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Econ 8400: Empirical Industrial Organization

The course provides a graduate-level introduction to the topics and methods of Empirical Industrial Organization (IO). It is designed to provide a broad introduction to topics and industries that current researchers are studying as well as to expose students to a wide variety of techniques. It will start the process of preparing economics Ph.D. students to conduct thesis research in the area and may also be of interest to doctoral students in other fields.

Note: this course was offered in previous years as Econ 712. This year it will be a half semester course.

Lectures: Tuesday/Thursday 1:45-3:15, PCPE 202

- All lectures will be live, unless the university policy change.
- We will follow the university rules regarding Covid. Specifically, with regards to wearing masks. You are welcome to wear a mask even if not required by the university.
- I will distribute slides, via Canvas, in advance of each lecture. My hope is to have a "preliminary" version a day or two before the lecture. In some cases, I might need to revise/edit the slides as I make final preparation for the lecture, in which case I will update the slides.
- In addition to the slides I will at times distribute notes or ask you to read a paper in advance of the lecture.
- Q+A are a very important part of the class. Questions help slow me down and make the class livelier. You need to do your part and come prepared to participate.

Office Hours: By appointment.

Evaluation: Grading will be based on three empirical problem sets (75%) and class participation (25%).

Textbooks: There is no textbook for this course.

For coverage of theoretical principles (that I will rely on, but not cover in any detail) see:

J. Tirole, *The Theory of Industrial Organization*, MIT, 1988. (*Tirole*).

For a broader coverage of empirical and public policy issues, you should also read:

D. Carlton and J. Perloff, *Modern Industrial Organization*, 4th ed., Pearson, 2005.

K. Viscusi, J. Vernon and J. Harrington, *Economics of Regulation and Antitrust*, 5th ed., MIT, 2018.

You also might want to read several of the surveys in:

R. Schmalensee and R. Willig, eds., *Handbook of Industrial Organization*, Volumes 1 and 2 North-Holland, 1989. (*HIO*).

M. Armstrong and R. Poter, eds., *Handbook of Industrial Organization*, Volume 3, North-Holland, 2007.

K. Ho, A. Hortacsu, and A. Lizzeri, eds., *Handbook of Industrial Organization*, Volumes 4 and 5, Elsevier, 2021.

The two chapters from the *Handbook of Econometrics,* in the first section below, and my *Handbook* chapter with Amit Gandhi are probably the closest thing to a textbook for the material I cover.

The reading list below covers a variety of topics. We will not have time to cover all these topics, or to cover all the papers in the topics we do cover. The list is meant as a future reference guide as much as it is meant as a guide to what we will cover. Starred items are most likely going to be covered in class (or are the place to start for topics we will not cover. We will not discuss all of the papers on the reading list, however, ***I expect you to read all of the papers we discuss in detail in class.***

The following abbreviations are used for journal titles:

AER	American Economic Review	JET	Journal of Economic Theory
BJE	Bell Journal of Economics	JIE	Journal of Industrial Economics
EMA	Econometrica	JLE	Journal of Law and
EJ	Economic Journal	JPE	Journal of Political Economy
IJIO	International Journal of Industrial Organization	QJE	Quarterly Journal of Economics
JE	Journal of Econometrics	RJE	Rand Journal of Economics
JEH	Journal of Economic History	ReStat	Review of Economics and Statistics
JEL	Journal of Economic Literature	ReStat	Review of Economics and Statistics
JEMS	Journal of Economics & Management Strategy		

I. Introduction

D. Ackerberg, L. Benkard, S. Berry and A. Pakes, "Econometric Tools for Analyzing Market Outcomes," *Handbook of Econometrics*, Volume 6A, Chapter 63.

P. Reiss and F. Wolak, "Structural Econometric Modeling: Rationales and Examples from Industrial Organization," *Handbook of Econometrics*, Volume 6A, Chapter 64.

II. Production, Technology and Industry Structure

(*) D. Ackerberg, K. Caves and G. Frazer, "Identification Properties of Recent Production Function Estimators," EMA, November 2015, 2411-51.

(*) M. Arellano, S. Bond, "Some Tests of Specification for Panel Data: Monte Carlo Evidence and an Application to Employment Equations," Restud, 1991, 277-297.

R. Blundell and S. Bond, "GMM Estimation with Persistent Panel Data: An Application to Production Functions," Econometric Reviews, 2000, 321-340.

U. Doraszelski and J Jaumandreu, "R&D and Productivity: Estimating Endogenous Productivity," Restud, 2013, 1338-83.

A. Gandhi, S. Navarro and D. Rivers, "On the Identification of Gross Output Production Functions," JPE. August 2020. mimeo

(*) Z. Griliches and J. Mairesse, "Production Functions: The Search for Identification," NBER Working Paper No. 5067.

(*) J. Levinsohn and A. Petrin, "Estimating Production Functions Using Intermediate Inputs to Control for Unobservables," ReStud, April 2003, 317-41.

J. De Loecker, "Product Differentiation, Multi-Product Firms and Estimating the Impact of Trade Liberalization on Productivity," September 2011, *Econometrica*, Vol. 79, No. 5, 1407–1451.

J. De Loecker and F. Warzynski, "Markups and Firm-level Export Status," October 2012, *American Economic Review*, Vol. 102, No. 6. 2437-2471.

(*) S. Olley and A. Pakes, "The Dynamics of Productivity in the Telecommunications Industry," EMA, November 1996, 1263-97.

C. Syverson, "Market Structure and Productivity: A Concrete Example," JPE, 2000.

C. Syverson, "Challenges to Mismeasurement Explanations for the U.S. Productivity Slowdown." *Journal of Economic Perspectives,* 2017

J. De Loecker and C. Syverson, "An Industrial Organization perspective on productivity," Chapter 3 in the *Handbook of IO, Volume 4.*

III. Empirical Studies of Pricing

1. Static Models

O. Ashenfelter and D. Sullivan, "Nonparametric Tests of Market Structure: An Application to the Cigarette Industry," JIE, June 1987, 483-98.

S. Borenstein, J. Bushnell and F. Wolak, "Measuring Market Inefficiencies in California's Restructured Wholesale Electricity Market," AER, December 2002, 1396-405.

(*) T. Bresnahan, "The Oligopoly Solution is Identified," Economics Letters, 1980, 10, 87-92.

(*) T. Bresnahan, "Empirical Studies of Industries with Market Power," HIO2, Chapter 17.

J. Bulow and P. Pfleiderer, "A Note on the Effect of Cost Changes on Prices [Measurement of Monopoly Behavior: An Application to the Cigarette Industry]," JPE, 1983, 91(1), 182-85.

K. Corts, "Conduct Parameters and the Measurement of Market Power," JE, November 1998, 227-50.

D. Genesove and W. Mullin, "Testing Static Oligopoly Models: Conduct and Cost in the Sugar Industry,

1890-1914," RJE, Summer 1998, 355-77.

J. Panzar and J. Rosse, "Testing for 'Monopoly' Equilibrium," JIE, June 1987, 443-56.

M. Salinger, "The Concentration-Margin Relationship Reconsidered," Brookings Papers on Economic Activity Micro, 1990, 287-335.

Sumner, Daniel A., "Measurement of Monopoly Behavior: An Application to the Cigarette Industry," JPE, 1981, 89(5), pg 1010-19**.**

R. Schmalensee, "Inter-industry Studies of Structure and Performance," in HIO2, Chapter 16.

C. Wolfram, "Measuring Duopoly Power in the British Electricity Spot Market," AER, September 1999, 805-26.

2. Repeated Interaction

V. Aguirregabiria, "The Dynamics of Markups and Inventories in Retail Firms," ReStud, April 1999, 275-308.

S. Borenstein and A. Shepard, "Dynamic Pricing in Retail Gasoline Markets," RJE, Autumn 1996, 429-51.

G. Ellison, "Theories of Cartel Stability and the Joint Executive Committee," RJE, Spring 1994, 37-57.

(*) R. Porter, "A Study of Cartel Stability: The Joint Executive Committee, 1880-1886," BJE, Autumn 1983, 301-14.

Evans, W. and I. Kessides, "Living by the 'Golden Rule': Multimarket Contact in the U.S. Airline Industry," QJE, May 1994, 341–66.

3. Differentiated Products Industries

S. Anderson, A. dePalma and J. Thisse. Discrete Choice Theory of Product Differentiation, 1992, MIT Press.

J. Baker and T. Bresnahan, "Estimating the Residual Demand Curve Facing a Single Firm," IJIO, 1988, 283-300.

(*) S. Berry, 1994, "Estimating Discrete-Choice Models of Product Differentiation," RJE, Summer 1994, 242-62.

(*) S. Berry, J. Levinsohn and A. Pakes, "Automobile Prices in Market Equilibrium," EMA, July 1995, 841-90.

S. Berry, J. Levinsohn and A. Pakes, "Differentiated Products Demand Systems from a Combination of Micro and Macro Data: The New Car Market," JPE, February 2004, 68-105.

S. Berry and A. Pakes, "The Pure Characteristics Demand Model," IER, November, 2007 11193-1225.

(*) T. Bresnahan, "Competition and Collusion in the American Automobile Market: The 1955 Price War," JIE, June 1982, 457-482.

F. Gasmi, J. Laffont and Q. Vuong, "Econometric Analysis of Collusive Behavior in a Soft-Drink Market," JEMS, Summer 1992, 277-311.

(*) P. Goldberg, "Product Differentiation and Oligopoly in International Markets: The Case of the U.S. Automobile Industry," EMA, July 1995, 891-951.

J. Hausman, G. Leonard and J. Zona, "Competitive Analysis with Differentiated Products," Annales D'Economie et de Statistique, April/June 1994, 159-80.

D. McFadden, "Econometric Analysis of Qualitative Response Models," Handbook of Econometrics, Volume 2, 1984, Chapter 24.

(*) A. Nevo, "A Practitioner's Guide to Estimation of Random Coefficients Logit Models of Demand," JEMS, Winter 2000, 513-48.

A. Nevo, "Measuring Market Power in the Ready-to-Eat Cereal Industry," EMA, March 2001, 307-42.

A. Nevo, "Empirical Models of Consumer Behavior," Annual Reviews, 2011.

Computational, Instruments and Identification

Knittel, Chris, and Konstantinos Metaxoglou, 2014 "Estimation of Random-Coefficient Demand Models: Two Empiricists' Perspective" ReStat 96(1) 34-59.

Dube, JP, Jeremey Fox, and Che-Lin Su, 2012, "Improving the Numerical Performance of Static and Dynamic Aggregate Discrete Choice Random Coefficients Demand Estimation," EMA, 80(5), 2231-2267.

Lee, Jinhyuk and Kyoungwon Seo, 2015, "A Computationally Fast Estimator for Random Coefficients Logit Demand Models Using Aggregate Data," RJE, 46(1), 86-105.

Mathias Reynaert and Frank Verboven. 2014. "Improving the Performance of Random Coefficients Demand Models – the Role of Optimal Instruments." JE, 179(1), 83-98.

Berry, Steven, and Phillip Haile. 2014. "Identification in Differentiated Products Markets Using Market Level Data." EMA, 82, 1749-1798.

Steven Berry and Philip Haile (2016), "Identification in Differentiated Products Markets," Annual Review of Economics, 8, pp. 27-52.

Gandhi, Amit and JF Houde, 2016. "Measuring Substitution Patterns in Differentiated Products Industries," NBER WP 26375. October 2019.

Gandhi, Amit and Aviv Nevo, 2021. "Empirical Models of Demand and Supply in Differentiated Products Industries", HIO4, Chapter 2.

Berry, Steven and Philip Haile, 2021, "Foundations of Demand Estimation," HIO4, Chapter 1.

Some Recent Papers

Sergei Koulayev, Marc Rysman, Scott Schuh, and Joanna Stavins. 2016. "Explaining Adoption and Use of Payment Instruments by U.S. Consumers" RJE, 47(2), 293-325.

Pierre Dubois, Rachel Griffith, and Aviv Nevo. 2014. "Do Prices and Attributes Explain International Differences in Food Purchases?" AER 104(3), 832-67.

Agarwal, Nikhil and Paulo Somaini, 2018, "Demand Analysis Using Strategic Reports: An application to a School Choice Mechanism," EMA, 86(2)m 391-444.

Ben Handel. 2013. "Adverse Selection and Inertia in Health Insurance Markets: When Nudging Hurts." Berkeley. AER 103(7) 2643-82.

Agarwal, Nikhil. 2015, "An Empirical Model of Medical Match," AER, 105(7) 1939-1978.

Miller, Nathan and Matthew Weinberg, 2017, "Understanding the Price Effects of the MillerCoors Joint Venture," EMA, 85(6), 1763-91.

Cilberto, Federico and Jonathan Williams. 2014. "Does Multi-Market Contact Facilitate Tacit Collusion? Inference on Conduct Parameters in the Airline Industry," RJE, 45(4), pages 764–791.

Backus, M., C. Conlon, and M. Sinkinson. 2021. "Common ownership and competition in the ready-to-eat cereal industry." Working Paper 28350, National Bureau of Economic Research.

Duarte, M., L. Magnolfi, M. Sølvsten, and C. Sullivan. 2021. "Testing firm conduct." Working paper.

4. Welfare and Hedonic Prices

Hedonic Price Regressions and Price Indices

(*) P. Bajari and L. Benkard, "Demand Estimation With Heterogeneous Consumers and Unobserved

Product Characteristics: A Hedonic Approach," JPE, December 2005, 1239-76.

D. Epple, "Hedonic Prices and Implicit Markets: Estimating Demand and Supply Functions for Differentiated Products," JPE, January 1987, 59-80.

R. Feenstra, "Exact Hedonic Price Indexes," ReStat, 1995, 634-53.

Z. Griliches, "Hedonic Price Indexes for Automobiles: An Econometric Analysis of Quality Change," In The Price Statistics of the Federal Government (General Series No. 73). New York: National Bureau of Economic Research;, 1961, 173-176. Reprinted in Griliches (ed.), Price Indices and Quality Change: Studies in New Methods of Measurement. Cambridge, Mass.: Harvard University Press, 1971.

A. Pakes, "A Reconsideration of Hedonic Price Indices with an Application to PC's," AER, December 2003, 1578-96.

(*) S. Rosen, "Hedonic Prices and Implicit Markets: Product Differentiation in Pure Competition," JPE, Jan./Feb. 1974, 34-55.

Welfare Measures Computed from Estimated Demand Systems

D. Ackerberg and M. Rysman, "Unobservable Product Differentiation in Discrete Choice Models: Estimating Price Elasticities and Welfare Effects," RJE, Winter 2005, 771-88.

T. Bresnahan, S. Stern and M. Trajtenberg, "Market Segmentation and the Sources of Rents from Innovation," RJE, 1997, S17-S44.

M. Gentzkow, "Valuing New Goods in a Model with Complementarity: Online Newspapers," AER, June 2007, 713-44.

(*) J. Hausman, "Valuation of New Goods Under Perfect and Imperfect Competition," in Bresnahan and Gordon (eds) The Economics of New Goods, Studies in Income and Wealth, 1996, Vol. 58, Chicago: NBER. Including comment by Bresnahan (in the same volume).

J. Hausman, "Cellular Telephone, New Products and the CPI," Journal of Business and Economic Statistics, 1999, 188-94.

A. Nevo, "New Products, Quality Changes and Welfare Measures Computed from Estimated Demand Systems," ReStat, 2003, 266-75.

A. Petrin, "Quantifying the Benefits of New Products: The Case of the Minivan," JPE, August 2002, 705-29.

(*) M. Trajtenberg, "The Welfare Analysis of Product Innovations, with an Application to Computed Tomography Scanners," JPE, April 1989, 444-79.

5. Markups, Competition and Welfare

Steven Berry, Martin Gaynor, and Fiona Scott Morton, "Do Increasing Markups Matter? Lessons from Empirical Industrial Organization," *Journal of Economic Perspectives*, 2019. 33(3) 44-68.

Jan De Loecker, Jan Eeckhout and Gabriel Unger. "The Rise of Market Power and the Macroeconomic Implications." QJE, 2020. 135(2) 561-644.

Autor, D., D. Dorn, L. F. Katz, C. Patterson, and J. Van Reenen. "The Fall of the Labor Share and the Rise of Superstar Firms," 2019.

Carl Shapiro, "Protecting Competition in the American Economy: Merger Control, Tech Titans, Labor Markets." *Journal of Economic Perspectives*, 33(3), 2019, 69–93.

Devesh Raval, "Testing the Production Approach to Markup Estimation," 2020, mimeo (available at http://www.devesh-raval.com/markupTest.pdf)

Ulrich Doraszelski, and Jordi Jaumandreu, "Using Cost Minimization to Estimate Markups" 2019, mimeo (available at http://people.bu.edu/jordij/papers/robust_markups20190625.pdf)

Mert Demirer. Production function estimation with factor-augmenting technology: An application to markups. Working paper, 2020.

IV. Vertical Relations, Empirical Models of Bargaining and Related Topics

(*) S. Villas-Boas, "Vertical Contracts Between Manufacturers and Retailers: An Empirical Analysis," University of California, Berkeley, Restud, 2007, 74(2), 625-652.

(*) J. Asker, "Diagnosing Foreclosure due to Exclusive Dealing", JIE, 2016, 64(3), 375-410.

M. Sinkinson, "Pricing and Entry Incentives with Exclusive Contracts: Evidence from Smartphones" mimeo

K.S. Corts, "The Strategic Effects of Vertical Market Structure: Common Agency and Divisionalization in the US Motion Picture Industry," JEMS, 2001, 10, 509-552

R. Gilbert and J. Hastings, "Pricing Vertical Integration in Gasoline Supply: An Empirical Test of Raising Rivals' Costs," JIE, December 2005.

J. Mortimer, "Vertical Contracts in the Video Rental Industry", Restud, 2008, 75(1), pp 165-199.

F. Lafontaine, "Agency Theory and Franchising: Some Empirical Results", RJE, 1992, 23, 263-283,

A. Hortcasu and C. Syverson, "Cementing Relationships: Vertical Integration, Foreclosure, Productivity, and Prices", JPE, 2007.

T. Chipty, "Vertical Integration, Market Foreclosure, and Consumer Welfare in the Cable Television Industry", AER, 2001, 428-453.

Capps Cory, David Dranove and Mark Satterhwaite, 2003, "Competition and market power in option demand markets," RAND Journal of Economics, 34(4), 737-763.

M. Draganska, D. Klapper, and S.Villas-Boas, "A Larger Slice or a Larger Pie? An Empirical Investigation of Bargaining Power in the Distribution Channel." Marketing Science, 2010, 29 (1):57 74.

(*) G. Crawford and A.Yurukoglu, "The Welfare Effects of Bundling in Multichannel Television," AER, 2012.

M. Grennan, "Price Discrimination and Bargaining: Empirical Evidence from Medical Devices," AER, 2013.

(*) G. Gowrisankaran, G., A. Nevo, and R. Town, "Mergers When Prices Are Negotiated: Evidence from the Hospital Industry," AER, 2015, 105: 172-203.

Crawford, Greg, Robin Lee, Michael Whinston and Ali Yurukoglu. 2018. "The Welfare Effects of Vertical Integration in Multichannel Markets." EMA, 86(3), 891–954.

K. Ho and R. Lee, "Insurer Competition and Negotiated Hospital Prices", 2017, EMA, 85(2), 379-417.

M. Lewis and K. Pflum. 2017. "Hospital Systems and Bargaining Power: Evidence from Out-of-Market Acquisitions." RJE, 48(3), 579-610.

T. Salz. 2016. "Intermediation and Competition in Search Markets: An Empirical Case Study." Job market paper.

Jason Allen, Robert C. Clark, Jean-François Houde. 2014. "The effect of mergers in search markets: Evidence from the Canadian mortgage industry", AER,104(10), 3365-96.

Jason Allen, Robert C. Clark, Jean-François Houde. 2019. "Search frictions and market power in price negotiated markets", JPE 127(4), 1550-1598.

Robin S. Lee, Michael D. Whinston, Ali Yurukoglu. 2021. "Structural empirical analysis of contracting in vertical markets." HIO4, Chapter 9.

The rest of the material is offered for your reference: we are unlikely to cover it this term

V. Dynamic (Demand) Models
Methods

Judd, Ken.1998. Numerical Methods in Economics, MIT Press.

(*) Rust, John. 1996. "Structural Estimation of Markov Decision Processes," Handbook of Econometrics, Volume 4, Chapter 51.

Rust, John. 1996. "Numerical Dynamic Programming in Economics," in H. Amman, D. Kendrick, and J. Rust (eds.), Handbook of Computational Economics, Volume 1, 619_729.

Rust, John. 1997 "Using Randomization to Break the Curse of Dimensionality," EMA, 65(3), 487-516.

Rust, John. "Dynamic Programming" 2006. New Palgrave Dictionary of Economics

Keane, Michael and Kenneth Wolpin. 1994. "The Solution and Estimation of Discrete Choice Dynamic Programming Models by Simulation and Interpolation: Monte Carlo Evidence," Review of Economics and Statistics, 76(4), 648_72.

Eckstein, Zvi and Kenneth Wolpin. 1989. "The Specification and Estimation of Dynamic Stochastic Discrete Choice Models," Journal of Human Resources, 24, 562-98.

Hotz, Joe and Bob Miller. 1993. "Conditional Choice Probabilities and the Estimation of Dynamic Models," ReStud 60, 497-529.

Hotz, Joe, Bob Miller, Sanders and Smith. 1994. "A Simulation Estimator for Dynamic Models of Discrete Choice," ReStud 61, 265-289.

(*) Aguirregabiria, Victor and Pedro Mira. 2002."Swapping the Nested Fixed Point Algorithm: A Class of Estimators for Discrete Markov Decision Models," EMA, 70 (4), 1519-1543

Applications

(*) Rust, John. 1987. "Optimal Replacement of GMC Bus Engines: An Empirical Model of Harold Zurcher," EMA, 55(5), 999_1033.

Pakes, Ariel. 1986. "Patents as Options: Some Estimates of the Value of Holding European Patent Stocks," EMA, 54(4), 755-784.

Hitsch, Guenter. 2006. “An empirical Model of Product Launch and Exit Under Demand Uncertainty” Marketing Science, 25 (1).

Erdem, Tulin and Michael Keane. 1996. “Decision-Making Under Uncertainty: Capturing Dynamic Brand Choice Processes in Turbulent Consumer Goods Markets,” Marketing Science, 15(1),1-20.

Ackerberg, Dan. 2003. “Advertising, Learning, and Consumer Choice in Experience Good Markets: An Empirical Examination,” International Economic Review, 44 (3), 1007-1040

(*) Hendel, Igal and Aviv Nevo. 2006. “Measuring the Implications of Sales and Consumer Stockpiling.” EMA, November 2006, vol 74(6), 1637-73.

Hendel, Igal and Aviv Nevo "Intertemporal Price Discrimination in Storable Goods Markets" AER, December 2013.

(*) Timmins, Chris. 2002. “Measuring the Dynamic Efficiency Costs of Regulators' Preferences: Municipal Water Utilities in the Arid West.” EMA, 70(2), 603-629.

Aguirregabiria, Victor. 1999. “The Dynamics of Markups and Inventories in Retailing Firms,” ReStud, 66, 275-308.

Melnikov, Oleg. 2001. “Demand for Differentiated Durable Products: The Case of the U.S. Computer Printer Market.” Economic Inquiry, December 2012, 1277-98

Hartmann, Wesley. 2005. Intertemporal Effects of Consumption and Their Implications for Demand Elasticity Estimates, Quantitative Marketing and Economics, 4(4), 2006.

Gowrisankaran, Gautam and Marc Rysman. “Dynamics of Consumer Demand for New Durable Goods” Journal of Political Economy 120, 1173-1219, 2012

Identification

Magnac, T. and D. Thesmar. 2002. “Identifying dynamic discrete decision processes.” Econometrica, 70, 801-816.

Aguirregabiria, Victor. 2005. “Nonparametric Identification of Behavioral Responses to Counterfactual Policy Interventions in Dynamic Discrete Decision Processes,” Economics Letters.

Aguirregabiria, Victor. “Another Look at the Identification of Dynamic Discrete Decision Processes,” Journal of Business and Economic Statistics.

VI. Market Structure

1. Entry Models

P. Bajari, H. Hong and S. Ryan, "Identification and Estimation of Discrete Games of Complete Information," EMA, September 2010, 1529-68.

(*) S. Berry, "Estimation of a Model of Entry in the Airline Industry," EMA, July 1992, 889–918.

(*) S. Berry and P. Reiss, "Empirical Models of Entry and Market Structure," HIO3, Chapter 29.

S. Berry and E. Tamer, "Identification in Models of Oligopoly Entry," in R. Blundell, W. Newey and T. Persson, eds., Advances in Economics and Econometrics: Theory and Applications, Vol. 2, Cambridge, 2007, 46-85.

S. Berry and J. Waldfogel, "Free Entry and Social Inefficiency in Radio Broadcasting," RJE, Autumn 1999, 397-420.

T. Bresnahan and P. Reiss, "Entry in Monopoly Markets," ReStud, October 1990, 531-53.

T. Bresnahan and P. Reiss, "Entry and Competition in Concentrated Markets," JPE, October 1991, 977–1009.

(*) F. Cilberto and E. Tamer, "Market Structure and Multiple Equilibria in Airline Markets," EMA, November 2009, 1791-1828.

P. Jia, "What Happens When Wal-Mart Comes to Town: An Empirical Analysis of the discount Retail Industry," EMA, 76(6): 1263-1316, November 2008.

M. Mazzeo, "Product Choice and Oligopoly Market Structure," RJE, Summer 2002, 221-42.

(*) K. Seim, "An Empirical Model of Firm Entry with Endogenous Product-Type Choices," RJE, Autumn 2006, 619-40.

(*) E. Tamer, "Incomplete Simultaneous Discrete Response Model with Multiple Equilibria," ReStud, January 2003, 147-65.

E., Liran, 2010. "Not All Rivals Look Alike: Estimating an Equilibrium Model of The Release Date Timing Game", Economic Inquiry, 48(2): 369-390.

O. Toivanen, and M. Waterson, 2005 "Market Structure and Entry: Where's the Beef?" RJE, 36(3): 680-699.

2. Entry, Growth, and Turnover

M. Asplund and V. Nocke, "Firm Turnover in Imperfectly Competitive Markets," ReStud, April 2006, 295-327.

T. Bresnahan and D. Raff, "Inter-industry Heterogeneity and the Great Depression: The American Motor Vehicles Industry, 1929-1935," JEH, June 1991, 317-31.

J. Campbell and H. Hopenhayn, "Market Size Matters," JIE, March 2005, 1-25, and "Erratum," JIE, June 2007, 373-8.

R. Caves, "Industrial Organization and New Findings on the Turnover and Mobility of Firms," JEL, December 1998, 1947-82.

(*) T. Dunne, M. Roberts, and L. Samuelson, "Patterns of Firm Entry and Exit in U.S. Manufacturing," RJE, Winter 1988, 495-515.

T. Dunne, M. Roberts, and L. Samuelson, "The Growth and Failure of U.S. Manufacturing Plants," QJE, November 1989, 671-98.

P. Ellickson, "Does Sutton Apply to Supermarkets?" RJE, Spring 2007, 43-59.

T. Holmes and J. Schmitz, "On the Turnover of Business Firms and Business Managers," JPE, October 1995, 1005-38.

H. Hopenhayn, "Entry, Exit and Firm Dynamics in Long Run Equilibrium," EMA, September 1992, 1127-50.

B. Jovanovic, "Selection and the Evolution of Industry," EMA, May 1982, 649–70.

S. Klepper and P. Thompson, "Submarkets and the Evolution of Market Structure," RJE, Winter 2006, 861-86.

M. Mitchell, "The Scope and Organization of Production: Firm Dynamics Over the Learning Curve," RJE, Spring 2000, 180-205.

J. Sutton, "Gibrat's Legacy," JEL, March 1997, 40-59.

J. Sutton, "Market Structure: Theory and Evidence," HIO3, Chapter 36.

VII. Dynamic Games

Methods

(*) Ericson, Richard and Ariel Pakes. 1995. "Markov-Perfect Industry Dynamics: A Framework for Empirical Work," Review of Economic Studies 62 (January): 53-82.

(*) Pakes, Ariel and Paul McGuire. 1994. "Computing Markov-perfect Nash Equilibria: Numerical Implications of a Dynamic Differentiated Product Model," Rand Journal of Economics 25 (Winter): 555-589.

Doraszalski, Uli and Mark Satterthwaite. 2010. "Computable Markov-perfect industry dynamics," RJE, 41(2), 215-43.

Doraszalski, Uli and Kenneth Judd. 2012. "Avoiding the Curse of Dimensionality in Dynamic Stochastic Games." Quantitative Economics, 3(1), 53-93.

Pakes, Ariel and Paul McGuire. 2000. "Stochastic Algorithms, Symmetric Markov Perfect Equilibria and the 'Curse' of Dimensionality," Econometrica 69(5): 1261-81.

Pakes, Ariel. 2000. "A Framework for Applied Dynamic Analysis in I.O.," NBER WP no. 8024.

Pesendorfer, Martin and Philipp Schmit-Dengler.2004. Least Squares Estimators for Dynamic Games, Review of Economic Studies.

Aguirregabiria, Victor and Pedro Mira. 2007. Sequential Estimation of Dynamic Discrete Games, Econometrica, 75(1) (January, 2007), 1-53

(*) Bajari, Pat, Lanier Benkard, and Jon Levin. 2007. Estimating Dynamic Models of Imperfect Competition, Econometrica, 75(5), September 2007.

Berry, Steven, Ariel Pakes and Michael Obstrovsky. 2007. Simple Estimators for the Parameters of Discrete Dynamic Games, RAND Journal of Economics, v. 38(2), Summer 2007, pp. 373-399.

Applications

Gowrisankaran, Gautam 1999. "A dynamic model of endogenous horizontal mergers." RJE, 30(1), 56-83.

Benkard, Lanier. 2004. "A Dynamic Analysis of the Market for Wide-Bodied Commercial Aircraft Market," ReStud.

Ryan, Stephen. 2005. "The Costs of Environmental Regulation in a Concentrated Industry." EMA.

Collard-Wexler, Allan. "Demand Fluctuations and Plant Turnover in Ready-Mix Concrete." EMA 2013.

Robin Lee, 2008. "Vertical Integration and Exclusivity in Platform and Two-Sided Markets" AER, December 2013.

Goettler, Ron and Brett Gordon. (2011) "Does AMD spur Intel to innovate more?" JPE, 119(6), 1141-1200.

VIII. Antitrust

1. Introduction

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