Class Content

The primary objective of this course is to offer exposure to several modern topics in econometrics. While the focus of 8828 is on the econometrics of micro data sets, this seminar will emphasize macroeconometric methods.

In current practice this focus leads to an emphasis on time series models and methods, with particular attention to the problems of inference when variables are nonstationary. Traditionally regressions with time series have ignored the issue of nonstationarity, proceeding as though the well-established properties of standard estimators held even in the nonstationary environment. This complacency was upset by simulation studies by Granger and Newbold and analytical work by Phillips establishing that regression estimators and test statistics do not have standard distributions in models with nonstationary or integrated variables. At the same time Engle and Granger provided the framework of cointegration for modeling relations among integrated time series, and established the connection between cointegration and the dynamic error correction models that Hendry and his disciples had pioneered. Following these seminal works published ten years ago, there has been a flowering of research extending these ideas and applying these methods to a variety of estimation problems. During the first section of the course you will be introduced to the statistical foundations, tests, and estimation procedures appropriate for work with integrated time series.

Another recent direction of econometric research has been is the development of estimation and testing procedures that are appropriate for nonlinear models and robust to non-normal distributions. After laying the foundations of nonlinear estimation and numerical optimization, we will examine the generalized method of moments (GMM) and the bootstrap procedure for estimation and inference with non-normal error distributions.

The final section of the course will cover the more traditional topic of simultaneous equations identification and estimation. Since you have already covered the fundamentals of these models in 7828, our coverage of this topic will build on some of the ideas from the previous sections of the class: exogeneity concepts; the relation between structural simultaneous equations models and various time series forms; nonlinear and robust estimation.

There will be one examination in this course during the midterm, counting towards 40% of your course grade. There will also be some problem sets counting another 10% of the final grade. There will be no final exam. The remaining 50% of your grade will be based on your individual project (40%) and several computer assignments (10%).
Individual Projects

While we are covering these topics in class and in the readings, you will each be responsible for an individual term project on an econometrics topic of interest to you. Your choice of topic may be related to the general areas described above, or another area in econometrics. Ideally your project should have both a theoretical or analytical component and an application, and the project should encompass a topic in econometrics that goes beyond what we cover in class, or the models and methods covered in 8828.

To make this assignment more concrete, an example of an appropriate project could involve allowing for structural breaks in tests of nonstationarity (unit roots). Although we will cover unit root testing in some depth, we will probably not cover this particular extension. There is a theoretical literature in which these tests are developed, and the analytical component of the project would present the statistical foundations behind these tests. Then the tests could be applied to one or more time series of interest as the applied component.

To assure that your project is appropriate, you should prepare a proposal describing (1) the econometric procedure you will investigate, (2) some key references to the relevant econometric theory, (3) the data set or model to which you plan to apply the procedure, and (4) the data sources. One or two pages should suffice for this proposal, and it should be submitted to me on or before Tuesday, September 17.

In keeping with the seminar format of the course, you will be asked to present your project to the class. I will schedule these presentations towards the end of the semester, possibly running into our scheduled final examination period. I would also like to meet with each of you individually before your presentation to discuss content, coverage, supplementary materials, etc. Your project, including the presentation, will count towards 40% of your course grade.

Computer Projects

To get some practical experience with some of the econometric methods discussed in the course, you will complete several computer projects using the TSP program that is on the Rastro computer. This version of TSP is considerably more powerful and flexible than MicroTSP that is available on our economics computer network. These projects are designed to acquaint you with the use of TSP and give you some experience applying the procedures that are discussed in class. You will be asked to submit relevant output and answers to exercises requiring some interpretation of the output. You are welcome to work in teams on these assignments as long as you let me know about such arrangements. These exercises will count towards 10% of your course grade.
Texts


Topics and Reading Assignments

I. Statistical Inference with Integrated Variables.
   A. Statistical foundations.
      BDGH, chapters 1, 3.
      Greene, pp. 549-563.
   B. Unit root tests.
      BDGH, chapter 4.
      Greene, pp. 563-566
   C. Mathematical representations of cointegrated systems.
      BDGH, chapter 5.
   D. Properties of regression estimators and test statistics in models with integrated variables.
      BDGH, chapter 6
D. Testing and Estimation of Cointegrating Relations.
   BDGH, chapter 7.

II. Nonlinear Models, Nonnormal Error Distributions.
   A. Nonlinear regression and optimization methods.
      Greene, Chapters 11, 12.
   B. Generalized Method of Moments.
      Greene, Sections 4.6; 9.5.3; 13.5
   C. Bootstrap procedure.

III. Simultaneous Equations Models
   A. Exogeneity.
      BDGH, Section 1.5.4
   B. Identification
      Greene, Sections 20.1 - 20.3.
   C. Estimation.
      Greene, Section 20.4
   D. Relation to time series models.
Additional References

Both of our texts contain numerous references to additional literature. In addition to these, the following references are included for further reading, with an emphasis on time series econometrics.


Handbook of Econometrics, volumes 1-4, Amsterdam: North Holland. Of particular relevance to our topics on time series are two chapters in volume 4: Chapter 46 by James Stock, "Unit Roots, Structural Breaks, and Trends" and Chapter 47 by Mark Watson, "Vector Autoregression and Cointegration." These chapters update earlier surveys of these topics with numerous references to theoretical and applied papers.
Harvey, Andrew, *Forecasting, Structural Time Series Models and the Kalman Filter*. Cambridge: Cambridge University Press (1989). Harvey promotes the use of state space models, estimated by the Kalman filter, as an approach to capturing stochastic trends and short term fluctuations characteristic of economic time series. This is an alternative to the Box-Jenkins and Dickey-Fuller approaches emphasized in the class.

*Journal of Economic Dynamics and Control* volume 12 (June-Sept. 1988) is a special issue containing some early and important papers on unit roots and cointegration.


*Oxford Bulletin of Economics and Statistics* volume 48 no. 3 (1986) is a special issue containing early papers on cointegration and error correction models. Volume 54, No. 3 (August 1992) is another special issue on Testing Integration and Cointegration.