Econ 871 (Fall 2022)

Time Series Analysis

Professor Peter Hansen

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Lectures: Tue & Thu 11:00-12:15 in Gardner Hall 308

Office Hour: Time TBD during first lecture.

Course website on CANVAS

Course Outline

The course provides an introduction to time series analysis. We will cover the following topics: stationarity/ergodicity, autoregressive and moving average models, unit root/spurious regression, vector autoregressive models, cointegration, GARCH, structural breaks/parameter instability and models with time-varying parameters. We will also spend time on some of the following topics: Forecasting, martingale, Markov chains, (quasi) maximum likelihood analysis, m-estimation, generalized method of moments, multiple comparisons testing. We typically spend extra time on a particular topic/theme, with is selected based on students' interest.

We will draw on material from several textbooks, including *Econometrics* by Bruce Hansen (Chapters 14-16), *Time Series Analysis* by J.D. Hamilton, and *Econometrics* by F. Hayashi.

Prerequisites

Economics 770 (Introduction to Econometric Theory), Economics 771 (Econometrics), Graduate level probability theory and mathematical statistics (usually obtained through 1 and 2)

COVID-19 Precautions

As is the case for all other university policies, we will comply policies related to the ongoing pandemic. This policies may change during the semester, as has been the case in past semesters. For additional information, see Carolina Together.

Problem Sets

A number of homework assignments will be given during the course. You may discuss and exchange ideas about how to solve the assignments, but each student must turn in her own work. Some assignments will require the use of computer software. I will mainly use Julia and I encourage you to do the same.

Grading Policy

Grades will be based on problem sets (40%) and a final exam (60%). The final exam a take home exam schedule to begin on December 3rd at 08:00 and will be due 24 hours later. I will update the syllabus as new information becomes available.

Schedule (Preliminary)

- Week 1. Stationarity, Ergodicity, Martingales, (Markov)

- Week 2: Autocorrelation, ARMA, Lag operator, Linear Processes, Wold representation

- Week 3: Yule-Walker, Estimation of stationary AR.

- Week 4: Estimation of MA, ARMA... and GARCH?

- Week 5: Unit Root, Spurious Regression,

- Week 6 Vector Autoregressive Model (VAR)

- Week 7 Cointegration

- Week 8-9 QMLE (GMM?) Time Series models

- Week 10 HAC estimation

- Week 11 Testing for structural changes.

- Week 12 Models with time-varying parameters. Score-driven model.

- Week 13-14 Advanced topic related to testing, model selection, forecasting.