Econometrics for Financial and Macroeconomic Time Series

Overview: The specification, estimation, diagnostic testing, and practical usage of dynamic models for economic and financial time series present a host of unique challenges, requiring the use of specialized statistical models and inference procedures. This course provides a selective overview of some of the most important of these approaches. The discussion will focus on the practical implementation of the different techniques, rather than formal proofs, including applications in both macroeconomics and asset pricing finance.

Requirements: I will assume that you have an understanding of econometrics and basic statistics at the level of first-year graduate econometrics, equivalent to Econ.703D and Econ.707D at Duke.

Class Schedule: Lectures will be held in Room 111, Tuesdays and Thursdays, 1:25-2:40pm.

Office Hours: My office hours are Wednesdays, 2:00-3:00pm in Room 313.

Webpage: http://www.econ.duke.edu/~boller/Econ.883

Evaluation: Your grade for the course will be based on an equal weighting of your performance on the final exam and four problem sets. Then final exam is scheduled for Monday, April 27, 9:00-11:00am. You are encouraged to work on the problem sets in groups of up to four people. If you do work in a group, each group should hand in only one solution to the assignment. I may also consider your participation in the classroom discussions when determining your final grade for the course.

Books: The main textbook for the course is:


This is a classic. It provides an exceptionally detailed and comprehensive discussion of the most important ideas in time series econometrics as of ~twenty years ago. Some of the discussion is a bit dated by now. It is a great general reference book, however.

In addition you might want to look at the more recent book:


This book offers a systematic framework for the specification, testing, and estimation of time series models. It strikes an excellent balance between formal theory, intuition, and actual
empirical applications, with an emphasis on maximum likelihood techniques. Parts of the book nicely complements many of my lectures. It also comes with a very comprehensive set of GAUSS, MATLAB and R routines.

Other classic and recent books pertaining to the statistical and econometric analysis of economic and financial time series include:


Andrew C. Harvey (1990). *Econometric Analysis of Time Series, 2nd Ed*. MIT Press. (Although this was first published more than two decades ago, it remains a good reference for many of the basic topics.)


**Course Outline and Readings:**

In addition to the relevant chapters in the book by Hamilton, we will also discuss several journal articles and Handbook chapters. In general, however, I will mostly rely on my own notes and interpretation.

1. **Univariate ARMA Models**

   Hamilton, Chapters 3, 4.

   Hamilton, Chapters 1, 2 (this is review material about difference equations and lag operators).

   Martin, Hurn and Harris, Chapter 13.

   Anderson, Chapters 5-7.
   Box and Jenkins, Chapters 1-9.
   Brockwell and Davis, Chapters 1, 3, 5, 7, and 9.
   Enders, Chapters 1, 2.
   Taylor, Chapter 3.
   Tsay, Chapters 2-3.

2. **MLE, QMLE and Estimation-by-Simulation**

   Hamilton, Chapter 5.

   Martin, Hurn and Harris, Chapters 1-2, 7, 9 and 12.


   Brockwell and Davis, Chapter 8.
   Harvey, Chapters 3-4.

3. **Hypothesis Testing and Model Selection**

   Hamilton, Chapter 5.

   Martin, Hurn and Harris, Chapter 4.


4. Spectral Analysis and Filtering

Hamilton, Chapter 6 and Sections 10.4-10.5.


Anderson, Chapters 8-9.
Brockwell and Davis, Chapters 4, 10, and Sections 11.6-11.8.
Priestley, Chapters 1, 4-11.

5. Vector Autoregressions

Hamilton, Sections 10.1-10.3 and Chapter 11.

Martin, Hurn and Harris, Chapters 14.


Enders, Chapter 5.
Gourieroux and Jasiak, Chapters 3, 4.
6. GMM

Hamilton, Chapter 14.
Martin, Hurn and Harris, Chapter 10.


7. Unit Roots

Hamilton, Chapters 15-18.

Martin, Hurn and Harris, Chapters 16-17.

Hamilton Chapter 7 (contains review material on standard asymptotic distribution theory for stationary processes).


8. Cointegration

Hamilton, Chapters 19-20.

Martin, Hurn and Harris, Chapter 18.


9. Long-Memory and Fractional Differencing


10. Volatility

Hamilton, Chapter 21.

Martin, Hurn and Harris, Chapter 20.


Jondeau, Poon and Rockinger, Chapters 4-6.
Gourieroux and Jasiak, Chapter 6.
Taylor, Chapters 8-12.
Tsay, Chapters 4-6.