

Empirical Analysis of Volatility Dynamics in High Frequency Returns with a Time-Varying Component Model

Kasing Man

Department of Information Management and Decision Sciences
Western Illinois University

Abstract:

Recent research in high frequency returns provides strong evidence for the existence of multiple volatility components at intradaily frequencies. We propose a new time-varying component model to analyze the components of intraday return volatility dynamics and the source of long-run volatility persistence. An approach to select the appropriate time-varying components to be included in the model is presented. We apply the model to analyze IBM intraday returns from 2002 to 2005. Empirical evidence indicates that the model with three additive components, consisting of a time-varying mean of absolute returns and two cosine components with time-varying amplitudes, captures very well the pronounced periodicity and persistence behaviors exhibited in the empirical autocorrelation pattern of IBM returns. We find that the long-run volatility persistence is driven predominantly by daily level shifts in mean absolute returns. After adjusting for the three intradaily components, the filtered returns behave much like a Gaussian noise, suggesting that the model is properly specified. A new volatility estimator (TCV) is derived from the time-varying component model. Results from out-of-sample forecast experiments suggest that the performance of using TCV in predicting future volatility fares well against alternative methods including GARCH model, realized volatility and realized absolute value.