

High-frequency Realized Stochastic Volatility Model*

Toshiaki Watanabe[†] and Jouchi Nakajima[‡]

Abstract

This paper proposes a new high-frequency realized stochastic volatility model. Apart from the standard daily-frequency stochastic volatility model, the high-frequency stochastic volatility model is fit to intraday returns by extensively incorporating intraday volatility patterns. In this paper, the daily realized volatility calculated using intraday returns is incorporated into the high-frequency stochastic volatility model by taking account of the bias in the daily realized volatility caused by microstructure noise. The volatility of intraday returns is assumed to consist of the autoregressive process, the seasonal component of the intraday volatility pattern, and the announcement component responding to macroeconomic announcements. A Bayesian method via Markov chain Monte Carlo is developed for the analysis of the proposed model. Using this method, the proposed model is fit to the 5-minute returns of Nikkei 225 stock index.

JEL Classification Number: C22, C51, C52, C53, C58, G17.

Key words: Bayesian methods, High-frequency data, Markov chain Monte Carlo, Realized volatility, Stochastic volatility model.

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[†]Institute of Economic Research, Hitotsubashi University, 2-1 Naka, Kunitachi, Tokyo, 186-8603, Japan (watanabe@ier.hit-u.ac.jp)

[‡]Research and Statistics Department, Bank of Japan, 2-1-1 Hongokuchō-Nihonbashi, Chūō-ku, Tokyo 103-0021, Japan (jouchi.nakajima@gmail.com)