

Time Series Econometrics

This course consists of two parts. Part I provides statistical foundation for macroeconomics, covering the standard methodology in time series analysis, while Part II is focused on some selected econometric time series models and methods that are relevant and useful for conducting substantive empirical research in macroeconomics. Notes on the actual lecture materials will be posted on Oncourse throughout the semester. There will be no required textbook, but the following books are recommended for background reading.

Brockwell, P.J. and R.A. Davis (1991) *Time Series: Theory and Methods*, 2nd Edition, Springer Verlag, Berlin.

Lütkepohl, H. (1993). *Introduction to Multiple Time Series Analysis*, 2nd Ed., Springer-Verlag, Berlin.

Hamilton, J.D. (1994) *Time Series Analysis*, Princeton University Press, New Jersey.

Kim, C.J. and C.R. Nelson (1999). *Dynamic Time Series Models and Markov-Switching: Classical and Gibbs-Sampling Approaches with Applications*, MIT Press.

Canova, F. (2007). *Methods for Applied Macroeconomic Research*, Princeton University Press.

DeJong, D. and C. Dave (2007). *Structural Macroeconometrics*, Princeton University Press.

Geweke, J., G. Koop and H. van Dijk (2011). *Handbook of Bayesian Econometrics*, Oxford University Press.

The class will meet on Mondays and Wednesdays in Wylie Hall 329 at 9-10:45am. The course grade will be based on problem sets (30%), a midterm examination (30%), and a take-home final examination (40%). The midterm examination will be given in class on October 15, Monday, and the take-home final examination will be distributed on December 3, Monday. I will have office hours (WY354) on Wednesdays at 1-2:30pm. If you wish to meet me outside my office hours should make an appointment in advance via email at yoosoon@indiana.edu.

Course Contents

Part I: Statistical Foundation

1. Stationary Time Series

1.1 Preliminaries

Introduction to Time Series, Basic Theory of Hilbert Space

1.2 Mathematical Theory of Stationary Processes

Stationary Processes in the Time Domain, Stationary Processes in the Frequency Domain, Prediction of Stationary Processes

1.3 Statistical Theory of Stationary Processes

Estimation of Sample Mean and Autocovariance Function, Inference for Spectrum

2. Nonstationary Time Series

2.1 Basic Asymptotics for Nonstationary Time Series

Functional Central Limit Theory, Asymptotics for Nonstationary Regressions

2.2 Unit Roots and Cointegration

Testing for Unit Roots, Inference in Cointegrated Models, VAR with Nonstationarity

2.3 Nonlinear Nonstationarity

Nonlinear Nonstationary Asymptotics, Inference in Nonstationary Nonlinear Models

Part II: Econometric Time Series Models

1. Structural VAR

Structural VAR Methodology, Identification of Structural VAR

2. Volatility Models

ARCH and Its Variants, Stochastic Volatility Model, Nonlinear Nonstationary Heteroskedasticity

3. Models with Latent Factors

State Space Models and Kalman Filter, Markov Switching Models, Markov-Chain Monte Carlo (MCMC) Methods