Optimal dividend problem under transaction cost for a two-dimensional insurance risk process

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Keywords: dividends optimization, impulse control, two-dimensional risk process.

Abstract:

We consider two branches of an insurance company, each one pays a fixed proportion of the amount of each claim and receives premiums at different rates. We assume that the surpluses follow a compound Poisson process and that the ruin occurs when the surpluses leave the positive quadrant.

We study the problem of maximizing the sum of the expected cumulative discounted dividend payments of the two branches in the presence of strictly positive transaction costs. As a consequence of these transaction costs, we have a two-dimensional impulse control problem.

The boundaries between the action and non-action regions of the optimal strategy are unknown (free boundary). We prove that the optimal value function is the smallest viscosity supersolution of the corresponding Hamilton-Jacobi-Bellman equation. We study an example with exponential claim-size distribution and find the free boundary between the optimal action and non-action region is a curve.

This work is a generalization of the works of Loeffen [1] and Thonhauser and Albrecher [2] for a two-dimensional case.

References:

[1] R. Loeffen. An optimal dividends problem with transaction costs for spectrally negative Lévy processes. Insurance Math. Econom., 45(1):41–48, 2009.

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