

# RESECON 797M: Industrial Organization II

## Syllabus, Spring 2021

This course is a part of the IO sequence and it follows RES EC 732 in the graduate level introduction to empirical industrial organization. The emphasis is heavily on recent, cutting-edge research papers. The aim is to provide the tools necessary to write a solid dissertation in empirical industrial organization, and the hope is that the techniques in this class will be useful to students from other fields.

The course has some difficult econometrics, and it is expected that students have a basic comfort level with estimation. It is also expected that students will do requisite background reading in econometric theory where necessary. There is no primary textbook for this class. We will be using a combination of lecture notes and journal articles. All of the articles below are easily accessible from the web. Problem sets will be assigned after each topic to ensure that students have familiarity with coding and computational issues.

Topics to be covered would include:

### 1. Demand Estimation

- Endogeneity issues, absence of individual level data, Logit models
- Random coefficient logit model (BLP models)
- Extensions of BLP models: Endogenous product choice, pure characteristics model, Computational issues

### 2. Estimation of entry games (Static Entry Models)

- Complete and incomplete information entry game
- Multiplicity of equilibria and econometric challenges
- Introduction to advanced techniques (a brief introduction to moment inequality and partial identification)

### 3. Dynamics

- Single agent dynamics
- Dynamic discrete choice and Dynamic games

### 4. Other Topics (Depending on time): Vertical issues, exclusive dealings, Antitrust issues; Productivity; Auctions; Bargaining

# Reading List

## 1 Demand

### Required Readings

- Deaton, A., and Muellbauer, J. (1980), “An Almost Ideal Demand System,” *American Economic Review*, 70, 312-336.
- Shubham Chaudhuri, Penny Goldberg, and Panle Jia (2006), “Estimating the Effects of Global Patent Protection in Pharmaceuticals: A Case Study of Quinolones in India”, *American Economic Review*.
- S. Berry (1994), “Estimating Discrete-Choice Models of Product Differentiation,” *RAND Journal of Economics*, 25 (2), pp. 242-262.
- S. Berry, J. Levinsohn, and A. Pakes (1995), “Automobile Prices in Market Equilibrium,” *Econometrica*, 63, July, pp. 841-890.
- S Berry, J Levinsohn, A Pakes, (2004), “Differentiated Products Demand Systems from a Combination of Micro and Macro Data: The New Car Market,” *Journal of Political Economy*, 112, 1, p. 68.
- Steven Berry and A. Pakes (2007), “The Pure Characteristics Demand Model,” *International Economics Review* (See Ariel’s website for the original working paper version).
- Myrto Kalouptsi (2010), “From Market Shares to Consumer Types: Duality in Differentiated Product Demand Estimation,” *Journal of Applied Econometrics*.
- Jean-Pierre Dube, Jeremy Fox, and Che-Lin Su (2012), “Improving the Numerical Performance of BLP Static and Dynamic Discrete Choice Random Coefficients Demand Estimation,” *Econometrica*, Vol. 80 (5), 2231-2267, September.

### Additional Readings (alphabetical order)

- Atila Abdulkadiroglu, Nikhil Agarwal, and Parag Pathak (2014), “The Welfare Effects of Congestion in Uncoordinated Assignment: Evidence from NYC HS Match,” MIT working paper.
- Dan Akerberg (2003), “Advertising, Learning and Consumer Choice in Experience Good Markets: A Structural Empirical Examination,” *International Economic Review*, Vol 44 (3). (This paper is one of the most under-appreciated papers and should have appeared in a much better journal)
- Pat Bajari, Lanier Benkard (2005), “Demand Estimation With Heterogeneous Consumers and Unobserved Product Characteristics: A Hedonic Approach,” *Journal of Political Economy*, 113(6), 1239-1276. (A hedonic model with minor flaws)
- Steven Berry, Amit Gandhi and Philip Haile (2013), “Connected Substitutes and Invertibility of Demand”, *Econometrica*, September.

- Steven Berry and Panle Jia (2010), “Tracing the Woes: An Empirical Analysis of the Airline Industry,” *American Economic Journal: Microeconomics*.
- Burda, M., Harding, M. C., & Hausman, J. A. (2012), “A poisson mixture model of discrete choice,” *Journal of Econometrics*.
- James Cardon and Igal Hendel (2001), “Asymmetric information in health insurance: evidence from the national medical expenditure survey” *Rand Journal of Economics*, Vol 32, No. 3, pp 408-427. (A mixture of discrete plan choice and continuous health expenditure)
- Tat Chan (2006), “Estimating a Continuous Hedonic Choice Model with an Application to Demand for Soft Drinks,” *Rand Journal of Economics*, Vol 37(2). (The title says it all)
- Dube, J.-P. (2004). Multiple discreteness and product differentiation: Demand for carbonated soft drinks. *Marketing Science*, 23, 66-81. (A discrete-continuous demand model.)
- J. Dubin and D. McFadden (1984), “An Econometric Analysis of Residential Electric Appliance Holdings and Consumption,” *Econometrica*, Vol 52., pp. 345-362. (One of the first few that combine discrete choices with continuous demand)
- Alon Eizenberg (2013), “Upstream Innovation and Product Variety in the United States Home PC Market,” The Hebrew University of Jerusalem working paper.
- Sara Ellison, Iain Cockburn, Zvi Griliches, and Jerry Hausman (1997), “Characteristics of Demand for Pharmaceutical Products: An Exploration of Four Cephalosporins,” *RAND Journal of Economics*, 28(3), 426-446. (A often-cited early application on pharma demand)
- Matthew Gentzkow (2006), “Valuing New Goods in a Model with Complementarity: Online Newspapers.” *American Economic Review*. (A model that analyzes complements)
- Michelle Goeree (2010), “Limited Information and Advertising in the U.S. Personal Computer Industry”, *Econometrica*. (A model that analyzes the uncertainty of choice sets)
- Penny Goldberg (1995), “Product Differentiation and Oligopoly in International Markets: The Case of the U.S. Automobile Industry,” *Econometrica*, Jul. 1995, pp. 891-951. (One of the early papers on nested logit demand)
- Austan Goolsbee and Amil Petrin (2004), “The Consumer Gains from Direct Broadcast Satellites and the Competition with Cable TV,” *Econometrica*.
- Hanemann, W. M. (1984). Discrete/continuous models of consumer demand. *Econometrica*, 52 (3), 541-561. (A discrete-continuous demand model)
- Jerry Hausman (1997), “Valuing the Effect of Regulation on New Services in Telecommunications,” *The Brookings Papers on Economic Activity: Microeconomics*, pp 1-38.
- Igal Hendel (1999), “Estimating Multiple-Discrete Choice Models: An Application to Computerization Returns,” *The Review of Economic Studies*, Vol 66, No. 2., pp. 423-446.
- Chris Knittel and Konstantinos Metaxoglou (2008), “Estimation of Random Coefficient Demand Models: Challenges, Difficulties, and Warnings,” forthcoming, *Review of Economics and Statistics*.

- Daniel McFadden and Kenneth Train (2000), “Mixed MNL Models for Discrete Response”, *Journal of Applied Econometrics*, Vol. 15(5), pp. 447-470.
- Aviv Nevo (2000), “A Practitioner’s Guide to Estimation of Random Coefficients Logit Models of Demand,” *Journal of Economics & Management Strategy*, 9(4), 513-548. Nevo’s website also posts the related MATLAB code. Note: there is a (famous) minor error in the calculation of the Jacobian matrix that has been widely recognized. It is possible that the current code posted on Nevo’s website has already been corrected.
- Aviv Nevo (2001), “Measuring Market Power in the Ready-to-Eat Cereal Industry,” *Econometrica*, 69(2), 307-342.
- Chris Nosko (2013), “Competition and Quality Choice in the CPU Market,” Chicago working paper.
- A. Pakes (2003), “A Reconsideration of Hedonic Price Indexes with an Application to PC’s,” *American Economic Review*, December.
- Amil Petrin (2002), “Quantifying the Benefits of New Products: The Case of the Minivan,” *Journal of Political Economy*, 110:705-729.
- Kenneth Train, (2003), “Discrete Choice Methods with Simulation”, Cambridge University Press.

### Methodological Readings: SMM

- Dan Akerberg (2009), “A New Use of Importance Sampling to Reduce Computational Burden in Simulation Estimation,” *Quantitative Marketing and Economics*, vol. 7(4), pages 343-376, December
- Paul Glasserman (2003), “Monte Carlo Methods in Financial Engineering,” Springer-Verlag New York, Inc.
- D. McFadden (1989), “A Method of Simulated Moments for Estimation of Discrete Response Models Without Numerical Integration,” *Econometrica*, Vol. 57(5), 995–1026.
- Ariel Pakes, and David Pollard (1989), “Simulation and the Asymptotics of Optimization Estimators,” *Econometrica*, vol. 57(5), pp. 027-1057.

## 2 Entry and Static Games

### Required Readings

- Timothy Bresnahan and Peter C. Reiss (1991), “Entry and Competition in Concentrated Markets”, *Journal of Political Economy*.
- S. Berry (1992), “Estimation of a Model of Entry in the Airline Industry,” *Econometrica*, 60, 889–917.
- M. Winston and N. Mankiw (1986), “Free Entry and Social Inefficiency,” *Rand Journal of Economics*, 17, Spring, pp. 48-58.

- K. Saim (2006), “An Empirical Model of Firm Entry with Endogenous Product-Type Choices,” *Rand Journal of Economics*.
- P. Jia (2008) “What Happens When Wal-Mart Comes to Town: An Empirical Analysis of the Discount Retail Industry,” *Econometrica*.
- Thomas Holmes (2011), “The Diffusion of Wal-Mart and Economies of Density,” *Econometrica*, Vol 79 (1), 253-302.

### Additional Readings

- Steven Berry and Joel Waldfogel (1999), “Free Entry and Social Inefficiency in Radio Broadcasting,” *Rand Journal of Economics*.
- Federico Ciliberto and Elie Tamer (2009), “Market Structure and Multiple Equilibria in the Airline Industry,” *Econometrica*.
- Leemore S. Dafny (2005), “Games Hospitals Play: Entry Deterrence in Hospital Procedure Markets,” *Journal of Economics and Management Strategy*, Vol 14 (3), pp513-542.
- Glenn Ellison and Sara Ellison (2011), “Strategic Entry Deterrence and the Behavior of Pharmaceutical Incumbents Prior to Patent Expiration,” *American Economic Journal: Microeconomics*, 3, Feb 2011, pp1-36
- Austan Goolsbee and Chad Syverson (2008), “How do Incumbents Respond to the Threat of Entry? Evidence from the Major Airlines,” *Quarterly Journal of Economics*, Vol 123(4), pp1611-33
- Chang-Tai Hsieh and Enrico Moretti (2003), “Can Free Entry Be Inefficient? Fixed Commissions and Social Waste in the Real Estate Industry,” *Journal of Political Economy*.
- Katherine Ho: “Insurer-Provider Networks in the Medical Care Market”, AER 2008.
- Joy Ishii: “Compatibility, Competition, and Investment in Network Industries: ATM Networks in the Banking Industry,” 2008 Stanford working paper.
- Vrinda Kadiyali (1996), “Entry, Its Deterrence, and Its Accommodation: A Study of the U.S. Photographic Film Industry,” *Rand Journal of Economics*, Vol. 27 (3), pp 452-478
- M. Mazzeo (2002), “Product Choice and Oligopoly Market Structure,” *Rand Journal of Economics*.
- Fiona M. Scott Morton (1999), “Entry Decisions in the Generic Pharmaceutical Industry,” *Rand Journal of Economics*, Vol 30(3), pp 421-440
- Robert Wilson (1992), “Strategic Models of Entry Deterrence,” in R.J. Aumann, and S. Hart, eds., *Handbook of Game Theory with Economic Applications*, New York: Elsevier Science Publishers, Vol 1, Chp 10, pp 305-329

## Methodological Readings

- Victor Chernozhukov, Elie Tamer, and Han Hong (2007), “Inference on Identified Parameter Sets in Econometric Models,” *Econometrica*.
- Azeem Shaikh (2010), “Inference for the Identified Set in Partially Identified Econometric Models”, *Econometrica*.
- Donald Topkis, “Supermodularity and Complementarity”, 1998, Princeton University Press.

## 3 Dynamic Models

### Required Readings

- John Rust: “Optimal Replacement of GMC Bus Engines: An Empirical Model of Harold Zurcher”, *Econometrica*, Vol. 55, No. 5 (Sep., 1987), pp. 999-1033
- R. Ericson and A. Pakes (1995), “Markov Perfect Industry Dynamics: A Framework for Empirical Work,” *Review of Economic Studies*, Vol.62, pp 53-82.
- V. Joseph Hotz and Robert A. Miller, “Conditional Choice Probabilities and the Estimation of Dynamic Models,” *Review of Economic Studies*, Vol. 60, No. 3 (Jul., 1993), pp. 497-529
- A. Pakes and P. McGuire (1994), “Computing Markov Perfect Nash Equilibrium: Numerical Implications of a Dynamic Differentiated Product Model,” *RAND Journal of Economics*, pp. 555-589.
- P. Bajari, L. Benkard, and J. Levin (2007), “Estimating Dynamic Models of Imperfect Competition,” *Econometrica*.
- V. Aguirregabiria and P. Mira (2007), “Sequential Estimation of Dynamic Discrete Games,” *Econometrica*
- M. Pesendorfer and Philipp Schmidt-Dengler (2008), “Asymptotic Least Squares Estimators for Dynamic Games,” *Review of Economic Studies*.
- A. Pakes, M. Ostrovsky, and S. Berry (2007), “Simple Estimators for the Parameters of Discrete Dynamic Games,” *Rand Journal of Economics*, vol 38(2), Jun.

### Methodological Readings

- V. Chernozhukov and H. Hong (2003), “An MCMC Approach to Classical Estimation,” *Journal of Econometrics*, 115(2), pp. 293-346.

### Additional References

- Lanier Benkard (2004), “Learning and Forgetting: The Dynamics of Aircraft Production,” *American Economic Review*, 90 (4), 1034 - 1054.
- David Besanko and Ulrich Doraszelski (2004), “Capacity Dynamics and Endogenous Asymmetries in Firm Size,” *RAND Journal of Economics*, 35 (1), 23 - 49.

- Thomas Covert (2014), “Experiential and Social Learning in Firms: The Case of Dydraulic Fracturing in the Bakken Shale,” job market paper, Harvard University.
- Michael Dickstein (2013), “Efficient Provision of Experience Goods: Evidence from Antidepressant Choice”, Stanford working paper.
- C. Fershtman and A. Pakes (2000), “A Dynamic Oligopoly with Collusion and Price Wars,” *RAND Journal of Economics*, Vol. 31(2), pages 207-236, Summer.
- A. Gavazza (2011), “Leasing and Secondary Markets: Theory and Evidence from Commercial Aircraft,” *Journal of Political Economy*, vol 119 (2), April.
- Ronald L. Goettler and Brett R. Gordon (2011), “Does AMD Spur Intel to Innovate More?” *Journal of Political Economy*, Vol. 119, No. 6, 1141-1200
- Gautam Gowrisankaran (1999), “A Dynamic Model of Endogenous Horizontal Mergers,” *RAND Journal of Economics* 30, 56-83
- Gautam Gowrisankaran and Marc Rysman (2012), “Dynamics of Consumer Demand for New Durable Goods”, *Journal of Political Economy*, 120, pp1173-1219.
- I. Hendel and A. Nevo (2006), “Measuring the Implications of Sales and Consumer Inventory Behavior,” *Econometrica*, 74(6), pp1637-1673.
- Myrto Kalouptsidi (2014), “Time to Build and Fluctuations in Bulk Shipping,” *American Economic Review*, 104(2): 564-608
- Thierry Magnac and David Thesmar, “Identifying Dynamic Discrete Decision Processes,” *Econometrica*, 70(2), pp 801-816
- Eric Maski and Jean Tirole (1988), “A Theory of Dynamic Oligopoly. I: Overview and Quantity Competition with Large Fixed Costs,” *Econometrica*, 56(3), pp549-569
- Eric Maski and Jean Tirole (1988), “A Theory of Dynamic Oligopoly. II: Price Competition, Kinked Demand Curves, and Edgeworth Cycles,” *Econometrica*, 56(3), pp571-599
- Mitsuru Igami (2013), “Estimating the Innovator’s Dilemma: Structural Analysis of Creative Destruction,” Yale working paper.
- Ariel Pakes (1986), “Patents as Options: Some Estimates of the Value of Holding European Patent Stocks,” *Econometrica*, Vol. 54, No. 4 (Jul., 1986), pp. 755-784
- S. Ryan (2012), “The Costs of Environmental Regulation in a Concentrated Industry,” *Econometrica*, 80(3), p. 1019–1062.

## 4 Merger and Competition Policy

### Required Readings

- “2010 United States Horizontal Merger Guidelines”
- “Antitrust Evaluation of Horizontal Mergers” by Joseph Farrell and Carl Shapiro
- Jonathan B. Baker and Timothy F. Bresnahan (1985), “The Gains from Merger or Collusion in Product-Differentiated Industries,” *Journal of Industrial Economics*, vol 33(4), pp. 427-444