

SÉMINAIRE DE MATHÉMATIQUES ACTUARIELLES ET FINANCIÈRES

organisé par *Quantact*, le *Laboratoire de mathématiques actuarielles et financières* du CRM

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2920, Chemin de la tour

Pavillon André-Aisenstadt, Université de Montréal

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Clustered Lévy processes and their financial applications

This work contributes to the literature over time-changed processes in two directions. Firstly, this is the first thorough study of theoretical properties of Lévy processes, subordinated by a self-excited random clock. The process observed on this new time scale, called clustered Lévy process, presents interesting features for financial modeling like stochastic volatility and grouped jumps. In this framework, we infer analytical expressions for the mean, variance, and a new parametric form of the moment generating function. A bivariate extension is also considered. Furthermore, this article introduces a class of exponential affine changes of measure and the necessary conditions to preserve the dynamics of clustered Lévy processes under an equivalent measure. The second major contribution is empirical. A new particle filter is proposed so as to recover the market time scale from a time series. And a method based on the numerical inversion of the moment generating function is used to estimate parameters. Finally, a numerical analysis reveals that random clocks driving the S&P 500 and Eurostoxx 50 indices are highly correlated to trading volumes.

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