Multiple-block dynamic equicorrelations with realized measures, leverage and endogeneity

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Abstract

The single equicorrelation structure among several daily asset returns is promising and attractive to reduce the number of parameters in multivariate stochastic volatility models. However, such an assumption may not be realistic as the number of assets may increase, for example, in the portfolio optimizations. As a solution to this oversimplification, the multiple-block equicorrelation structure is proposed for high dimensional financial time series, where we assume common correlations within a group of asset returns, but allow different correlations for different groups. The realized volatilities and realized correlations are also jointly modelled to obtain stable and accurate estimates of parameters, latent variables and leverage effects. Using a state space representation, we describe an efficient estimation method of Markov chain Monte Carlo simulation. Illustrative examples are given using simulated data, and empirical studies using U.S. daily stock returns data show that our proposed model outperforms other competing models in portfolio performances.

Key words: Asymmetry, leverage effect, Markov chain Monte Carlo, multiple-block equicorrelation, multivariate stochastic volatility, realized correlation, realized volatility.

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