

Investigating Impacts of Self-Exciting Jumps in Returns and Volatility: A Bayesian Learning Approach

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Abstract

The paper proposes a new class of continuous-time asset pricing models where whenever there is a negative jump in asset returns, it is simultaneously passed on to diffusion variance and the jump intensity, generating co-jumps of prices and volatility and jump clustering. To properly deal with parameter uncertainty and hindsight bias, we employ a Bayesian learning approach, which generates all quantities necessary for sequential real-time model analysis. Empirical study using S&P 500 index returns shows that volatility jumps at the same time as negative jumps in asset returns mainly through jumps in diffusion volatility. We find weak evidence of jump clustering. Learning and parameter uncertainty are shown to have important implications for risk management, option pricing and volatility forecasting.

Keywords: Self-Excitation, Volatility Jump, Jump Clustering, Parameter Learning, Sequential Bayes Factor, Risk Management, Option Pricing, Volatility Forecasting