

Multi-refracted and level-dependent Lévy risk processes

Abstract: We consider multi-refracted Lévy risk process whose dynamics change by subtracting off a fixed linear drifts whenever the process is above certain levels. Formally, we define a multi-refracted Lévy risk process as a unique strong solution of the SDE (for $k \geq 1$):

$$dU_k(t) = dX(t) - \sum_{j=1}^k \delta_j 1_{\{U_k(t) > b_j\}} dt, \quad t \geq 0,$$

where X is a spectrally negative Lévy process, $0 < \delta_1, \dots, \delta_k$ and $b_1 < b_2 < \dots < b_k$ are model parameters.

Moreover, we present the formulas for one and two sided exit problems written in terms of the new q - scale functions associate with the process U_k . We also present new properties of the obtained scale functions. Finally, we extend the theory of multi-refracted processes to processes with general premium rate function ϕ .

This talk is based on joint work with Tomasz Rolski, José-Luis Pérez and Kazutoshi Yamazaki.