March - April 2020

ECON 703: Advanced Research Topics:
Time Series Econometrics (module #5)

Peter C. B. Phillips

Purpose

This course forms Module #5 of a multi-module sequence of 5 courses taught over successive years that cover advanced topics in Time Series and Panel Econometrics with Applications. Each module includes a selection of topics in time series and stochastic process econometrics that are suited to Ph.D students advancing in any area of econometrics or financial econometrics. Modules #1, #2, #3, and #4 were taught in years 2016 -- 2019. They are not a pre-requisite for Module #5. Material taught in the earlier modules that may be needed for Module #5 will be reviewed as required.

The sessions outlined below include topics intended for module #5. The list is approximate, not all topics will be covered, and more time will be spent on some topics than others. No text is assigned. References will be given in class. A take home examination is used for assessment, with the option of an applied paper or scientific overview of a field of current interest.

Outline Topics

1. Review of some material from Modules #1, #2, #3, #4
   a. Probability spaces, projections, ergodic theory
   b. Martingales, maximal inequality, convergence theorem, martingale CLT
   c. Brownian motion, Donsker theorem. Stochastic integration, KL representations
   d. Linear process asymptotics: CLT, FCLT, LIL limit theory & frequency domain
   e. Cointegration basics
2. Recent advances in cointegration theory
   a. Trend IV regression and optimal inference
   b. IM-OLS and partially spurious regression asymptotics
   c. Multicointegrated systems and robust inference
   d. IVX methods, extensions and applications
3. Functional coefficient cointegrated systems
   a. Functional coefficient limit theory – stationary case
   b. Functional coefficient limit theory – cointegration case
   c. Functional coefficient limit theory – non cointegrated case
   d. Applications
   a. Mild integration, limit theory and applications
   b. Explosive process and co-explosive process asymptotics
   c. Mildly explosive processes and asymptotics
   d. Structural change and bubble detection
5. Long Memory
   a. LM Models and Properties
   b. Parametric and Semiparametric Approaches
   c. Bias and Short Memory Noise effects
   d. Applications to interest rates, the Fisher Effect, and volatility