Cointegration Rank Estimation for High-dimensional Time Series with Breaks

Rongmao Zhang

Zhejiang University
E-mail: rmzhang@zju.edu.cn

Abstract: A novel and simple-to-use procedure for estimating the cointegration rank of a high-dimensional time series system with possible breaks is proposed in this paper. Based on a similar idea to principal component analysis, a new expression of the cointegrated time series is derived, from which the cointegration rank can be estimated by the number of the eigenvalues of certain non-negative definite matrix.   This method is different from that of Zhang, Robinson and Yao (ZRY, 2019), which used the cointegrated time series to recover the cointegration space.

There are several advantages of the new method: (a) the dimension of the cointegrated time series is allowed to vary with the sample size; (b) it is model free; (c) it is robust for a linear trend, that is, the cointegration rank can be identified without detrending; (d) it is simple-to-use and robust against possible breaks in trend. The cointegration rank can be estimated without testing and estimating the break points a priori. Asymptotic properties of the proposed methods are investigated when the dimension of the time series increases with the sample size. Illustrations of simulations are also reported.