Syllabus for Econ 575

Applied Time Series Analysis and Forecasting

Professor Peter Reinhard Hansen
Email: reinhardhansen@gmail.com
Lectures: Tue & Thu 14:00-15:15 in Gardner Hall 001.
Office Hours: TBD in Gardner Hall 300G.

Prerequisites:

Econ 410, 420 and 470 (Intermediate Microeconomics, Macroeconomics, and Econometric). In particular it is assumed the student is familiar with regression model estimation and related hypothesis testing techniques.

Course Outline

The objective of the course is to introduce you to time series analysis and forecasting. The orientation of the course is theoretical and applied. A theoretical understanding of time series and the forecasting problem is critical for understanding forecasting methods and using them effectively. Empirical applications will serve to illustrate forecasting techniques and familiarize you with applied time series analysis and a variety of forecasting techniques

Econometric methods that relate to forecasting are rather extensive. In this course we will mainly focus on regression-based forecasts and a GARCH volatility models. We will also cover econometrics topics such as autoregressive and moving average models and other topics related to time series and forecasting.

Website

Course website: https://sakai.unc.edu/portal/site/econ575sp2020

Textbook

We will use material from multiple sources, primarily the following two textbooks, of which one is available for free online.

- *Introduction to Econometrics* 4th ed. by Stock & Watson (SW)
- *Forecasting in Economics, Business, Finance and Beyond* by Francis X. Diebold. (D) Available from the authors website.

Review and treatment of regression analysis will be based on SW, and we will proceed with the time series material in SW, chapters 15-17. Then we cover material from D, which will be supplemented with lecture notes and research papers.

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 may require the use of computer software such as Matlab, Gauss, R, Julia, Ox, STATA. Matlab is quite popular in Economics/Econometrics/Finance, while R is popular in Statistics. You can obtain Matlab inexpensively from UNC; R is shareware and therefore free online; and Ox can be obtained for free for academic use.

Grading Policy

Grades will be based on: a midterm exam (20%) and a final exam (40%). The remaining 40% is based on homework assignments and the forecasting project. Active class participation is also factored into this part of the grade. I expect you to be present and actively participate in all lectures. So make sure to let me know, in advance, if a timing conflict will cause you to miss a lecture.
The midterm will take place in class on March 5th (Thursday before spring break). The empirical project is due 4/14.

Each student must work alone on the projects that involves: Collecting a variable to be forecasted (e.g. annual unemployment rate in Brazil from 1955-2015), as well as predictor variables (if any); build a forecasting model; estimate it and evaluate the forecasts (including an out-of-sample evaluation if possible). Students are graded on how well the project is written, along with the presentation of the model and final results. Projects that attempt to forecast "challenging time series" may be grade lighter. A project that is simply thrown together at the last minute will receive "zero" credit. Additional details about the project will given later in the course. The project carries the same weight as three regular homework assignments. Late projects are accepted, but the score is discounted by 25% for each day that it is late (unless you have a documented medical emergency). Exams are closed-book, but you may bring a sheet with your own notes (one side of a letter-sized sheet of paper for the midterm, both sides for the final exam).

Schedule (preliminary)

Week 1-2

Introduction and Review of Basic Linear Regression Analysis

Week 2-3

SW Ch. 15 Time-Series Models: Autoregressive Models

Week 4-5

SW Ch. 16 Distributed Lag Models

Week 5-6

SW Ch 17.1-3. Vector Autoregression.

Week 7-8

SW Ch 17.5. Volatility Clustering

Week 8-10

Forecasting (Diebold)

Week 12-14

Advanced Topics & Project Presentations