

Economics 848
Empirical Industrial Organization and Applied Microeconomics
Spring 2024

Instructor Information:

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Schedule Information:

Class Time: T/TR 8:00-9:30 am
Class Location: Gardner 106
Office Hours: T/TR 11:00-12:30 pm (and by appointment)
Office Location: Gardner 300A

Course organization and goals:

This is the second of two empirical industrial organization (IO) courses offered each year at UNC. The courses are designed to be taken in sequence. The first course covers static demand estimation, information issues, vertical relations between firms, productivity, and networks. This course, the second in the sequence, covers static discrete games of complete and incomplete information, dynamic demand, dynamic games, auctions, and potentially topics that are of particular interest to the class. These courses are intended (in part) to complement the IO theory course offered by Professor Gary Biglaiser each fall.

This sequence of courses in IO, and this course specifically, has three objectives. The main objective is to prepare you to do original research in empirical IO. To this end, we survey some of the main areas of the IO literature. Our survey focuses on introducing modeling and estimation techniques that are central to modern empirical IO, and we will also review some topics that are prominent in current research. Our second objective is to improve your ability to do research in applied microeconomics, broadly defined. To satisfy this objective, we will put extra weight on parts of the empirical IO literature that are most likely to be beneficial for research outside of IO. In some cases these benefits will come through exposure to particular econometric techniques, and in other cases they will come through economic models or empirical results that are useful for all microeconomists to know. The final objective is to show you some very successful dissertation papers in empirical IO. Successful dissertations across applied microeconomics will have much in common in terms of question selection, data construction, and methodology. To accomplish all three of these goals, there will be a strong emphasis on applying econometric and modeling techniques. This is reflected in the assignments throughout the course.

Approach:

We will read a selection of papers from the empirical IO literature. The emphasis will be on seminal papers to get a strong foundation and recent papers so that you can see the latest methods and applications. For each paper we read, you will need to evaluate:

- How is the empirical exercise motivated by theory or policy relevance?
- What is the relationship between the relevant theory and the empirical exercise?
- What about the data and modeling assumptions do you believe and/or not believe?
- Do the empirical results achieve author's objective?
- How could this paper be extended to provide additional useful results? If the present data and model are insufficient, what is needed?

We will develop your ability to answer these questions through a series of in-class activities, homework assignments, and a final paper.

Graded work:

Your grade will come from four distinct activities:

1. Class participation (10%). Our class meetings will involve balanced discussion among all of us. You need to contribute constructively and frequently to classroom discussion for your own grade and to help move the class along.
2. Paper presentations (30%). Each student will do two in-class presentations of a research article during the semester. Each presentation will last about 25 minutes and provide a discussion of the question, motivation, objective, method, and results, as well as comments and criticisms. Think of the exercise as an extended referee report, similar to a detailed discussion offered at an academic conference. One of the papers will be chosen in an area of interest to the student (preferably recent), the other will be among those written by an empirical IO job-market candidate in the last 3 years.
3. Homework assignments (30%). There will be at least two homework assignments that focus on empirical and modeling techniques. You can use whatever programming language you like. I can offer the most assistance with Matlab or Python, but you are free to use the software of your choosing (e.g., Julia, Fortran, etc). I strongly recommend getting a research computing account (longleaf) and familiarizing yourself with use of those resources in this process, as it will be a valuable bit of human capital going forward.
4. Final paper (30%). On the day of the final, you will turn in a brief paper/slides (15-20 pages) that motivates and describes a novel research idea that is part of industrial organization, broadly defined. This paper may advance work done in the fall to include a simplified model or discussion of a modeling approach, empirical model and identification strategy. Or, it may introduce an entirely new idea. It should also include a discussion of the relevant literature. During the last week of class you will give a 25-minute presentation on your paper topic and progress.

For homework assignments, any requests to have the grade altered or corrected must be made to me within 7 days of the assignment being handed back. I will use Sakai (or other agreed upon electronic means) to distribute notes, readings, homework assignments, etc. We will agree upon these means the first day of class and stick to it throughout the semester. I will post assignments

one week before they are due. Homework assignments can be completed in groups of 2 or 3 students. You are welcome to discuss all assignments and potential solutions freely with any students in the class, but each individual or group must turn in their own version of the homework. The presentations are an individual assignment unless high class enrollment necessitates groups. Homework and presentations are to be done in LaTeX, and the Tex and pdf file should be turned in (along with accompanying files). I plan to keep a repository of the presentations, as they can be quite useful for future cohorts.

Classroom etiquette

My goal is to maintain a classroom environment that provides a good learning environment for everyone. To minimize distractions, you must turn off all phones, laptops, and other electronic devices during class, except in those situations where using such a device is desirable. That is, there will be times when we will be programming in class to demonstrate something, and a laptop would be desirable. I will notify you ahead of time, so that you may bring a laptop if you'd like (not required). I expect you to arrive on time and prepared for the day's class.

General References:

There are several high-quality background sources that you should be ready to consult. They are:

- D. Carlton and J. Perloff, *Modern Industrial Organization*, Addison Wesley, 2004.
- F. Hayashi, *Econometrics*, Princeton, 2000
- J. Tirole, *The Theory of Industrial Organization*, MIT Press, 1988
- T. Bresnahan, "Empirical Studies of Industries with Market Power." in Schmalensee and Willig (Eds.), *Handbook of Industrial Organization*, Vol. 2, Ch. 17, pp. 1011-58. 1989.
- P. Reiss and F. Wolak "Structural Econometric Modeling: Rationales and Examples from Industrial Organization," in Heckman and Leamer (Eds), *Handbook of Econometrics*, Vol. 6, Ch. 64, pp. 4277-4415.
- Fudenberg, D. and J. Tirole, 1991, *Game Theory*, Cambridge, MIT Press.
- R. Schmalensee and R. Willig, eds., *Handbooks of Industrial Organization* 1 and 2, North-Holland, 1989
- M. Armstrong and R. Porter, eds., *Handbook of Industrial Organization* 3, North Holland, 2007.
- K. Ho, A. Horacsu, A. Lizzeri, eds., *Handbook of Industrial Organization* 4, North Holland, 2021

The books are available for purchase or at the library. I will make any required readings from handbook chapters available through Sakai (or other convenient means).

Course Readings, Additional References, and Outline:

Readings for this course are listed below and separated by topic. I have provided (rough) estimates of how much time each topic will take us to cover. We will adjust these as needed throughout the semester based upon typical fluctuations and the interests of the class. Each listed topic identifies papers we will cover in class, plus some extra material for students interested in any particular topic. You are required to read the papers under the *in-class* header before we discuss them in class. For many of these papers, you'll only need to read specific sections, which I'll point out. I will give you advance notice on what papers we will cover in upcoming classes. Count on reading about one paper per class meeting. About a half way into the semester, we will begin having student presentations of papers. Presentation topics and timing will be decided about two weeks before the presentations begin.

The following abbreviations are used for journal titles below:

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 Economics
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
AEJ-XXX: American Economic Journal - XXX
QE: Quantitative Economics
JOF: Journal of Finance
MOR: Mathematics of Operations Research
JES: Journal of Economic Surveys
HOE: Handbook of Econometrics
HIO: Handbook of Industrial Organization
JEP: Journal of Economic Perspectives
JAE: Journal of Applied Econometrics
ARE: Annual Review of Economics
OR: Operations Research
JEMS: Journal of Economics & Management Strategy

Empirical Methods in Industrial Organization

Aguirregabiria, Victor, Collard-Wexler, Allan, Ryan, Stephen, "Dynamic Games in Empirical Industrial Organization" HIO

Ghandi, Amit and Nevo, Aviv, "Empirical Models of Demand and Supply in Differentiated Product Industries" HIO

Ackerberg D., L. Benkard, S. Berry and A. Pakes, "Econometric Tools for analyzing Market Outcomes," *HOE*

Angrist J. and J. Pischke, "The Credibility Revolution in Empirical Economics: How Better Research Design is Taking the Con out of Econometrics," JEP 2010

Bresnahan, T. "Empirical Studies of Industries with Market Power," HIO 1989

Leamer E., "Let's Take the Con Out of Econometrics," AER 1983

Nevo A. and M. Whinston, "Taking the Dogma out of Econometrics: Structural Modeling and Credible Inference," JEP 2010

Pakes A., "Common Sense and Simplicity in Empirical Industrial Organization," WP 2003
Reiss P. and F. Wolak, "Structural Econometric Modeling: Rationales and Examples from Industrial Organization," *HOE*
Schmalansee, R., 1989, "Interindustry Studies of Structure and Performance," HIO 1989
Sims C., "But Economics Is Not an Experimental Science," JEP 2010
Sutton J, "Marhsall's Tendencies: What Can Economists Know?", MIT Press, 2002.

Dynamic Models of Demand:

In Class:

Rust J. "Optimal Replacement of GMC Bus Engines: An Empirical Model of Harold Zurcher", EMA 1987
Gowrisankaran G. and M. Rysman "Dynamics of Consumer Demand for New Durable Goods," JPE 2012
Hendel I. and A. Nevo, "Measuring the Implications of Sales and Consumer Inventory Behavior," EMA 2006
Hendel I. and A. Nevo, "Intertemporal Price Discrimination in Storable Goods Markets." AER 2013
Hotz J. and B. Miller, Sanders and Smith, "A Simulation Estimator for Dynamic Models of Discrete Choice," *ReStud* 1994.
Lee R. "Dynamic Demand Estimation in Platform and Two-Sided Markets." AER 2013
Nevo, A., J. Turner, and J. Williams, "Usage-Based Pricing and Demand for Residential Broadband", EMA forthcoming
Pakes, A. "Patents as Options: Some Estimates of the Value", EMA 1986
Malone, J., A. Nevo, and J. Williams, "The Tragedy of the Last Mile: Economic Solutions to Congestion in Broadband Networks", Working Paper
Williams, K. "The Welfare Effects of Dynamic Pricing: Evidence from Airline Markets." EMA
Hortacsu, Natan, Parsley, Schweig, Williams, "Incorporating Search and Sales Information into Demand Estimation" Working Paper 2021
Aryal, G., C. Murry, and J. Williams, "Price Discrimination in International Airline Markets.", Working Paper
Nekipelov, D., Novosad, P., and Ryan, Stephen. "Moment Forests" Working Paper 2022
Fox J., K. Kim, and C. Yang, "A Simple Nonparametric Approach to Estimating the Distribution of Random Coefficients in Structural Models", JOE 2016
Kaji T, Manresa E, and G. Pouliot. "An Adversarial Approach to Structural Estimation" Working Paper 2022
Kaji T, Manresa E, and G. Pouliot. "Adversarial Inference is Efficient" AEA P&P 2021

Liang T, Misra S, and M Ferrell. "Deep Neural Networks for Estimation and Inference" *Econometrica* 2021

Liang T, Misra S, and M Ferrell. "Deep Learning for Individual Heterogeneity" Working Paper 2021

Supplemental:

Arcidiacono P. and R. Miller, "Conditional Choice Probability Estimation of Dynamic Discrete Choice Models with Unobserved Heterogeneity," EMA 2011

Aguirregabiria V. "The Dynamics of Markups and Inventories in Retail Firms," *ReStud* 1999.

Aguirregabiria V. and P. Mira, "Swapping the Nested Fixed Point Algorithm: A Class of Estimators for Discrete Markov Decision Models", EMA 2002

Eckstein, Z., and K. Wolpin. "The Specification and Estimation of Dynamic Stochastic Discrete Choice Models," *JHR* 1989

Fox J. and A. Gandhi, "Nonparametric Identification and Estimation of Random Coefficients in Multinomial Choice Models" *RAND*

Fox J., K. Kim, S. Ryan, P. Bajari, "A Simple Estimator for the Distribution of Random Coefficients" *QE* 2011

Gilligan T. "Lemons and Leases in the Used Business Aircraft Market," *JPE* 2004

Hendel I. and A. Nevo, "Sales and Consumer Inventory." *RJE* 2006

Hotz J. and B. Miller, "Conditional Choice Probabilities and the Estimation of Dynamic Models," *ReStud* 1993

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

Schmidt-Dengler, P. "The Timing of New Technology Adoption: The Case of MRI" WP 2015

Discrete Games:

In Class:

Berry S., "Estimation of a Model of Entry in the Airline Industry," EMA 1992

Bresnahan T. and P. Reiss, "Entry in Monopoly Markets," *ReStud* 1990

Bresnahan T. and P. Reiss, "Entry and Competition in Concentrated Markets," *JPE* 1991

Ciliberto F. and E. Tamer, "Market Structure and Multiple Equilibria in Airline Markets," EMA 2008

Mazzeo M., "Product Choice and Oligopoly Market Structure," *RJE* 2002

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

Sweeting, A., "The strategic timing incentives of commercial radio stations: An empirical analysis using multiple equilibria" *RJE* 2009

Tamer, E. "Incomplete Simultaneous Discrete Response Model with Multiple Equilibria," *ReStud* 2003

Ciliberto, Murry, and Tamer "Market Structure and Competition in Airline Markets." *JPE* 2021

Li, Mazur, Park, Sweeting, Zhang, "Repositioning and Market Power After Airline Mergers," *RAND* 2022

Supplemental:

Andrews D., S. Berry, and P. Jia, "Confidence Regions for Parameters in Discrete Games with Multiple Equilibria, with an Application to Discount Chain Store Location," *EMA* forthcoming

Bajari P., H. Hong, and S. Ryan, "Identification and Estimation of Discrete Games of Complete Information," *EMA* 2010

Berry S. and J. Waldfogel, "Product Quality and Market Size," *JIE* 2010.

Bresnahan, T., "Sutton's sunk costs and Market Structure: Price Competition, Advertising, and the Evolution of Concentration: Review Article." *RJE* 1992

Ciliberto F., A. Miller, H. Nielsen, and M. Simonsen, "Playing the Fertility Game At Work," *IER* forthcoming

Cohen A. and M. Mazzeo, "Market Structure and Competition among Retail Depository Institutions," *The ReStat* 2007

Cohen A., B. Freeborn and B. McManus, "Competition and Crowding Out in the Market for Outpatient Substance Abuse Treatment," *IER* 2013

De Paula, A. and B. Honore, "Interdependent Durations in Joint Retirement Decisions" *WP* 2015

De Paula A. and X. Tang "Inference of Signs of Interaction Effects in Simultaneous Games with Incomplete Information *EMA* 2012

De Paula, A. "Econometric Analysis of Games with Multiple Equilibria", *ARE* 2013

De Paula, A. "Inference in a Synchronization Game with Social Interactions" *JOE* 2009

Ellickson, P. B., "Does Sutton apply to supermarkets?", *RJE* 2007

Ho K., "Insurer-Provider Networks in the Medical Care Market," *AER* 2009.

Ho, K., "The welfare effects of restricted hospital choice in the US medical care market," *JAE* 2006

Holmes T. "The Diffusion of Wal-Mart and Economies of Density," *EMA* 2011

Mankiw, N. G. and M.D. Whinston. "Free Entry and Social Inefficiency." *RJE* 1986

McManus B. and B. Hamilton, "Technology Diffusion and Market Structure: Evidence from Infertility Treatment Markets," *WP*

Panle J., "What Happens When Wal-Mart Comes to Town: An Empirical Analysis of the Discount Industry," *EMA* 2008

Reiss P. "Empirical Models of Discrete Strategic Choices," *AER* 1996

Shaked, A. and J. Sutton, "Multi-Product Firms and Market Structure." RJE 1990

Snider C. and J. Williams "Barriers to Entry in the Airline Industry: A Multi-Dimensional Regression-Discontinuity Analysis of AIR-21" ReStat 2015

Sutton J., Sunk Costs and Market Structure, MIT Press 1991

Dynamic Games:

In Class:

Aguirregabiria, V. and P. Mira. "Sequential Estimation of Dynamic Discrete Games," EMA 2007

Bajari, P., Benkard, L., J. Levin. "Estimating Dynamic Models of Imperfect Information," EMA 2007

Benkard, C.L., P. Jeziorksi, and G.Y. Weintraub "Oblivious Equilibrium for Concentrated Industries", RJE 2014

Benkard, L., Bodoh-Creed, A., and John Lazarev. "Simulating the Dynamic Effects of Horizontal Mergers: U.S. Airlines," WP 2015

Benkard L., "A Dynamic Analysis of the Market for Wide-Bodied Commercial Aircraft Market," Review of Economics Studies, 2004.

Berry, S. and A. Pakes, "Estimation from the First Order Conditions for Dynamic Controls." WP 2000

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

De Paula, A., S. Richards-Shubik, and E. Tamer, "Identification of Preferences in Network Formation Games", WP 2015

Doraszelski, U. and M. Satterthwaite. "Computable Markov-Perfect Industry Dynamics," RJE 2010

Ericson, R. and A. Pakes. "Markov-Perfect Industry Dynamics: A Framework for Empirical Work," ReStud 1995

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

Farias, V., D. Saure, and G.Y. Weintraub "An Approximate Dynamic Programming Approach to Solving Dynamic Oligopoly Models", RJE 2012

Gedge C., J. Roberts, and A. Sweeting, "A Model of Dynamic Limit Pricing with an Application to the Airline Industry", WP 2015

Goolsbee A. and C. Syverson, "How Do Incumbents Respond to the Threat of Entry? Evidence from the Major Airlines", QJE 2008

Ifrach, B. and G.Y. Weintraub, "A Framework for Dynamic Oligopoly in Concentrated Industries, WP 2015

Pakes A., J. Porter, K. Ho, and J. Ishii, "Moment Inequalities and Their Applications," EMA 2015

Pakes, A. and P. McGuire. "Stochastic Algorithms, Symmetric Markov Perfect Equilibrium, and the 'Curse' of Dimensionality," EMA 2001

Pakes, A. and P. McGuire. "Computing Markov-Perfect Nash Equilibria: Numerical Implications of a Dynamic Differentiated Product Model," RJE 1994

Ryan S., "The Costs of Environmental Regulation in a Concentrated Industry", EMA 2012

Sweeting, A. "A Model of Non-Stationary Dynamic Price Competition with an Application to Platform Design" WP 2015

Sweeting A., "Dynamic Product Positioning in Differentiated Product Industries: The Effect of Fees for Musical Performance Rights on the Commercial Radio Industry", EMA 2013

Takahashi, Y. "Estimating a War of Attrition: The Case of the US Movie Theatre Industry" AER 2015

Weintraub, G.Y., C.L. Benkard, and B. Van Roy, "Computational Methods for Oblivious Equilibrium, *OR* 2010

Weintraub, G.Y., C.L. Benkard, and B. Van Roy "Markov Perfect Industry Dynamics with Many Firms", EMA 2008

Horacsu A, Ory A, K Williams "Dynamic Price Competition: Theory and Evidence from Airline Markets" WP 2022

Deb J, Ory A, K Williams "Aiming for the Goal: Contribution Dynamics of Crowd Funding" WP 2022

Seim K, Li F., Zhang H., and J Williams "Measuring the Implications of Common Resources on Demand: Evidence from Telecommunications" WP 2022

Supplemental:

Abreu, D. "Extremal Equilibria of Oligopolistic Supergames," JET 1986

Adlakha, S., R. Johari, and G.Y. Weintraub, "Equilibria of Dynamic Games with Many Players: Existence, Approximation, and Market Structure, *JET* 2015

Aguirregabiria V. and C. Ho, "A Dynamic Oligopoly Game of the US Airline Industry: Estimation and Policy Experiments," JOE 2012

Aguirregabiria V., P. Mira, H. Roman, "An Estimable Dynamic Model of Entry, Exit and Growth in Oligopoly Retail Markets," *AER. Papers and Proceedings*. May, 2007.

Besanko, D., Doraszelski, U., Lu, L., and M. Satterthwaite. "Lumpy Capacity Investment and Disinvestment Dynamics," OR 2010

Besanko, D., Doraszelski, U., Kryukov, Y., and M. Satterthwaite. "Learning-by-Doing, Organizational Forgetting, and Industry Dynamics," EMA 2010

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

Brock, W., and J. Scheinkman, "Price-Setting Supergames with Capacity Constraints," ReStud 1985

Chen, J., Doraszelski, U., and J. Harrington. "Avoiding Market Dominance: Product Compatibility in Markets with Network Effects," RJE 2009

Chevalier, J., A. Kashyap and P. Rossi, "Why Don't Prices Rise During Periods of Peak Demand? Evidence from Scanner Data," AER 2003

Compte, O., F., Jenny, and P. Rey, "Capacity Constraints, Mergers, and Collusion," EER 2002

Doraszelski, U. "An RD Race with Knowledge Accumulation," RJE 2003

Doraszelski, U. and S. Markovich. "Advertising Dynamics and Competitive Advantage," RJE 2007

Doraszelski, U. and K. Judd. "Dynamic Stochastic Games with Sequential State-to-State Transitions," WP 2007

Doraszelski, U. and K. Judd. "Avoiding the Curse of Dimensionality in Dynamic Stochastic Games," QE 2011

Ellison, Glenn. "Theories of Cartel Stability and the Joint Executive Committee," RJE 1994

Ellison G. and S.F. Ellison, "Strategic Entry Deterrence and the Behavior of Pharmaceutical Incumbents Prior to Patent Expiration," AEJ – Micro 2011

Esteban, S. and Shum, M. "Durable-Goods Oligopoly with Secondary Markets: the Case of Automobiles," RJE 2007

Fershtman, C. and A. Pakes. "A Dynamic Oligopoly with Collusion and Price Wars," RJE 2000

Genesove, D. and W. Mullin, "Rules, Communication and Collusion: Narrative Evidence from the Sugar Institute Case," AER 2001

Green, E. and R. Porter. "Non-Cooperative Collusion Under Imperfect Price Information," EMA 1984

Goettler, R. L. and Gordon, B. R. "Does AMD spur Intel to Innovate More?" JPE 2011

Gowisankaran, G. and R. Town "Dynamic Equilibrium in the Hospital Industry." JEMS 1997

Gowrisankaran G. and T. Holmes, "Mergers and the Evolution of Industry Concentration: Results From the Dominant Firm Model," RJE 2004

Gowrisankaran G., "A Dynamic Model of Endogenous Horizontal Mergers," RJE 1999

Gowrisankaran G. and R. Town, "Dynamic Equilibrium in the Hospital Industry," JEMS 1997

Judd, K.. "Credible Spatial Preemption," RJE 1978

Kadiyali, V.. "Entry, its Deterrence, and its Accommodation: A Study of the U.S. Photographic Film Industry," RJE 1996

Kadiyali, V.. "Post Entry Investment and Market Structure in the Chemical Processing Industry," RJE 1987

Kalouptsidi, M. "Time to Build and Shipping Prices," WP 2015

Levhari, D. and L. Mirman. "The Great Fish War: An Example Using a Dynamic Cournot-Nash Solution," BJE 1980

Maskin, E. and J. Tirole. "A Theory of Dynamic Oligopoly, I: Overview and Quantity Competition with Large Fixed Costs," EMA 1988

Maskin, E. and J. Tirole. "A Theory of Dynamic Oligopoly, II: Price Competition, Kinked Demand Curves, and Edgeworth Cycles," EMA 1988

Milgrom, P. and J. Roberts. "Limit Pricing and Entry Under Incomplete Information: An Equilibrium Analysis." EMA 1982

Ordover, J. and Saloner G., "Predation, Monopolization, and Antitrust," in HIO.

Pakes, A. "A Framework for Applied Dynamic Analysis in I.O.," WP 2000

Pakes, A., Ostrovsky, M., Steven Berry. "Simple Estimators for the Parameters of Discrete Dynamic Games (with Entry/Exit Examples)," RJE 2007

Pesendorfer, M. and P. Schmidt-Dengler "Asymptotic Least Squares Estimators for Dynamic Games," ReStud 2008

Porter, Robert. "A Study of Cartel Stability and the Joint Executive Committee," BJE 1983

Rotemberg, J. and G. Saloner. "A Supergame-Theoretic Model of Price Wars During Booms," AER 1986

Stigler G., "A Theory of Oligopoly," JPE 1964

Salvo A., "Inferring Market Power under the Threat of Entry: The Case of the Brazilian Cement Industry", RJE 2010.

Schmalensee R., "Entry Deterrence in the Ready-to-eat Breakfast Cereal Industry," BJE 1978

Snider C., "Predatory Incentives and Predation Policy: The American Airlines Case" WP 2015

Takahashi, Y. "Pooling Data across Markets in Dynamic Markov Games" QE forthcoming

Timmins, C.. "Measuring the Dynamic Efficiency Costs of Regulators' Preferences: Municipal Water Utilities in the Arid West," EMA 2002

Tirole, "Industrial Organization", Chapter 6

Vasconcelos, H., "Tacit Collusion, Cost Asymmetries, and Mergers," RJE 2005

Weintraub, G.Y., L. Benkard, P. Jeziorski, and B. Van Roy "Nonstationary Oblivious Equilibrium" WP 2015

Weintraub, G.Y., C.L. Benkard, and B. Van Roy, "Industry dynamics: Foundations for Models with an Infinite Number of Firms," *JET* 2011.

Williams J., "Capacity Investment, Exclusionary Behavior, and Welfare: A Dynamic Model of Competition in the US Airline Industry," WP 2015

Auctions:

In Class:

Hendricks, K. and R. Porter. "An Empirical Study of an Auction with Asymmetric Information," AER 1988

Guerre, E., I. Perrigne, and Q. Vuong. "Optimal Nonparametric Estimation of First-Price Auctions", EMA 2000

Haile, P. and E. Tamer. "Inference in an Incomplete Model of English Auctions," JPE 2003

Hong, H. and M. Shum. "Increasing Competition and the Winners Curse: Evidence from Procurement," ReStud 2002

Laffont, J., O. Herve, and Q. Vuong, "Econometrics of First-Price Auctions," EMA 1995

Laffont, J. and Q. Vuong, "Structural Analysis of Auction Data," AER P&P 1996

Supplemental:

Akerlof, G. "The Market for Lemons: Qualitative Uncertainty and the Market Mechanism," QJE 1970

Ashenfelter, O. "How Auctions Work for Wine and Art," JEP 1989

Athey, S. and P. Haile. "Identification of Standard Auction Models," EMA 2002

Bajari, P. and A. Hortacsu. "Are Structural Estimates of Auction Models Reasonable? Evidence from Experimental Data," JPE 2005

Bhattacharya, V., J. Roberts, and A. Sweeting, "Regulating Bidder Participation in Auctions" RJE 2014

Bulow, J. and J. Roberts. "The Simple Economics of Optimal Auctions," JPE 1989

Klemperer, P., "Auction Theory: A Guide to the Literature," JES 1999

Hendricks, K., J. Pinske, and R. Porter. "Empirical Implications of Equilibrium Bidding in First-Price, Symmetric, Common Value Auctions," ReStud 2003

Hendricks, K. and Robert Porter. "An Empirical Perspective on Auctions," HIO

Milgrom, P. and R. Weber. "A Theory of Auctions and Competitive Bidding," EMET 1982

Myerson, R., "Optimal Auction Design," MOR 1981

Myerson, R. and M. Satterthwaite. "Efficient Mechanisms for Bilateral Trading," JET 1983

Paarsch H. and H. Hong "An Introduction to the Structural Econometrics of Auction Data." Cambridge, MA: MIT Press.

Roberts, J. and A. Sweeting, "When Should Sellers Use Auctions?" AER 2013

Vickrey, W. "Counterspeculation, Auctions and Competitive Sealed Tenders," JOF 1961,

Other Papers of Interest (things I've found interesting)

Gowrisankaran G., R. Lee, and A. Collard-Wexler "'Nash-in-Nash' Bargaining: A Microfoundation for Applied Work," WP 2015

Gowrisankaran G., A. Nevo, R. Town, "Mergers When Prices Are Negotiated: Evidence from the Hospital Industry" AER 2015

Ackerberg, D.. "Advertising, Learning, and Consumer Choice in Experience Good Markets: An Empirical Examination," IER 2003

Crawford G. and M. Shum, "Uncertainty and Learning in Pharmaceutical Demand," EMA 2005

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

Crawford G. "The Discriminatory Incentives to Bundle: The Case of Cable Television," QME 2008

Crawford G. and M. Shum "Monopoly Quality Degradation and Regulation in Cable Television," JLE 2007

Crawford G., M. Shum, and A. Shcherbakov "The Welfare Effects of Monopoly Quality Choice: Evidence from Cable Television Markets," WP 2015

Crawford G., R. Lee, M. Whinston, and A. Yurukoglu, "The Welfare Effects of Vertical Integration in Multichannel Television Markets," WP 2015

Luo, Y. "Bundling and Nonlinear Pricing in Telecommunications" WP 2015

Luo, Y. and Q. Vuong "Structural Analysis of Nonlinear Pricing," WP 2015

Luo, Y., I. Perrigne, and Q. Vuong, "Multiproduct Nonlinear Pricing: Mobile Voice Service and SMS," WP 2012

Lazarev J., "The Welfare Effects of Intertemporal Price Discrimination: An Empirical Analysis of Airline Pricing in US Monopoly Markets" WP 2015

Lazarev J., "Getting More from Less: Understanding Airline Pricing." WP 2012