

Economics 8681 Syllabus

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Welcome to Economics 8681! This is a course intended for Ph.D. students interested in conducting research in empirical industrial organization. In the course, we will discuss estimation and applications of several broad classes of models:

1. Models of product differentiation.
2. Static games of Imperfect Competition.
3. Dynamic games of Imperfect competition.
4. Auctions.

Special attention will be paid to the most recent research in these areas so that students are exposed to papers on the research frontier. The main goal of this course is to provide students with a set of tools so that they can begin to write their own original research in empirical IO.

Requirements.

This class will be rather demanding. However, I hope you will find that the potential benefits exceed the cost.

1. The first, and most important requirement, is that you read the papers **before** attending class. The papers we will read will be challenging. You will internalize the concepts and models much more clearly if you spend time struggling with the material before class begins.
2. There will be 3 or 4 intensive exercises where students will implement the estimators discussed in class. The students should familiarize themselves with an appropriate software package (e.g. Matlab, Fortran, C, Gauss....) in order to program these exercises.

Grading.

Students will be graded on the problem sets listed above. Also, students will be graded based on class participation. There will be no in class exams. Students are encouraged to work together by discussing the papers and in implementing the estimators.

Reading List

1. Differentiated Products

- Ackerberg, Benkard, Berry and Pakes, "Econometric Tools for Analyzing Market Outcomes", in *The Handbook of Econometrics*, J. J. Heckman (ed.), 2007.
- Bajari, P. and Benkard, L. "Demand Estimation With Heterogeneous Consumers and Unobserved Product Characteristics: A Hedonic Approach, *Journal of Political Economy*, 113(6), 1239-1276 (2005).
- Bajari, P. and Kahn, M. "Estimating Housing Demand with an Application to Explaining Racial Segregation in Cities", *Journal of Business and Economic Statistics*, 23(1), 20-33 (2005).
- Bajari, P., Fox, J., Kim, K. and Ryan, S. "Discrete Choice Models with a Nonparametric Distribution of Random Coefficients", mimeo, University of Minnesota.
- Patrick Bayer, Fernando Ferreira, Robert McMillan, "A Unified Framework for Measuring Preferences for Schools and Neighborhoods," *Journal of Political Economy*, August 2007.
- Berry, S.T. "Estimating Discrete Choice Models of Product Differentiation", *RAND Journal of Economics* (25), Summer 1994, 242-62.
- Berry, S., J. Levinsohn, and A. Pakes, "Automobile Price in Market Equilibrium", *Econometrica* (63), July 1995.
- Bresnahan, T.F. "Empirical Studies with Market Power," *Handbook of Industrial Organization*, vol. II, chap. 17.
- Brett, C. Pinkse, J. and Slade, M. Spatial Price Competition: a Semiparametric Approach *Econometrica*, 70-3, 1111-1153. 2001.
- Bresnahan, T.F. "The Oligopoly Solution Concept is Identified," *Economics Letters*, vol. 10, pp. 87-92, 1982.
- Davis, P. Spatial Competition in Retail Markets: Movie Theatres, forthcoming, *RAND Journal of Economics*.
- Hausman, Jerry, Gregory, Leonard and J. Douglas Zona. "Competitive Analysis with Differentiated Products." *Annales d'Economie et de Statistique* (34) 159-80, 1987.
- Leslie, P. "Price Discrimination in a Broadway Theatre", forthcoming in the *RAND Journal of Economics*.
- McCulloch, R. and Rossi, P. "Bayesian Analysis of the Multinomial Probit Model" (with R. McCulloch), *Simulation Methods in Econometrics* (2000) (Cambridge University Press).
- McManus, B. "Nonlinear Pricing in an Oligopoly Market: the Case of Specialty Coffee", Washington University St. Louis Working Paper.
- Nevo, A "A Practitioner's Guide to Estimation of Random Coefficients Logit Models of Demand," *Journal of Economics & Management Strategy*, 9(4), 513-548, 2000.
- Nevo, A. "Measuring Market Power in the Ready-to-Eat Cereal Industry," *Econometrica*, 69(2), 307-342, 2001.
- Petrin, A. "Quantifying the Benefits of New Products: The Case of the Minivan," *Journal of Political Economy*, 110:705-729, 2002.
- Petrin, A. and Goolsbee, A. "The Consumer Gains from Direct Broadcast Satellites and the Competition with Cable TV", forthcoming, *Econometrica*.
- Petrin, A and Train, K. "Control Function Corrections for Omitted Attributes in Differentiated Product Markets," Minnesota and Berkeley Working Paper.
- Rossi, P, Allenby, G and McCulloch, R, "Bayesian Statistics and Marketing", John Wiley and Sons, December 2005
- Train, K. *Discrete Choice Methods with Simulation*, Cambridge University Press, 2003.

III. Static Games.

- Akerberg, D. and Gowrisankaran, G. "Quantifying Equilibrium Network Externalities in the ACH Banking Industry," December 2002, Working Paper, Wash U. St. Louis.
- Aradillas-Lopez, A. and Tamer, E. "The Identification Power of Equilibrium in Games", Northwestern Working Paper.
- Bajari, P., Hong, H. and Ryan, S. "Identification and Estimation of Discrete Games of Complete Information", NBER Working Paper.
- Bajari, P., Hong, H., Krainer, J. and Nekipelov, D. "Estimating Static Models of Strategic Interactions", NBER working paper.
- Bayer, P. and Timmins, C. A Note on the Equilibrium Properties of Locational Sorting Models," mimeo, Yale University.
- Berry, S., "Estimation of a Model of Entry in the Airline Industry," *Econometrica*, 60 (July 1992), 889-918
- Bresnahan, T.F. and P.C. Reiss (1991), "Empirical Models of Discrete Games", *Journal of Econometrics* 48(1-2):57-81.
- Bresnahan, T. and P. Reiss, "Entry and Competition in Concentrated Markets," *Journal of Political Economy*, 99 (October 1991), 977-1009.
- Brock, W. and Durlorf, S. "Discrete Choice with Social Interactions", *The Review of Economic Studies*, Apr 2001.
- Brock, W. and Durlorf, S. "Multinomial Choice with Social Interactions", Wisconsin Working Paper.
- Ciliberto, F. and Tamer, E. "Market Structure and Multiple Equilibrium in Airline Markets", Working Paper, Princeton and NC State.
- Haile, P., Hortacsu, A., and Kosenok, G. "On the Empirical Content of Quantal Response Equilibrium Models", University of Chicago Working Paper.
- McKelvy, R. and Palfrey, T. "Quantal Response Equilibrium for Normal Form Games", *Games and Economic Behavior* 10 (July 1995): 6-38.
- Pakes, A., Porter, J., Ho, K. and Ishi, J. "Moment Inequalities and Their Application", Harvard Working Paper.
- Seim, K. "An Empirical Model of Firm Entry with Endogenous Product-Type Choices." Working Paper, Stanford GSB.
- Tamer, E. T. "Incomplete Bivariate Discrete Response Model with Multiple Equilibria," *Review of Economic Studies*, 70, 147-167.

IV. Dynamic Games.

- Aguirregabiria, V. and Mira, P., "Sequential Simulated-Based Estimation of Dynamic Discrete Games", *Econometrica*, 75, 1-53.
- Aguirregabiria, V. and Mira, P., "Swapping the Nested Fixed Point Algorithm: A Class of Estimators for Discrete Markov Decision Models", *Econometrica*, 70 (July 2002), 1519-1543.
- Bajari, P. Benkard, C.L. and Levin, J.D. Estimating Dynamic Games of Incomplete Information. , *Econometrica*, 75, 1331-1370.
- Bajari, P., Chernozhukov, V., Hong, H., and Nekipelov, D. "Semiparametric Estimation of a Dynamic Game of Incomplete Information", University of Minnesota Working Paper.
- Benkard, Lanier. "Dynamic Equilibrium in the Commercial Aircraft Market." Forthcoming, *Review of Economic Studies*.
- Berry, S. and Pakes, A. "Estimation From the Optimality Conditions for Dynamic Controls", Working Paper, Yale University.
- Berry, S. Ovstrovsky, M. and Pakes, A. "Simple Estimators for the Parameters of Dynamic Discrete Games", Working Paper, Harvard University.

Doraszelki, U. and Pakes, A., "A Framework for Applied Dynamic Analysis in IO", forthcoming Handbook of IO Volume 3.

Dube, J.P., Hitsch, G. and Rossi, P.E., "Do Switching Costs Make Markets Less Competitive?", University of Chicago GSB Working Paper. Ericson, R. and A. Pakes, "Markov-Perfect Industry Dynamics: A Framework for Empirical Work," *Review of Economic Studies* (1995), 53-82.

Gowrisankaran, G. "Dynamic Equilibrium in the Hospital Industry," Mimeo, University of Minnesota.

Hopenhayn, Hugo, "Entry, Exit and Firm dynamics in Long-run Equilibrium," *Econometrica* (60), 1127-50.

Jovanovic, B., "Selection and the Evolution of Industry," *Econometrica* (50), May 1982, 649-70.

Jofre-Bonet, M. and Pesendorfer, M. "Estimation of a Dynamic Auction Game", *Econometrica*, forthcoming.

Hollifield, B., Miller, R. and Sandas, P. "An Empirical Analysis of Limit Order Markets", forthcoming, *Review of Economics Studies*.

Hotz, V. and Miller, R. "Conditional Choice Probabilities and the Estimation of Dynamic Models", *Review of Economic Studies*, 60, 397-429.

Judd and Su (2007), A New Optimization Approach to Maximum Likelihood Estimation of Structural Models, Stanford University Working Paper.

Kasahara, H. and Shimotsu, K., "Nonparametric Identification of Finite Mixture Models of Dynamic Discrete Choices", University of Western Ontario Working Paper.

Keane, M. and Wolpin, K. "The Career Decisions of Young Men", *Journal of Political Economy*, 105:3, 473-522.

Olley, S. and A. Pakes, "The Dynamics of Productivity in the Telecommunications Equipment Industry," *EMA*, November 1996.

Pakes, A. "A Framework for Dynamic Analysis in I.O.," Mimeo Yale University.

Pakes, A. and McGuire, P. "Stochastic Algorithms, Symmetric Markov-Perfect Equilibria, and the 'Curse' of Dimensionality," *Econometrica*, Vol. 69 (5). pp.1261-81.

Pakes, A. and P. McGuire, "Computing Markov-Perfect Nash Equilibrium: Empirical Implications of a Dynamic Model." *RAND Journal of Economics* (1994) 555-589.

Pakes, A., Ostrovsky, T., and S. Berry, Simple Estimators for the Parameters of Discrete Dynamic Games (with Entry/Exit Examples), forthcoming, *RAND Journal of Economics*.

Pesendorfer, M. and Schmidt-Dengler, P. "Identification and Estimation of a Dynamic Game", working Paper, London School of Economics.

Rust, J. "Structural Estimation of Markov Decision Processes", Handbook of Econometrics, Volume IV.

Ryan, S. (2005), "The Costs of Environmental Regulation in a Concentrated Industry," mimeo, MIT.

Ryan, S. and Tucker, C. "Heterogeneity and the Dynamics of Technology Adoption", MIT Working Paper.

V. Auctions

Athey, S. and J. Levin, "Information and Competition in U.S. Forest Service Timber Auctions," *Journal of Political Economy*, 109 (2), April 2001: 375-417.

Bajari, P. and L. Ye, "Deciding Between Competition and Collusion," *Review of Economics and Statistics*, November 2003.

Bajari, P. and A. Hortacsu, "Winner's Curse, Reserve Prices, and Endogenous Entry: Empirical Insights from Ebay Auctions," *RAND Journal of Economics*, Summer 2003.

- Bajari, P. and Hortacsu, A. "Are Structural Estimates of Auction Models Reasonable? Evidence from Experimental Data", *Journal of Political Economy*, 113(4), 703-741 (2005).
- Guerre, E., I. Perrigne, and Q. Vuong, "Optimal Nonparametric Estimation of First-Price Auctions," *Econometrica* 68 (3), May 2000, 525-74.
- Haile, P. and Tamer, E. "Inference with an Incomplete Model of English Auctions", *Journal of Political Economy*, 111:1, 1-51.
- Hendricks and Porter, "Lectures on Auctions: An Empirical Perspective" in M. Armstrong and R. Porter, eds., *Handbook of Industrial Organization*, Vol. 3.
- Hendricks, K., Pinkse, J. and Porter, R. "Empirical Implications of Equilibrium Bidding in First Price Common Value Auctions, *Review of Economic Studies* 70-1, 242, pp. 115-146.
- Hong, H. and Shum, M. "Increasing Competition and the Winner's Curse: Evidence from Procurement", *Review of Economic Studies*, 69 (4), pp 871-898.
- Hortacsu, A. "Mechanism Choice and Strategic Bidding in Divisible Good Auctions: An Empirical Analysis of the Turkish Treasury Auction Market", Working Paper, University of Chicago.
- Hortacsu, A. "Bidding Behavior in Divisible Good Auctions: Theory and Evidence from the Turkish Treasury Auction Market", University of Chicago Working Paper.
- Li, T., I. Perrigne and Q. Vuong, "Conditionally Independent Private Information in OCS Wildcat Auctions," *Journal of Econometrics* 98 (1), September 2000, 129-61.
- Paarsch, H.J. (1992) "Deciding Between the Common and Private Values Paradigms in Empirical Models of Auctions", *Journal of Econometrics* 51(1-2):191-216.
- Pesendorfer, M. and M. Jofre-Benet, "Bidding Behavior in a Repeated Procurement Auction," Mimeo, Yale, 2000.
- Porter, R., "The Role of Information in U.S. Offshore Oil and Gas Lease Auctions," *Econometrica*, 63 (January 1995), pp. 1-27.