

Berkeley
Department of Economics

Spring Semester 2004
241a

Econometric Theory, First Half

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Office Hours: Thursday, 2.00–3.30pm and by appointment
Classes: Monday/Wednesday 4.00-5.30pm, 24 Evans Hall

This part of the course in theoretical econometrics focuses on nonlinear models. We discuss two broad topics, devoting approximately 7 lectures to each. For each topic there we discuss at least one empirical paper, using a particular set of techniques. We then discuss a number of more theoretical papers developing the tools that are used in the empirical paper. For example, in the first paper in the first topic, Lancaster uses maximum likelihood methods to estimate a particular model for unemployment durations. We then look at maximum likelihood estimation in general using the chapters from Ferguson. In addition we look at numerical methods for finding the maximum likelihood estimates such as the Newton–Raphson algorithm. Lancaster also argues that one of his initial models is misspecified in a particular way. We look at misspecification tests for this case and in general. Finally we look at the more general models employed by Lancaster and the use of the EM algorithm for finding the estimates for one of these more general model.

For both topics there there are a number of problem sets using real data sets and applying methods similar to those in the papers. They will all require analysis of data sets on computers. The recommended software package is Matlab, although students are free to use other packages such as Gauss. Grades for this half of the class will be based on a a midterm exam at the end of the first half of the class (40%) and the problem sets (two problem sets, each in three parts, 10% for each part, for a total of 60%).

Lectures and Sections

Each week there will be two lectures of 1 1/2 hours.

Books

The textbooks that will be used for part of the course are Amemiya, *Advanced Econometrics*, Harvard University Press, and Ferguson *A Course in Large Sample Theory*, Chapman and Hall. In addition there are a number of papers, most of which can be downloaded from JSTORE.

Course Outline1. Maximum Likelihood Methods

- (a) Duration Models and Computational Issues (Lancaster, 1979, Amemiya 4.4 11)
- (b) Consistency, Asymptotic Normality and Efficiency (Amemiya 4.1-4.3, Ferguson)
- (c) Classical Testing (Amemiya 4.5, Ferguson, Hausman)
- (d) Hausman-Wu Tests (Hausman)
- (e) Unobserved Heterogeneity, Mixture Models and the EM algorithm (Lancaster, 1979)
- (f) Information Matrix Tests (Lancaster, 1984)
- (g) Partial Likelihood (Cox)
- (h) Incidental Parameters (Neyman and Scott)

2. Generalized Method of Moments

- (a) Motivation (Abowd and Card)
- (b) Consistency and Asymptotic Normality (Hansen, Ferguson)
- (c) Semiparametric Efficiency Bounds (Chamberlain)
- (d) Empirical Likelihood, (Imbens, Spady and Johnson)
- (e) Choice-based Sampling (Coslett)
- (f) Clustering (Moulton)

References

1. LANCASTER, T., (1979), "Econometric Methods for the Analysis of Duration Data", *Econometrica*, Vol. 47.
2. HAUSMAN, J. (1978), "Specification Tests in Econometrics", *Econometrica*, Vol. 46.
3. LANCASTER, T., (1984), "The Covariance Matrix of the Information Matrix Test", *Econometrica*, Vol. 52, No. 4, 1051-1053.
4. COX, D. R. "Partial Likelihood," *Biometrika* Vol 62, 269–276, 1975
5. NEYMAN, J., AND B. SCOTT, (1948), "Consistent Estimation from Partially Consistent Observations," *Econometrica*, Vol 16, 1-32.
6. ABOWD, J. AND D. CARD, (1989), "On the Covariance Structure of Earnings and Hours Changes," *Econometrica*, Vol. 57, No 2, 441-445.
7. HANSEN, L.-P., (1982), "Large Sample Properties of Generalized Method of Moment Estimators" *Econometrica*, Vol 50, No 4, 1029–54.
8. CHAMBERLAIN, G., (1987), "Asymptotic Efficiency in Estimation with Conditional Moment Restrictions", *Journal of Econometrics* Vol 34, 305–334.
9. IMBENS, G., R. SPADY, AND P. JOHNSON, (1998), "Information Theoretic Approaches to Inference in Moment Condition Models", *Econometrica*, Vol. 66, No. 2, 333-357.
10. COSSLETT, S., (1983), "Maximum Likelihood Estimation for Choice-based Samples", *Econometrica*, vol 49, 1289–1316.
11. MOULTON, B. (1990), "An Illustration of the Pitfalls in Estimating the Effects of Aggregate Variables on Micro Units," *Review of Economics and Statistics*, Vol. 72, 334-338.