

Signal noise decomposition of financial data: An infrequent trading analysis

Helgi Tomasson

The observed transaction prices on a stock market at discrete time points are assumed to be a sample from a continuous time-value process. The theory of an efficient market is used as motivation for a random-walk type model. The fact that bid-ask spread and other microstructure phenomena exist is accounted for by adding a noise term to the model. Models for elementary detrending based on stochastic processes in continuous time are set up. For empirical analysis, they are formulated in state-space form, and calculations are performed with the Kalman-filter recursions. The result is an analytical way of decomposing the observed transaction price change into a value innovation and a market noise component. The respective innovation standard deviations and market noise standard deviations are easily interpreted. Some alternative stochastic structures are considered and applied to data from the Iceland Stock Exchange. Algorithm is implemented in the statistical language R combined with Fortran subroutines.

Keywords: Diffusion processes, state-space models, financial data, infrequent trading