Abstract:

We investigate the collinearity of vector time series in the frequency domain, by examining the rank of the spectral density matrix at a given frequency of interest. Rank reduction corresponds to collinearity at the given frequency. When the time series data is nonstationary and has been differenced to stationarity, collinearity corresponds to co-integration at a particular frequency. We pursue a full understanding of rank through the Schur complements of the spectral density matrix, and test for rank reduction via assessing the positivity of these Schur complements, which are obtained from a nonparametric estimator of the spectral density. We provide new asymptotic results for the Schur complements, under the fixed bandwidth ratio paradigm. The test statistics are $O_p(1)$ under the alternative, but under the null hypothesis of collinearity the test statistics are $O_p(T^{-1})$, and the limiting distribution is non-standard. Subsampling is used to obtain the limiting null quantiles. Simulation study and an empirical illustration for six-variate time series data are provided.