Time Series Econometrics

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Syllabus

1 Description

The purpose of this course is to familiarize students with current techniques used in macroeconomic time series models with applications in macroeconomics, international finance, and finance; with the ultimate aim of providing students with the necessary tools to conduct original research in the area.

Topics include ARMA models, VARs and impulse response functions; local projection; unit roots, and structural breaks; spurious regressions; cointegration and VECM; ARCH models of volatility, and trend/cycle decomposition methods, including Kalman filtering. We will mostly work with the classical framework in the time domain but will touch upon Bayesian and frequency domain frameworks.

2 Prerequisites

I will assume some familiarity with matrix algebra and introductory statistics and econometrics. The mathematical appendix in the Hamilton textbook provides a good summary of useful mathematical and statistical tools.

The course is the continuation of "Econometrics" course but we will also review the univariate time series analysis in this course.

3 Requirements

Attending lectures and participating in classroom discussions are essential to the learning process. There will be two or three homework assignments. The class ends with a take-home exam. The assignments and exam will require the use of econometrics software. The weights in determining your grade are given as follows:

Homework assignments	50%
Final exam	50%

4 Readings

There is a number of textbooks that covers a part of material discussed in class. Book that covers most of the material is

- *Time Series Analysis* by James D. Hamilton, Princeton University Press, 1994.

Other texts that cover discussed material or serve as good introduction are

- *State-Space Models with Regime Switching* by Chiang-Jin Kim and Charles R. Nelson, MIT Press, 1999.
- *New Introduction to Multiple Time Series Analysis* by Helmut Lütkepohl, Springer-Verlag, 2005.
- *Introduction to Bayesian Econometrics* by Edward Greenberg, Cambridge University Press, 2007.
- *Time Series and Panel Data Econometrics* by M. Hashem Pesaran, Oxford University Press, 2015.
- *Applied Econometric Time Series* by Walter Enders, Wiley, 2010.

The readings include journal articles and chapters from the above books.

5 Outline

1. Stationary Time Series Analysis
   (a) Overview of ARMA models
   (b) State-Space Representation
   (c) Kalman Filter

2. Structural Analysis
   Granger Causality, IRFs, Estimation, Variance decomposition
   (a) Reduced-form VAR models
   (b) Structural VAR models
   (c) Distributed lag models
   (d) Jordà's local projection

3. Unit Roots and Structural Breaks
   (a) Unit root tests
   (b) Structural break tests
   (c) Trend/cycle decomposition
   (d) Cointegration
   (e) VEC models

4. Nonlinearity*
   (a) ARCH/GARCH models
   (b) Markov switching
   (c) Time-varying parameters
   (d) Gibbs sampling
   (e) Threshold models

   * *time permitting*