



統計科學研究所

INSTITUTE OF
STATISTICAL SCIENCE



S E M I N A R



S T A T A S

Seminar

Title : Determination of the effective cointegration rank
in high-dimensional time-series predictive regression

Speaker : Prof. Ruey S. Tsay (蔡瑞胸 教授)

(Booth School of Business, University of Chicago, US)

Time : 15:00 PM~16:30 PM, Wednesday, Nov 30, 2022

Place : Auditorium, B1F, Institute of Statistical Science

Abstract

Co-author: Prof. Puyi Fang and Prof. Zhaoxing Gao

This paper proposes a new approach to identifying the effective cointegration rank in high-dimensional unit-root (HDUR) time series from a prediction perspective using reduced-rank regression. For a HDUR process $x_t \in \mathbb{R}^N$ and a stationary series $y_t \in \mathbb{R}^p$ of interest, our goal is to predict future values of y_t using x_t and lagged values of y_t . The proposed framework consists of a two-step estimation procedure. First, the Principal Component Analysis (PCA) is used to identify all cointegrating vectors of x_t . Second, the co-integrated stationary series are used as regressors, together with some lagged variables of y_t , to predict y_t . The estimated reduced rank is then defined as the effective cointegration rank of x_t . Under the scenario that the autoregressive coefficient matrices are sparse (or of low-rank), we apply the Least Absolute Shrinkage and Selection Operator (LASSO) (or the reduced-rank techniques) to estimate the autoregressive coefficients when the dimension involved is high. Theoretical properties of the estimators are established under the assumptions that the dimensions p and N and the sample size $T \rightarrow \infty$. Both simulated and real examples are used to illustrate the proposed framework, and the empirical application suggests that the proposed procedure fares well in predicting stock returns.

Keywords: Cointegration, Factor model, Reduced rank, High dimension, LASSO.

※ Lecture in English. Online live streaming through Cisco Webex will be available.

※ The tea reception will be held at 14:40.