Outline

This graduate-level course will cover time series econometrics in a macroeconomic context. We will cover the specification, estimation, and testing of core time series models, with emphasis on both theory and application. Emphasis will be placed on understanding the models and the estimation techniques such that the students will be able to apply the models to real-world economic data. The primary textbook is Applied Econometric Time Series by Walter Enders (see below). I will largely follow the outline of topics and material in this book but will also augment material from other texts as needed.

Prerequisites

The university prerequisites are 440.602 (Macroeconomic Theory and Policy) and 440.606 (Econometrics).

Textbook and materials

- This course will largely follow this book and its topics, although we will not cover every subtopic.
- I will also introduce topics, technical details, empirical examples, and motivation not contained in this book, so class attendance is critical.
Software

I will use mostly Eviews and Matlab but feel free to use any suitable statistical software. The software should be able to estimate standard time series models (e.g., Eviews) and be able to manipulate matrices, perform calculations, generate random numbers, maximize functions, and generate plots (e.g., Matlab).

Grading Policy

- **40%** will be based on weekly graded homework assignments. These assignments will typically contain a mixture of theory (e.g., questions and exercises from the textbook), application (e.g., interpret an estimated model as applied to data), and light statistical programming (e.g., program the log-likelihood function of a model and maximize it to get estimates). Assignments are due at the beginning of the lecture.
- **30%** will be based on an in-class midterm exam.
- **30%** will be based on an in-class final exam. The final will be comprehensive.

Schedule

The following is a tentative schedule of the topics, due dates, and classroom activities.

**Week 1 (May 16)**

- Introduction, review of statistical concepts, introduction to statistical software, and stationary univariate time series models (if time permits). Enders Ch 2
- Pass out HW1.

**Week 2 (May 23)**

- Stationary univariate time series models (part 1). Enders Ch 2
- Specification, estimation, and testing of AR, MA, and ARMA models. Estimation with statistical software.
- Collect HW1.
- Pass out HW2.

**Week 3 (May 30)**

- Stationary univariate time series models (part 2). Enders Ch 2
- Nonstationary univariate time series models (part 1, if time permits). Enders Ch 4
- Specification, estimation, and testing of models with stochastic and deterministic trends. Random walk model, Dickey Fuller tests, and structural breaks.
• Collect HW2.
• Pass out HW3.

Week 4 (June 6)
• Nonstationary univariate time series models (part 2). Enders Ch 4.
• Collect HW3.
• Pass out HW4.

Week 5 (June 13)
• Stationary multivariate time series (part 1). Enders Ch 5
• Specification, estimation, and testing of VAR models.
• Collect HW4.
• Pass out HW5.

Week 6 (June 20)
• Stationary multivariate time series (part 2). Enders Ch 5
• Review material for midterm.
• Collect HW5.
• Pass out HW6.

Week 7 (June 27)
• In-class midterm.
• Collect HW6.

Week 8 (July 11)
• Non-stationary multivariate time series (part 1). Enders Ch 6
• Cointegration, testing and estimation of cointegrated systems.
• Pass out HW7.

Week 9 (July 18)
• Non-stationary multivariate time series. (part 2). Enders Ch 6
• Collect HW7.
• Pass out HW8.
Week 10 (July 25)

- Volatility models (part 1). Enders Ch 3
  - Specification, estimation, and testing of ARCH and GARCH models. Time permitting, stochastic volatility models.
- Collect HW8.
- Pass out HW9.

Week 11 (Aug 1)

- Volatility models (part 2). Enders Ch 3
- Collect HW9.
- Pass out HW10.

Week 12 (Aug 8)

- Student choice of topics. For example, nonlinear time series models (regime switching, Enders Ch 6), state space models, and Bayesian MCMC estimation of time series models.
- Collect HW10.
- Pass out HW11.

Week 13 (Aug 15)

- Finish student choice topics.
- Review of course.
- Collect HW11.
- Pass out HW12.

Week 14 (Aug 22)

- Last day of class.
- In-class final exam.
- Collect HW12.

Course Policy

Please read the AAP code of conduct for academic misconduct and plagiarism at: