English Abstract

The study of volatility and covariation has become one of the most active and successful areas of research in time series econometrics and economic forecasting in recent decades. This dissertation contains a complete theory for realized variation and covariation estimation, generalizing current knowledge and taking the estimation into the time-frequency domain for the first time. The first part of the theory presents a wavelet-based realized variation theory, while the second part introduces its multivariate counterpart, a wavelet-based realized covariation theory. The results generalize the popular realized volatility framework by bringing robustness to noise as well as jumps and the ability to measure realized variation and covariation not only in the time domain, but also in the frequency domain. The theory is also tested in a numerical study of the small sample performance of the estimators and compared to other popular realized variation estimators under different simulation settings with changing noise as well as jump level. The results reveal that our wavelet-based theory is able to estimate the realized measures with the greatest precision. Another notable contribution lies in the application of the presented theory. Our time-frequency estimators not only produce more efficient estimates, but also decompose the realized variation and covariation into arbitrarily chosen investment horizons. The results thus provide a better understanding of the dynamics of stock markets. In the last part, the theory is also used to build a long memory forecasting model based on the decomposed measures. Wavelet-based estimators carry the highest information content for the volatility, covariation and correlations forecasts when compared to other estimators. Moreover, decomposition of realized covariation to its continuous part, individual jumps and co-jumps improves the covariance forecasts significantly.