Empirical Industrial Organization II
Syllabus

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Winter 2015

Course Overview

This is a second course in empirical industrial organization. The material is essential for students planning to do research in empirical IO, and it will also be useful to any students interested in understanding, evaluating, and designing structural estimation strategies.

Last semester, Prof Dubois covered demand and auctions. This semester, we will cover industry dynamics and productivity, dynamic discrete choice models, entry models, moment inequalities, and collusion. We will read a mix of both methodological and applied papers, and some topics will involve a little theory.

Time and Location

The course meets on Thursdays, 9:30-12:30 in MD 104.

Course requirements

Grades will be based on two problem sets and in-class participation.

Both problems sets will be due towards the end of the semester (date TBA). *Do not* leave them to the last minute.

It can be very hard to understand structural estimation papers well without some learning by doing, so problem sets are very important.

Problem sets may be done in pairs.

Reading List

Broader references

There is no standard comprehensive reference for graduate-level empirical IO. The following references are useful although imcomplete:

Ackerberg, Daniel A. et al. (2007). "Econometric Tools for Analyzing Market Outcomes". *Handbook of Econometrics* 6, pp. 4171–4276.

Aguirregabiria, Victor (2012). *Empirical Industrial Organization: Models, Methods and Applications.* URL: http://www.academia.edu/2816069/Empirical_Industrial_Organization_Models_Methods_and_Applications.

Industry dynamics and productivity: facts and theory

Bartelsman, Eric J. and Mark Doms (2000). "Understanding Productivity: Lessons from Longitudinal Microdata". English. *Journal of Economic Literature* 38.3, pp. 569–594. ISSN: 00220515. URL: http://www.jstor.org/stable/2565420.

Dunne, Timothy, Mark J. Roberts, and Larry Samuelson (1989). "The Growth and Failure of U. S. Manufacturing Plants". *The Quarterly Journal of Economics* 104.4, pp. 671–698. DOI: 10.2307/2937862. eprint: http://qje.oxfordjournals.org/content/104/4/671.full.pdf+html. URL: http://qje.oxfordjournals.org/content/104/4/671.abstract.

Hopenhayn, Hugo A. (1992). "Entry, Exit, and firm Dynamics in Long Run Equilibrium". English. *Econometrica* 60.5, pp. 1127–1150. ISSN: 00129682. URL: http://www.jstor.org/stable/2951541.

Jovanovic, Boyan (1982). "Selection and the Evolution of Industry". English. *Econometrica* 50.3, pp. 649–670. ISSN: 00129682. URL: http://www.jstor.org/stable/1912606.

Melitz, Marc J. (2003). "The Impact of Trade on Intra-Industry Reallocations and Aggregate Industry Productivity". *Econometrica* 71.6, pp. 1695–1725. ISSN: 1468-0262. DOI: 10.1111/1468-0262.00467. URL: http://dx.doi.org/10.1111/1468-0262.00467.

Industry dynamics and productivity: methods

Ackerberg, Daniel A., C. Lanier Benkard, et al. (2007). "Econometric Tools for Analyzing Market Outcomes". *Handbook of Econometrics* 6, pp. 4171–4276.

Ackerberg, Daniel A., Kevin Caves, and Garth Frazer (2006). "Structural Identification of Production Functions". Working paper.

Blundell, Richard and Stephen Bond (2000). "GMM estimation with persistent panel data: an application to production functions". *Econometric reviews* 19.3, pp. 321–340.

Gandhi, Amit, Salvador Navarro, and David Rivers (2013). "On the Identifcation of Production Functions: How Heterogeneous is Productivity?" Working Paper.

Griliches, Zvi and Jacques Mairesse (1998). "Production Functions: The Search for Identification". In: *Econometrics and Economic Theory in the 20th Century: The Ragnar Frisch Centennial Symposium.* Vol. 31. Cambridge University Press, p. 169.

Levinsohn, James and Amil Petrin (2003). "Estimating Production Functions Using Inputs to Control for Unobservables". *Review of Economic Studies* 70.2, pp. 317–341.

Marschak, Jacob and Jr. Andrews William H. (1944). "Random Simultaneous Equations and the Theory of Production". English. *Econometrica* 12.3/4, pp. 143–205. ISSN: 00129682. URL: http://www.jstor.org/stable/1905432.

Olley, G. Steven and Ariel Pakes (1996). "The Dynamics of Productivity in the Telecommunications Industry". *Econometrica* 64.6, pp. 1263–1297.

Industry dynamics and productivity: applications

Collard-Wexler, Allan and Jan De Loecker (2015). *Reallocation and Technology: Evidence from the US Steel Industry.* Tech. rep. 1, pp. 131–71. DOI: 10.1257/aer.20130090. URL: http://www.aeaweb.org/articles.php?doi=10.1257/aer.20130090.

De Loecker, Jan (2011). "Product differentiation, multiproduct firms, and estimating the impact of trade liberalization on productivity". *Econometrica* 79.5, pp. 1407–1451.

Doraszelski, Ulrich and Jordi Jaumandreu (2013). "R&D and productivity: Estimating endogenous productivity". *The Review of Economic Studies* 80.4, pp. 1338–1383.

Foster, Lucia, John Haltiwanger, and Chad Syverson (2008). "Reallocation, Firm Turnover, and Efficiency: Selection on Productivity or Profitability?" *American Economic Review* 98.1, pp. 394–425.

Nerlove, Marc (1963). "Returns to Scale in Electricity Supply". In: *Measurement in Economics-Studies in Mathematical Economics and Econometrics in Memory of Yehuda Grunfeld.* Stanford University Press.

Pavcnik, Nina (2002). "Trade liberalization, exit, and productivity improvements: Evidence from Chilean plants". *The Review of Economic Studies* 69.1, pp. 245–276.

Syverson, Chad (2004). "Market Structure and Productivity: A Concrete Example". *Journal of Political Economy* 112.6, pp. 1181–1222.

Auction estimation

Guerre, Emmanuel, Isabelle Perrigne, and Quang Vuong (2000). "Optimal Nonparametric Estimation of First-Price Auctions". *Econometrica* 68.3, pp. 525–574.

Haile, Philip A and Elie Tamer (2003). "Inference with an incomplete model of English auctions". *Journal of Political Economy* 111.1, pp. 1–51.

Laffont, Jean-Jacques, Herve Ossard, and Quang Vuong (1995). "Econometrics of first-price auctions". *Econometrica: Journal of the Econometric Society*, pp. 953–980.

Market power: collusion and cartels

Asker, John (2010). "A Study of the Internal Organization of a Bidding Cartel". English. *The American Economic Review* 100.3, pp. 724–762. ISSN: 00028282. URL: http://www.jstor.org/stable/27871229.

Clark, Robert and Jean-François Houde (2013). "Collusion with asymmetric retailers: Evidence from a gasoline price-fixing case". *American Economic Journal: Microeconomics* 5.3, pp. 97–123.

Ellison, Glenn (1994). "Theories of cartel stability and the joint executive committee". *The Rand journal of economics*, pp. 37–57.

Fershtman, Chaim and Ariel Pakes (1999). "A dynamic oligopoly with collusion and price wars".

Genesove, David and Wallace P Mullin (2001). "Rules, Communication, and Collusion: Narrative Evidence from the Sugar Institute Case". *American Economic Review* 91.3, pp. 379–398.

Green, Edward J and Robert H Porter (1984). "Noncooperative collusion under imperfect price information". *Econometrica: Journal of the Econometric Society*, pp. 87–100.

Porter, Robert H (1983). "A study of cartel stability: The Joint Executive Committee, 1880-1886". *The Bell Journal of Economics*, pp. 301–314.

Rotemberg, Julio J and Garth Saloner (1986). "A supergame-theoretic model of price wars during booms". *The American Economic Review* 76.3, pp. 390–407.

Stigler, George J (1964). "A theory of oligopoly". *The Journal of Political Economy*, pp. 44–61.

Market power: identification

Albæk, Svend, Peter Møllgaard, and Per B. Overgaard (1997). "Government-Assisted Oligopoly Coordination? A Concrete Case". English. *The Journal of Industrial Economics* 45.4, pp. 429–443. ISSN: 00221821. URL: http://www.jstor.org/stable/2950610.

Bresnahan, Timothy F (1982). "The oligopoly solution concept is identified". *Economics Letters* 10.1, pp. 87–92.

– (1987). "Competition and collusion in the American automobile industry: The 1955 price war". *The Journal of Industrial Economics*, pp. 457–482.

– (1989). "Empirical studies of industries with market power". *Handbook of industrial organization* 2, pp. 1011–1057.

De Loecker, Jan and Frederic Warzynski (2012). "Markups and Firm-Level Export Status". *American Economic Review* 102.6, pp. 2437–71. DOI: 10.1257/aer.102.6.2437. URL: http://www.aeaweb.org/articles.php?doi=10.1257/aer.102.6.2437.

Genesove, David and Wallace P. Mullin (1998). "Testing Static Oligopoly Models: Conduct and Cost in the Sugar Industry, 1890-1914". *The RAND Journal of Economics* 29.2, pp. 355–377. ISSN: 07416261. URL: http://www.jstor.org/stable/2555893.

Porter, Robert H. and J. Douglas Zona (1999). "Ohio School Milk Markets: An Analysis of Bidding". English. *The RAND Journal of Economics* 30.2, pp. 263–288. ISSN: 07416261. URL: http://www.jstor.org/stable/2556080.

Mergers

Benkard, C Lanier, Aaron Bodoh-Creed, and John Lazarev (2010). "Simulating the dynamic effects of horizontal mergers: Us airlines". *Manuscript, Yale University.*

Farrell, Joseph and Carl Shapiro (2010). "Antitrust evaluation of horizontal mergers: An economic alternative to market definition". *The BE Journal of Theoretical Economics* 10.1.

Jaffe, Sonia and E. Glen Weyl (2013). "The First-Order Approach to Merger Analysis". *American Economic Journal: Microeconomics* 5.4, pp. 188–218. DOI: 10.1257/mic.5.4.188. URL: http://www.aeaweb.org/articles.php?doi=10.1257/mic.5.4.188.

Miller, Nathan H. et al. (2013). "On the First Order Approximation of Counterfactual Price Effects in Oligopoly Models". *Working Paper.* URL: http://www.nathanhmiller.org/MRRS-2013.08.21.pdf.

Dynamics: single-agent models

Chan, Tat Y., Barton H. Hamilton, and Nicholas W. Papageorge (2015). "Health, Risky Behavior and the Value of Medical Innovation for Infectious Disease". Working Paper.

Pakes, Ariel (1986). "Patents as options: Some estimates of the value of holding European patent stocks".

Rust, John (1987). "Optimal Replacement of GMC Bus Engines: an Empirical Model of Harold Zurcher". *Econometrica* 55.5, pp. 999–1033.

Dynamic estimation: methods and identification

Aguirregabiria, Victor and Pedro Mira (2002). "Swapping the Nested Fixed Point Algorithm: A Class of Estimators for Discrete Markov Decision Models". *Econometrica* 70.4, pp. 1519–1543. ISSN: 1468-0262. DOI: 10.1111/1468-0262.00340. URL: http://dx.doi.org/10.1111/1468-0262.00340.

– (2007). "Sequential Estimation of Dynamic Discrete Games". *Econometrica* 75.1, pp. 1–53. ISSN: 1468-0262. DOI: 10.1111/j.1468-0262.2007.00731.x. URL: http://dx.doi.org/10.1111/j.1468-0262.2007.00731.x.

Arcidiacono, Peter and Paul B. Ellickson (2011). "Practical Methods for Estimation of Dynamic Discrete Choice Models". *Annual Review of Economics* 3.1, pp. 363–394. DOI: 10.1146/annurev-economics-111809-125038. eprint: http://www.annualreviews.org/doi/pdf/10.1146/annurev-economics-111809-125038. URL: http://www.annualreviews.org/doi/abs/10.1146/annurev-economics-111809-125038.

Arcidiacono, Peter and Robert A. Miller (2011). "Conditional Choice Probability Estimation of Dynamic Discrete Choice Models With Unobserved Heterogeneity". *Econometrica* 79.6, pp. 1823–1867. ISSN: 1468-0262. DOI: 10.3982/ECTA7743. URL: http://dx.doi.org/10.3982/ECTA7743.

Hotz, V Joseph and Robert A Miller (1993). "Conditional Choice Probabilities and the Estimation of Dynamic Models". *Review of Economic Studies* 60.3, pp. 497–529. URL: http://ideas.repec.org/a/bla/restud/v60y1993i3p497-529.html.

Hotz, V Joseph, Robert A. Miller, et al. (1994). "A Simulation Estimator for Dynamic Models of Discrete Choice". *Review of Economic Studies* 61.2, pp. 265–89. URL: http://ideas.repec.org/a/bla/restud/v61y1994i2p265-89.html.

Magnac, Thierry and David Thesmar (2002). "Identifying Dynamic Discrete Decision Processes". *Econometrica* 70.2, pp. 801–816. ISSN: 1468-0262. DOI: 10.1111/1468-0262.00306. URL: http://dx.doi.org/10.1111/1468-0262.00306.

Pesendorfer, Martin and Philipp Schmidt-Dengler (2008). "Asymptotic Least Squares Estimators for Dynamic Games". *The Review of Economic Studies* 75.3, pp. 901–928. DOI: 10.1111/j.1467-937X.2008.00496.x. eprint: http://restud.oxfordjournals.org/content/75/3/901.full.pdf+html. URL: http://restud.oxfordjournals.org/content/75/3/901.abstract.

Su, Che-Lin and Kenneth L. Judd (2008). "Constrained Optimization Approaches to Estimation of Structural Models". Working paper.

Dynamic estimation: Euler equations

Altug, Sumru and Robert A. Miller (1998). "The Effect of Work Experience on Female Wages and Labour Supply". *The Review of Economic Studies* 65.1, pp. 45–85. DOI: 10.1111/1467-937X.00035. eprint: http://restud.oxfordjournals.org/content/65/1/45.full.pdf+html. URL: http://restud.oxfordjournals.org/content/65/1/45.abstract.

Hall, Robert E (1978). "Stochastic Implications of the Life Cycle-Permanent Income Hypothesis: Theory and Evidence". *Journal of Political Economy* 86.6, pp. 971–87. URL: http://ideas.repec.org/a/ucp/jpolec/v86y1978i6p971-87.html.

Hansen, Lars Peter and Kenneth J Singleton (1983). "Stochastic consumption, risk aversion, and the temporal behavior of asset returns". *The Journal of Political Economy*, pp. 249–265.

Scott, Paul T. (2013). "Dynamic Discrete Choice Estimation of Agricultural Land Use". *Working Paper.*

Dynamic estimation: value function measurement

Kalouptsidi, Myrto (2014a). "Detection and Impact of Industrial Subsidies: The Case of World Shipbuilding". Working paper.

– (2014b). "Time to build and fluctuations in bulk shipping". *The American Economic Review* 104.2, pp. 564–608.

Kalouptsidi, Myrto, Paul Scott, and Eduardo Souza-Rodrigues (2015). "Resale Prices and Unobservable Market States in Dynamic Discrete Choice Models". Working Paper.

Dynamic estimation: games

Bajari, Patrick, C. Lanier Benkard, and Jonathan Levin (2007). "Estimating Dynamic Models of Imperfect Competition". *Econometrica* 75.5, pp. 1331–1370. ISSN: 1468-0262. DOI: 10.1111/j.1468-0262.2007.00796.x. URL: http://dx.doi.org/10.1111/j.1468-0262.2007.00796.x.

Collard-Wexler, Allan (2013). "Demand Fluctuations in the Ready-Mix Concrete Industry". *Econometrica* 81.3, pp. 1003–1037.

Doraszelski, Ulrich and Ariel Pakes (2007). "A framework for applied dynamic analysis in IO". *Handbook of industrial organization* 3, pp. 1887–1966.

Doraszelski, Ulrich and Mark Satterthwaite (2010). "Computable Markov-perfect industry dynamics". *The RAND Journal of Economics* 41.2, pp. 215–243.

Ericson, Richard and Ariel Pakes (1995). "Markov-perfect industry dynamics: A framework for empirical work". *The Review of Economic Studies* 62.1, pp. 53–82.

Fowlie, Meredith, Mar Reguant, and Stephen P Ryan (2014). "Market-based Emissions Regulation and Industry Dynamics".

Pakes, Ariel and Paul McGuire (1994). "Computing Markov-Perfect Nash Equilibria: Numerical Implications of a Dynamic Differentiated Product Model". *The Rand Journal of Economics*, pp. 555–589.

Pakes, Ariel, Michael Ostrovsky, and Steven Berry (2007). "Simple estimators for the parameters of discrete dynamic games (with entry/exit examples)". *The RAND Journal of Economics* 38.2, pp. 373–399. ISSN: 1756-2171. DOI: 10.1111/j.1756-2171.2007.tb00073.x. URL: http://dx.doi.org/10.1111/j.1756-2171.2007.tb00073.x.

Ryan, Stephen P. (2012). "The Costs of Environmental Regulation in a Concentrated Industry". *Econometrica* 80.3, pp. 1019–1061. ISSN: 1468-0262. DOI: 10.3982/ECTA6750. URL: http://dx.doi.org/10.3982/ECTA6750.

Weintraub, Gabriel Y, C Lanier Benkard, and Benjamin Van Roy (2008). "Markov perfect industry dynamics with many firms". *Econometrica* 76.6, pp. 1375–1411.

– (2010). "Computational methods for oblivious equilibrium". *Operations research* 58.4-part-2, pp. 1247–1265.

Entry and exit models

Bajari, Patrick, Han Hong, and Stephen P Ryan (2010). "Identification and estimation of a discrete game of complete information". *Econometrica* 78.5, pp. 1529–1568.

Berry, Steven and Peter Reiss (2007). "Empirical models of entry and market structure". *Handbook of industrial organization* 3, pp. 1845–1886.

Bresnahan, Timothy F and Peter C Reiss (1990). "Entry in monopoly market". *The Review of Economic Studies* 57.4, pp. 531–553.

– (1991). "Entry and competition in concentrated markets". *Journal of Political Economy*, pp. 977–1009.

Ciliberto, Federico and Elie Tamer (2009). "Market structure and multiple equilibria in airline markets". *Econometrica* 77.6, pp. 1791–1828.

Jia, Panle (2008). "What Happens When Wal-Mart Comes to Town: An Empirical Analysis of the Discount Retailing Industry". *Econometrica* 76.6, pp. 1263–1316.

Seim, Katja (2006). "An empirical model of firm entry with endogenous product-type choices". *The RAND Journal of Economics* 37.3, pp. 619–640.

Sweeting, Andrew (2009). "The strategic timing incentives of commercial radio stations: An empirical analysis using multiple equilibria". *The RAND Journal of Economics* 40.4, pp. 710–742.

Tamer, Elie (2003). "Incomplete simultaneous discrete response model with multiple equilibria". *The Review of Economic Studies* 70.1, pp. 147–165.

Moment inequalities: econometrics (guest lecturer: Christian Bontemps)

Moment inequalities: applications

Crawford, Gregory S and Ali Yurukoglu (2012). "The welfare effects of bundling in multichannel television markets". *The American Economic Review* 102.2, pp. 643–685.

Ho, Kate and Ariel Pakes (2013). "Hospital Choices, Hospital Prices and Financial Incentives to Physicians".

Ho, Katherine (2009). "Insurer-Provider Networks in the Medical Care Market". *American Economic Review* 99.1, pp. 393–430. DOI: 10.1257/aer.99.1.393. URL: http://www.aeaweb.org/articles.php?doi=10.1257/aer.99.1.393.

Holmes, Thomas J (2011). "The Diffusion of Wal-Mart and Economies of Density". *Econometrica* 79.1, pp. 253–302.

Morales, Eduardo, Gloria Sheu, and Andrés Zahler (2011). "Gravity and extended gravity: Estimating a structural model of export entry".

Pakes, Ariel (2010). "Alternative models for moment inequalities". *Econometrica* 78.6, pp. 1783–1822.