Course Outline and Reading List

Empirical Methods for Dynamic Economic Models is a topics course on contemporary methods and issues in structural economics. In particular, this module will focus on the solution methods, estimation, and evaluation of dynamic models of the macroeconomy and individual markets.

The learning goals for the course are: 1) learn how to solve dynamic models using recursive methods; 2) learn how to estimate the structural parameters of dynamic models; 3) learn how to assess the goodness-of-fit of mis-specified models.

Since most of the models we will be working with do not have analytical solutions, the first part of the course will focus on computational methods. I will discuss solution techniques in class and provide Matlab code. Students will be required to use the computer to solve models and implement the solution and estimation methods presented in the course.

While we are going to work largely with Matlab in this course, you may wish to work in another computer language. Both python and Julia are popular programming languages for solving economic models. The web course http://quant-econ.net/ covers many of the same topics we will cover and uses these two languages. Below I refer to the material from this course.

One of the appealing aspects of dynamic structural models is the tight link these models provide between theory and estimation. The solution (or really the equilibrium) of these models are exactly the objects for which the econometrics is cast. The decision rules and the law of motions for the state variables are Markov processes, and these Markov processes imply ergodic distributions. Markov processes and ergodic distributions are objects econometricians are well set up to estimate.

Of course most dynamic models suffer from a paucity of shocks and general mis-specification. Furthermore it is often difficult if not impossible to fully characterize the likelihood function for these models. Hence this course will discuss a variety of methods for parameterizing and evaluating the goodness of fit of these models. We will discuss not only the consistency and efficiency of these methods, but their numerical implementation as well.
The primary textbooks for this course are:


In addition to these three texts, you may find it useful to have the following books close at hand:


We will focus on numerically implementing the methods discussed. Consequently much of the material will be presented in a more “cookbook” style than may be the case in other classes. As you progress in your use of these methods, you will want to move beyond these cookbook discussions; but hopefully this course will allow you make links between your economic theory and econometrics courses. Moreover this course is designed to have you enter your third-year of graduate school moving forward on a dissertation rather than spending time learning how to translate what you have learned in your course work onto the computer. You will probably find it useful to have on your bookshelf a good econometrics text at the level of


Class will meet on Tuesday and Thursday mornings from 9:30 to 10:50 in the Sachar Chancellor’s Suite.

Students are encouraged to ask questions in class or to stop by my office. My official office hours are Wednesdays 3-5. You may wish to send me an e-mail before showing up if you would like to meet outside that time. My contact information is:

George Hall
Lemberg 164
781-736-2242
ghall@brandeis.edu

Economics 302a and 304a are prerequisites for this course. Students who have take Econ 182a may take this course with permission.
There will be several homework assignments and a short research paper.

Success in this 4 credit hour course is based on the expectation that students will spend a minimum of 9 hours of study time per week in preparation for class (readings, papers, discussion sections, preparation for exams, etc.).

While you are encouraged to discuss the problems with others, you are expected to answer problems on your own. Resist the temptation to copy someone else’s answer. This is worse than useless as it is not only a violation of Brandeis University rules but also will lull you into a false sense that you understand the material. More generally, you are expected to be familiar with and to follow the University’s policies on academic integrity (see http://www.brandeis.edu/studentlife/sdc.ai). Instances of alleged dishonesty will be forwarded to the Department of Student Rights and Community Standards for possible referral to the Student Judicial System. Potential sanctions include failure in the course and suspension from the University.

If you are student with a documented disability on record at Brandeis University and wish to have a reasonable accommodation made for you in this class, please see Mr. Hall immediately.

The home page for this course is on the LATTE system. Announcements, problem sets, computer programs, and additional handouts will be posted on this page. You are encourage to check the web page regularly.

When writing a dissertation, you will find that your understanding of both current issues and methods will be bolstered by regularly attending the Research Seminar, the Faculty Brown Bag seminar, and the Ph.D. Workshop. You are strongly encouraged to attend all three.

The reading list provides neither a comprehensive list of methods nor a complete list of papers developing and using these methods. The list is designed to highlight some of the key papers and illustrate the methods used in a variety of settings.

1. Models and Solution Methods

(a) Discrete State Space Dynamic Programming
   Cooper and Adda, chapters 1, 2 and 3.
   Ljungqvist and Sargent, chapters 3 and 4.
   Sargent and Stachurski, section 2.13

(b) Incomplete Markets Models with Uninsurable Individual Risks
   Sargent and Stachurski, sections 3.3 and 3.7
Ljungqvist-Sargent, chapter 17, will be distributed in class


(c) The Life-cycle Model

(d) The Optimal Linear Regulator

Ljungqvist and Sargent, chapter 5.
Sargent and Stachurski, section 2.12

(e) Time Series Analysis

DeJong and Dave, chapters 3 and 4.
Ljungqvist and Sargent, chapter 2.
Sargent and Stachurski, sections 2.6, 3.8

2. Taking models to the data

(a) Calibration

DeJong and Dave, chapter 6.


(b) Maximum Likelihood

Adda and Cooper, chapter 4.
DeJong and Dave, chapter 8.
Sargent and Stachurski, section 2.8

(c) Generalized Method of Moments

Adda and Cooper, chapter 4.
DeJong and Dave, chapter 7.
(d) Indirect Inference

Adda and Cooper, chapter 4.

DeJong and Dave, chapter 7.


(e) Bayesian Approaches

DeJong and Dave, chapter 9.
