

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; 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 is essential to the learning process. There will be two or three homework assignments. The class ends either in-class 2 hour long exam. The assignments and exam will require the use of econometrics software. The weights in determining your grade are given as follows:

Class participation	10%
Homework assignments	40%
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

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*