ECO 2404
EMPIRICAL APPLICATIONS OF ECONOMIC THEORY

University of Toronto. Department of Economics. Spring 2011

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Office: 150 St. George St., Room 308

Office hours: Wed 11.00am-12:00pm or by appointment
Lecture: Wed 9.10am-11.00am. Room GE100

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Office hours: TBA
Lecture: Wed 9.10am-11.00am. Room GE100

COURSE DESPRIPTION

This course covers methods and applications in economic theory. This year we will focus on topics and structural econometric methods that are at the core of the new empirical industrial organization. We have divided the course into two parts. The first part of the course will last six weeks and will be taught by Professor Serrano. This part will focus on the estimation of estimation of demand, the estimation of production functions, and the estimation of single agent finite horizon decision problem). The second part of the course will last six weeks and will be taught by Professor Junichi Suzuki. This second part will focus on the estimation of single-agent infinite horizon decision problem and the estimation of static games.

The course will emphasize the interactions between economic theory and empirical methods rather than focusing just on the statistical analysis. There will be no text book, the course will be based on published and working papers. We have organized the course in five parts (see main references below). We expect you to participate in the class discussion of these papers.

LECTURES

There will be two hours of lectures every week. Wed 9.10am-11.00am. Room GE100

COMPUTATION

Both MA and PhD students must be familiar with statistical packages like Stata or SAS as well as some basic computer programming (or be prepared learn it during the semester).

There will be teaching assistant who will provide an introduction to Matlab. The introduction will go over from topics such as how to start with Matlab to value function iteration.

If you plan to apply for a PhD and are interested in empirical work, then you should seriously consider learning a computational language as soon as possible.

EVALUATION

The final exam grade will be based on four problem sets and a final exam. Problem sets: 50%, final exam 50%. Students are strongly encouraged to collaborate on problem sets. However, students should write the final answer to the problem sets on their own, and submit them individually. Students must acknowledge the help of classmates and others by citing their names in the problem sets. Problem sets submitted within one 24h after the deadline will receive 50% of the points. Problem sets submitted 24h after the deadline or more will receive zero points.

CONTENTS OF THE COURSE

1. Estimation of demand and supply functions / differentiated products. Instrumental variables and the role of simulation (2 weeks)

2. Estimation of production functions. Simultaneity and endogenous firm exit (2 weeks)

3. Estimation of single agents' finite horizon decision problems and simulation methods (2 weeks)

4. Estimation of single agents' infinite horizon decision problems and simulation methods (3 weeks)

5. Estimation of static games (3 weeks)

References

Surveys

• [ABBA] D. Ackerberg, L. Benkard, S. Berry and A. Pakes, "Econometric Tools for analyzing Market Outcomes," forthcoming in *Handbook of Econometrics*, Volume 6. Available at http://www.stanford.edu/~lanierb/research/tools8l-6-8.pdf .

• [RW] Reiss, Peter, and Wolak, Frank (2006): "Structural Econometric Modeling: Rationales and Examples from Industrial Organization," *Handbook of Econometrics*, volume 6, forthcoming. Available at http://www.stanford.edu/~preiss/makeit.pdf

1. Demand and Supply Estimation / Differentiated Products

1.1. Introduction: Empirical questions and econometric issues
• * [ABBA] Section 1
• * [RW]. Sections 5 to 7.
• Angrist, Josh, Graddy, Kathryn, and Imbens, Guido (2000): "The Interpretation of Instrumental Variables Estimators in Simultaneous Equations Models with an Application to the Demand for Fish," *Review of Economic Studies*, 67, 3, 499-527.
• Hausman, Jerry, G. Leonard, and J. Zona (1994): "Competitive Analysis with Differentiated Products," *Annales D'Economie et de Statistique,* 34, 159-180.

1.2. Models in characteristics space with heterogeneous agents
• Anderson, S., A. de Palma, and J.-F. Thisse (1992): "Discrete choice theory of product differentiation", Cambridge, MA. MIT Press. Chapter 7.
• Berry, S., (1994), "Estimating Discrete Choice Models of Product Differentiation", RAND, vol. 25, no. 2, pp. 242-262.

1.3. Simulation-based estimation
• Hajivassiliou, V. and P. Ruud (1994): "Classical Estimation Methods for LDV Models Using Simulation," in R. Engle and D. McFadden (eds.), Handbook of Econometrics, vol. 4. North-Holland.
• McFadden, D. and K. Train (2000): "Mixed MNL models for discrete response," *Journal of Applied Econometrics*, 15, 447-470.
• Nevo, Aviv (2000): "A Practitioners Guide to Estimation of Random Coefficients Logit Models of Demand," *Journal of Economics & Management Strategy*, 9(4), 513-548.
• Train, K. (2003): "Discrete Choice Methods with Simulation," Cambridge University Press.

1.4. Applications to static models with aggregate data
• Berry, S., J. Levinsohn, and A. Pakes (1995): "Automobile Prices in Market Equilibrium," *Econometrica*, 63(4), 841-890.
• Bresnahan, T. (1987): "Competition and Collusion in the American Auto Industry:

The 1955 Price War," *Journal of Industrial Economics*, 35, 457-482.
• Bresnahan, T., S. Stern and M. Trajtenberg (1997): "Market Segmentation and the Sources of Rents from Innovation: Personal Computers in the Late 1980s." *The Rand Journal of Economics*, 28, S17-S44.
• Nevo, A. (2001): "Measuring Market Power in the Ready-to-Eat Cereal Industry," *Econometrica*, 69(2).
• Petrin, A. and K. Train (2005). Control function corrections for omitted attributes in differentiated product models. wp, University of Chicago.

1.5. Applications to static models with consumer level data
• Allenby, G. and P. Rossi (1998): "Marketing models of consumer heterogeneity," Journal of Econometrics, 89(1).
• Berry, S., J. Levinsohn, and A. Pakes, (2003): "Differentiated Product Demand Systems From a Combination of Micro and Macro Data: The New Car Market", Harvard University working paper.

1.6. New goods
• Bresnahan, Timothy F. and Robert J. Gordon, eds., 1997, The Economics of New Goods, Chicago, Il: University of Chicago Press.
• Hausman, J. A. (1994). Valuation of new goods under perfect and imperfect competition. NBER wp 4970.
• Petrin, Amil. 2002. Quantifying the Benefits of New Products: The Case of Minivans, *Journal of Political Economy*, 110(4), 705-727.
• * Trajtenberg, Manuel (1989): "The Welfare Analysis of Product Innovations, with an Application to Computed Tomography Scanners," Journal of Political Economy, 97, 2, 444-79.

2. Production Function Estimation

2.1 Introduction
• [ABBA]. Section 2.
• Griliches, Zvi, and Jacques Mairesse (1995): "Production Functions: The Search for Identification," NBER Working Paper No. 5067. http://www.nber.org/papers/W5067
• Marschak, Jacob, and William Andrews (1944) "Random Simultaneous Equations and the Theory of Production," *Econometrica*, 12, 3/4, 143-205. See Also Marschak and Andrews, 1945, Errata, 13,1, 91.

2.2. Using lagged inputs as instruments
• Blundell, R. and S. Bond (1999): "GMM estimation with persistent panel data: An application to production functions," The Institute for Fiscal Studies. Working Paper Series No. W99/4. http://www.ifs.org.uk/wps/wp9904.pdf
• Bond, S., and M. Söderbom (2004): "Adjustment costs and the identification of Cobb Douglas production functions," Manuscript, Institute for Fiscal Studies, London.

2.3. Control function approach
• Ackerberg, D., K. Caves and G. Frazer (2003): "Structural Identification of Production Functions," manuscript.
• Levinsohn, J. and A. Petrin (2003): "Estimating production functions using inputs to control for unobservables," Review of Economic Studies, pp. 317-342.
http://www.nber.org/papers/w7819.pdf
• * Olley, S., and A. Pakes (1996), "The dynamics of productivity in the telecommunications equipment industry", *Econometrica*, 64, 1263-97.

3. Estimation of Single Agent Decision Problems (finite horizon)

• Rust, J. (1987). "Optimal Replacement of GMC Bus Engines: An Empirical Model of Harold Zurcher," *Econometrica*
• Pakes, A. and Schankerman (1986). "Estimates of the Value of Patent Rights in European Countries During the Post-1950 Period." *The Economic Journal*, Vol. 96: No. 384, pp. 1052-1076.
• Pakes, A. (1986). "Patents as Options: Some Estimates of the Value of Holding European Patent Stocks." *Econometrica*, Vol. 54, No. 4.
• Serrano, C. (2010), "The Market for Intellectual Property: Evidence from the Transfer of Patents", Working Paper, University of Toronto.

4. Estimation of Single Agent Decision Problems (infinite horizon)

• Aguirregabiria, V. and Mira, P., (2010), "Dynamic discrete choice structural models: A survey", *Journal of Econometrics*, Vol. 156(1): 38-67
• Arcidiacono, P. and Miller, R., (2010), "CCP Estimation of Dynamic Discrete Choice Models with Unobserved heterogeneity", Duke University Working Paper.
•Hendel, I. and Nevo, A. (1994). "Measuring the Implications of Sales and Consumer Inventory Behavior", *Econometrica* Vol. 74 (6): 1637-1673.
•Hotz, V.J. and Miller, R.A. (1993). "Conditional Choice Probabilities and the Estimation of Dynamic Models", *Review of Economic Studies* Vol. 60 (3): 497-529.
•Hotz, V.J., Miller, R.A., Sanders S. and Smith, J. (1994). "A Simulation Estimator for Dynamic Models of Discrete Choice", *Review of Economic Studies* Vol. 61 (2): 265-289.
•Imai, S., Jain, N. and Ching, A. (2009). "Bayesian Estimation of Dynamic Discrete Choice Models", *Econometrica* Vol. 77 (6): 1865-1899.
•Murphy, A. (2010). "A Dynamic Model of Housing Supply", Washington Univeristy in St. Louis Working Paper.
• Rust, J. (1994). "Structural Estimation of Markov Decision Processes" in *Handbook of Econometrics,* Volume IV, Ch 51: 3081-3143. Elsevier.
• Rust, J. (1987). "Optimal Replacement of GMC Bus Engines: An Empirical Model of Harold Zurcher," *Econometrica*
• Rust, J. (1994). "Structural Estimation of Markov Decision Processes" in *Handbook of Econometrics,* Volume IV, Ch 51: 3081-3143. Elsevier.

5. Estimation of Static Games

• Bajari, P., Hong, H., Krainer, J. and Nekipelov, D. (2010). "Estimating Static Models of Strategic Interaction", *Journal of Business and Economic Statistics,* 28 (4), 469-482.
• Bajari, P., Hong, H. and Ryan, S. (2010). "Identification and Estimation of a Discrete Game of Complete Information", *Econometrica,* 78 (5), 1529-1568.
• Berry, S. (1992). "Estimation of a Model of Entry in the Airline Industry", *Econometrica,* 60 (4), 889-917.
• Berry, S. and Reiss, P. (2006). "Empirical Models of Entry and Market Structure," in *Handbook of Industrial Organization*, Volume III, 1845-1886. Elsevier.
• Bresnahan, T.F. and Reiss, P. (1990). "Entry in Monopoly Markets", *Review of Economic Studies*, 57: 531-553.
• Bresnahan, T.F. and Reiss, P. (1991a). "Empirical Models of Discrete Game", *Journal of Econometrics*, 48: 57-81.
• Bresnahan, T.F. and Reiss, P. (1991b). "Entry and Competition in Concentrated Markets", *Journal of Political Economy*, 99(5): 977-1009.
• Ciliberto, F., and Tamer, E. (2009). "Market Structure and Multiple Equilibria in the Airline Industry", *Econometrica*, 77(6): 1791-1828.
•Ellickson, P. and Misra, S. (2008). "Supermarket Pricing Strategies", *Marketing Science*, 27(5): 811-828.
• Einav, L. and J. Levin (2010) "Empirical industrial organization: A progress report". *Journal of Economic Perspectives* 24 (2), 145-162.
• Jia, P. (2008) "What Happens When Wal-Mart Comes to Town: An Empirical Analysis of the Discount Industry". *Econometrica* 76 (4), 679-725.
• Mazzeo, M. (2002) "Product Choice and Oligopoly Market Structure". *Rand Journal of Economics* 33 (2), 1-22.
• Seim, K. (2010) "An Empirical Model of Firm Entry with Endogenous Product-Type Choices". *Rand Journal of Economics* 37 (3), 619-640.
• Sweeting, A. (2009) "Coordination Games, Multiple Equilibria and the Timing of Radio Commericials". *Rand Journal of Economics* 40 (4).
• Tamer (2003) "Incomplete Simultaneous Discrete Response Model with Multiple Equilibria". *Review of Economic Studies* 70: 147-165.