Is it necessary to add a diffusion term onto a pure jump model?

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Abstract

It is widely accepted that the asset price process consists of a jump component because of the heavy tails of the asset returns. Many literatures, theoretically or empirically, even suggested purely discontinuous process as the underlying model of asset prices. Is there any evidence from the high frequency financial data supporting the purely discontinuous models? Or equivalently, does the continuous diffusion component vanish or not?

In this paper, we formally propose a statistical test against the necessity of a continuous diffusion component. Under the null hypothesis that a continuous diffusion component does not vanish, our test statistics has a CLT when the discontinuous process has infinite variation, which facilitates control of type I error asymptotically. This is the advantage of our test over other tests developed recently. Simulation shows that the asymptotic size is close to the true value, and the test is powerful.