

# Statistical analysis of covariance and cross-spectral matrices for multiple high-frequency financial data

Aki-Hiro Sato<sup>a</sup> and Takaki Hayashi<sup>b</sup>

<sup>a</sup>Department of Applied Mathematics and Physics,  
Graduate School of Informatics, Kyoto University  
Yoshida Honcho, Sakyo-ku, Kyoto, 606-8501, JAPAN  
aki@i.kyoto-u.ac.jp

<sup>b</sup>Graduate School of Business Administration, Keio University  
4-1-1 Hiyoshi Kouhoku-ku, Yokohama Kanagawa, 223-8526, JAPAN  
takaki@kbs.keio.ac.jp

Recent accumulation of massive data in a broad spectrum of fields in our modern society requires to develop mathematical methodology to handle such large-scale data and to extract meaningful information from them, with which we need to make various decisions under uncertainty. From this perspective it is important to find summary quantities to measure association among them. It is also important to pursue methods to separate “global” trend and “local” fluctuations. In this study we focus on the financial markets and consider the global and local components of multiple financial time series in both time and frequency domains by means of covariance and cross-spectral matrices. Empirical covariance matrices and cross-spectral matrices, which reflect the underlying correlated structure of the markets, are estimated from multivariate, high-frequency financial time series. Statistical properties of both matrices are found to be useful to capture market movements with a high resolution.

## Keywords

High-frequency financial time series, covariance matrix, cross-spectral matrix

## References

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