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Bayesian Inference for Nonlinear and Non-Gaussian Stochastic Volatility Model with Leverage Effect

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Abstract: Stochastic volatility (SV) models provide useful tools to describe the evolution of asset returns, which exhibit time-varying volatility. This paper extends a basic SV model to capture a leverage effect, a fat-tailed distribution of asset returns and a nonlinear relationship between the current volatility and the previous volatility process. The Bayesian approach with the Markov chain Monte Carlo method is employed to estimate model parameters. To assess the goodness of the estimated model, we calculated several Bayesian model selection criteria that include the Bayes factor, the Bayesian predictive information criterion and the deviance information criterion. The proposed method is tested on simulated data and then applied to daily returns on the Nikkei 225 index where several SV models are formally compared.

Key words: Bayesian model selection, *B*-splines, fat tail, leverage effect, Markov chain Monte Carlo

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