumulative injected capital exceeds a certain amount.

Keywords: spectrally-negative Lévy processes, exit problems, scale functions

References

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