LTCC Proposed Course

Title: Advanced Time-Series Modelling and Estimation.

Basic Details:
Core Audience: second/third, Statistics. Course
Format: Extended, 5x2 hours lectures.

Course Description:
Economic theory suggests that many econometric time series (e.g., growth rates of GDP, interest and inflation rates, as well as monetary variables) are interrelated. In the course, methods for analyzing two or more time series are introduced. Emphasis is given on the Vector Autoregressive Framework, which is used for forecasting and for investigating the dynamic interrelations between different variables (impulse response analysis). In particular, the course covers the analysis of stable vector autoregressive (VAR) models (including model estimation, model specification and model checking) as well as the statistical analysis of integrated and cointegrated variables. A further topic to be discussed include recent advances in structural VAR modelling. If time permits, multivariate GARCH models and Score-Driven will be covered.

Key words: Multiple Time-Series, Vector Autoregressive Models, Cointegrated Variables, Structural VAR, Multivariate GARCH, Score-Driven models.

Syllabus:
1. Introduction to Multiple Time-Series modelling.
2. Stable Vector Autoregressive Models (estimation, model specification and model checking).
3. Analysis of Integrated and Co-Integrated variables.
4. Structural VAR.
5. Multivariate GARCH and Score-Driven Models [If time permits].

Recommended reading:
Helmut Lütkepohl, *New Introduction to Multiple Time Series Analysis***,** (2005). Kilian Lutz and Helmut Lütkepohl, *Structural vector autoregressive analysis* (2017).
Francq, Christian and Zakoian, Jean-Michel, *GARCH models: structure, statistical inference and financial applications,* (2019).
Harvey, Andrew C, *Score-driven time series* models; Annual Review of Statistics and Its Application; (2022), 9(1):321—342.

Prerequisites:
Background in Statistics and Probability.

Format:

- Number of discussion/problem sheets: 4.
- Electronic lecture notes: Yes.
- Necessary support facilities: Python.

Lecturer Details:

- Lecturer: Dr. Giulia Livieri.
- Lecturer home institution: The London School of Economics and Political Science.
- Lecturer e-mail: g.livieri@lse.ac.uk