Econ. 553a
Fall 2005

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Econometrics IV: Time Series Econometrics

Course Outline 2005

This is the first semester of what has recently been a two-course sequence in time series econometrics. (This academic year, the Spring semester course Econ 557b will not be taught, so we will attempt to cover some of the material in that course in the first semester). The Fall course provides an introduction to time series methods in econometrics and emphasizes stationary time series, although some aspects of trend behavior and detrending are covered, and we will discuss some aspects of unit root theory and cointegration. Both time domain and frequency domain methods are discussed, and Bayesian as well as classical approaches are included. The treatment relies on asymptotic theory for linear processes, martingales and martingale approximations. We will overview a large literature, so not all topics are treated in the same depth. Theory, computations and some empirical applications are discussed.

No specific text is recommended. However, Hamilton's (1994)[1] book, Fuller (1996) and Gourieroux and Monfort (1997) are recommended as useful references. Hamilton's coverage is broad and relevant to econometrics, the book is easy to read and it includes much introductory material. Fuller's book provides an accessible statistical treatment of the subject, is a useful revision of an earlier (1976) edition, and was the first text to discuss unit root theory. Gourieroux and Monfort (1997) is a translation of an excellent modern French textbook of time series that covers a wide literature and is oriented towards econometrics. Lutkepohl and Kratzig (2004) is a new textbook of applied time series econometrics that emphasizes practicalities and covers methods that are popular in empirical economic applications. Brockwell and Davis (1991) is a very successful time series text that is commonly used in North American graduate statistics courses. This book is more technical than the above texts and stresses univariate models, but is well exposited, covers most of the traditional stationary time series topics and comes with some computer software. Lutkepohl's (1993) book provides an excellent coverage of VAR and Bayesian VAR modelling methods, together with some small scale practical applications to macro data. Davidson (1994) is a good general reference source on limit theory for econometrics including functional laws, emphasizing mixing and weak dependence. Taniguchi and Kakizawa (2000) gives a modern treatment of time series asymptotics from a stochastic process perspective and includes some useful special topics like large deviation expansions, saddlepoint approximations and higher order asymptotics.

In addition, some older lecture notes and my 1998 IMF Lectures will be available. These cover some of the topics we will talk about in lectures. Past take home exams are available on the web and some solution sets are available. With these, the course should be self-contained.

A take home examination will be given at the end of the course and students have the option of doing an applied paper instead.

The following is a general outline of how we will proceed through the course material. This year I will make some adjustments in attempting to incorporate some material on nonstationary time series.

[1] See Section 0 in the Reading Guide below for general references.

Week	Content
1	Ideas and approaches to time series. Primary concerns and methods of inference: Classical, Bayesian and prequential approaches. Role of unit roots and cointegration in econometric modeling.
2&3	Bayesian and classical asymptotics for time series. Heuristic ideas and implications for inference and modelling. Model selection. Trend Elimination.
4 &5	Ergodic theory, implications and applications. Notions of weak dependence.
6	The Wold decomposition and forecasting. Conditional expectations and Hilbert projections.
7	The Phillips-Solo device & shortcuts to time series asymptotics. Strong laws and CLT's for time series.
8	Martingales and time series applications of the martingale convergence theorem
9	Vector Autoregressions and Bayesian VARs. Impulse response and forecast error variance asymptotic theory
10-11	Frequency domain approaches and spectral regression. Spectral density and long run variance estimation.
12	Long memory models and econometric methods. More on unit roots and cointegration.
December	***Take Home examination paper or applied econometrics paper***

Reading Guide

Time series is a vast subject. The following list covers only that part of the subject that relates most closely to econometric research. The list is subdivided into topics that are relevant to material we intend to discuss, if only briefly in some cases, during the course.

0. General References[2]

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[2] Asterisked references are more important to the course.

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