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Applications of Fractional Calculus to Stochastic Models for Finance

Abstract

Many empirical features of financial data can be incorporated into stochastic models via a random time change by a suitable stochastic process. Time changes in the classical geometric Brownian motion model lead to the fractal activity time geometric Brownian motion (FATGBM) models. We discuss several time change processes, an inverse of the standard stable subordinator and a fractional tempered stable Levy motion, and the properties of the resulting FATGBM models. We also discuss how models that use fractional Skellam process for high frequency data can overcome the drawbacks of models that are based on the difference of two Poisson processes.