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Day/Time	Tue. 11:00AM - 1:00PM
Location	OI 5270
Office Hours	Tue. 4:00PM - 5:00PM (GE 310)

Course Overview

This is a course in the Industrial Organization sequence. We aim to give a solid grounding in understanding the structure of markets, and the strategic behavior of firms and their consumers. The goal is to familiarize students with selected theoretical and empirical topics in industrial organization. In particular, this course aims to help students start their own research agendas, and to look at some particular IO topics in greater depth.

Why studying industrial organization? There are policy issues on anti-trust, regulation, and consumer protection and commercial implications which are based primarily around IO issues including pricing and competitive analysis. In this course we will cover fundamental topics and techniques in IO, and such techniques are widely used in other economics fields as well. Beyond the economics discipling, estimating demand, understanding product positioning, pricing, and the other topics that we cover are also central concerns in the literature on marketing, strategy and information systems.

Below is a short list of what will be covered in this course (details in course outline, page 2):

- Demand Estimation
 - Product space approach
 - Characteristic space approach
- Production Functions
 - Industry dynamics
- Market Structure
 - Antitrust and horizontal merger
 - Vertical markets: theory and empirics
 - Two-sided markets: theory and empirics
- IO Topics
 - Bargaining: theory and empirics
 - Models of Networks

Assessment

The grades will be determined by **two problem sets (25% each)**, and **one final exam (50%)**. The secret to a successful researcher in IO is like everything else, practice, practice, practice. In the first class I will explain how the problems are designed and why it may help you better understand each topic.

- **Problem sets**

There will be two problem sets, and this class will require you to be able to program. You are expected to have a working knowledge of Matlab **and** Stata, or equivalent software (such as R, Python, Julia, or whatever you are comfortable with). But I **highly** recommend you settle on software that is part of the current equilibrium in economics.

All students must write and submit their **own** answers and code to all the problem sets. As you will see very soon, structural models and IO techniques are complicated. The only way to learn is to actually go through the exercises with a substantial amount of personal effort.

- **Final exam**

The final exam is a two-hour, closed-book exam. The time and location will be announced later in the semester.

Background Reading

We expect all of you to have micro and econometrics background on the order of what is covered in the first-year PhD sequence.

- For many of the theory topics, we will start by covering material in Tirole's *Theory of Industrial Organization*. This is essentially a required text for an IO economist.
- For empirical IO, Victor's new book *Empirical Industrial Organization: Models, Methods, and Applications* is a good reference. Also, you can check *Dynamic Games in Empirical Industrial Organization* by Victor Aguirregabiria, Allan Collard-Wexler, and Stephen Ryan
- If you are interested in antitrust issues, you should read *The Antitrust Revolution*. It covers a wide range of litigation cases, it is non-technical, and fun to read.

Course Outline

Below is an outline of the topics that will be covered during the course, with a rough idea of the number of classes devoted to each topic. Papers that are starred (*) will be covered in class and you are **recommended** to read them before each class. This set of papers listed is by no means comprehensive and is more for your reference. But if you do IO as a field, you will likely end up reading these sooner or later. This outline is tentative and subject to change as the course progresses.

1. Introduction to Course and IO Overview

- * Berry, Steven and Gaynor, Martin and Morton, Fiona Scott "Do Increasing Markups Matter? Lessons from Empirical Industrial Organization" *Journal of Economic Perspectives*, 33 (2019), pp. 44–68.
- * Tirole, Jean "Theory of Industrial Organization", Monopoly 62-69, and Cournot-Bertrand page 204-237.
- Einav and Levin. "Empirical Industrial Organization: A Progress Report." *Journal of Economic Perspectives* 24.2 (2010), pp.145-162.
- Bresnahan, Tim "Empirical Studies with Market Power." *Handbook of Industrial Organization*, vol. II, chap. 17.
- Tirole, Jean. "Market Failures and Public Policy." *American Economic Review* 105.6 (2015), 1665-82.
- Chandler, Alfred D. "The Visible Hand: The Managerial Revolution in American Business" Harvard University Press, 1977.
- Sutton, John. "Sunk Costs and Market Structure: Price Competition, Advertising, and the Evolution of Concentration." MIT Press Books 1 (2007).

2. Overview of Demand Estimation and Product Space Approach

- * Hausman, J., G. Leonard, et al. "Competitive Analysis with Differentiated Products." *Annales D'Economie et de Statistique* 34.2 (1994): 159-80.
- * Goldberg, P and S. Chaudhuri and P. Jia "Estimating the Effects of Global Patent Protection in Pharmaceuticals: A Case Study of Quinolones in India" *American Economic*

Review 96.5 (2006), 1477-1514.

- Deaton and Muellbauer. "An Almost Ideal Demand System" *American Economic Review* 70.3 (1980), 312-326.
- Bresnahan, T. "Competition and Collusion in the American Automobile Oligopoly: The 1955 Price War" *The Journal of Industrial Economics*, Vol. 35, No. 4, *The Empirical Renaissance in Industrial Economics* (Jun., 1987), pp. 457-482.
- Hausman, Jerry, "Valuation of New Goods Under Perfect and Imperfect Competition," in Bresnahan and Gordon (eds.), *The Economics of New Goods*, NBER Studies in Income and Wealth vol. 58 (1996): 209-237.
- Trajtenberg, Manuel, "The Welfare Analysis of Product Innovation, with an Application to CT Scanners," *Journal of Political Economy* vol. 97 (1989): 444-479.

3. Characteristics Space Approach (Discrete Choice and BLP)

- * Berry, S. "Estimating Discrete-Choice Models of Product Differentiation" *The RAND Journal of Economics*, Vol. 25, No. 2 (Summer, 1994), pp. 242-262.
- * Berry, S. and Levinsohn, J. and Pakes, A. "Automobile Prices in Market Equilibrium", *Econometrica*, 63.4 (1995), pp. 841-890.
- Nevo, Aviv. "Measuring Market Power in the Ready-to-Eat Cereal Industry", *Econometrica*, Vol. 69, No. 2 (Mar., 2001), pp. 307-342.
- Anderson, Simon P., Andre de Palma, and Jacques-Francois Thisse (1992): *Discrete Choice Theory of Product Differentiation*, Cambridge, MA: The MIT Press.
- Caplin, A., and B. Nalebuff, "Aggregation and Imperfect Competition: On the Existence of Equilibrium." *Econometrica* 59 (1991): 25-60.
- Goldberg, Pinelopi Koujianou. "Product Differentiation and Oligopoly in International Markets: The Case of the U.S. Automobile Industry." *Econometrica*, 63 (1995), 891-951.
- TF Bresnahan, S Stern, M Trajtenberg "Market Segmentation and the Sources of Rents from Innovation: Personal Computers in the Late 1980s", *RAND Journal of Economics* 28.0 (1997), S17-S44.
- Petrin, Amil. "Quantifying the Benefits of New Products: The Case of the Minivan", *Journal of Political Economy* 110.4 (2002), 705-729.
- Rasmusen Notes on BLP (<http://www.rasmusen.org/published/blp-rasmusen.pdf>).
- Nevo, A. "Mergers with differentiated products: The case of the ready-to-eat cereal industry." *Rand Journal of Economics* 31.3 (2000): 395-421.
- Nevo, Aviv. "A practitioner's guide to estimation of random coefficients logit models of demand." *Journal of economics & management strategy* 9.4 (2000): 513-548.
- Hendel, Igal, "Estimating Multiple Discrete Choice Models: An Application to Computerization Returns", *Review of Economic Studies* vol. 66 (1999): 423-446.
- Gentzkow, Matthew, "Valuing New Goods in a Model with Complementarities: Online

Newspapers", *American Economic Review* 97.3 (2007), 713-744.

- Train, Kenneth E. *Discrete choice methods with simulation*. Cambridge university press, 2009.

4. Production Functions

- * Akerberg, Daniel A, Kevin Caves, and Garth Frazer, "Identification properties of recent production function estimators," *Econometrica*, 2015,83(6), 2411–2451.
- * Olley, G Steven and Ariel Pakes, "The dynamics of productivity in the telecommunications equipment industry," *Econometrica*, 1996,64(6), 1263–1297.
- Levinsohn, James and Amil Petrin, "Estimating production functions using inputs to control for unobservables," *The review of economic studies*, 2003,70(2), 317–341.
- Blundell, Richard, and Stephen Bond. "Initial conditions and moment restrictions in dynamic panel data models." *Journal of econometrics* 87, no. 1 (1998): 115-143.
- Arellano, Manuel, and Stephen Bond. "Some tests of specification for panel data: Monte Carlo evidence and an application to employment equations." *The review of economic studies* 58, no. 2 (1991): 277-297.
- Hsieh, Chang-Tai, and Peter J. Klenow. "Misallocation and manufacturing TFP in China and India." *The Quarterly journal of economics* 124, no. 4 (2009): 1403-1448.
- Asker, John, Allan Collard-Wexler, and Jan De Loecker. "Dynamic inputs and resource (mis) allocation." *Journal of Political Economy* 122, no. 5 (2014): 1013-1063.

5. Antitrust and Horizontal Mergers

- * Tirole. pp 209-224.
- * Bresnahan, T (1982) "The oligopoly solution concept is identified", *Economic Letters*, Vol 10(1): 87-92.
- * Whinston, M. D. (2006). *Lectures on Antitrust Economics*, MIT Press (chapter 2 on Horizontal Mergers).
- Williamson, O. E. "Allocative Efficiency and the Limits of Antitrust." *The American Economic Review* 59.2 (1969): 105-118.
- Horizontal Mergers: An Equilibrium Analysis Joseph Farrell and Carl Shapiro, *The American Economic Review* Vol. 80, No. 1 (Mar., 1990), pp. 107-126.
- U.S. Department of Justice. (1997). "Horizontal Merger Guidelines." <https://www.justice.gov/atr/horizontal-merger-guidelines-0>
- Tirole on Tacit Collusion
- Dafny, L., Duggan, M. and Ramanarayanan, S., "Paying a Premium on Your Premium? Consolidation in the U.S. Health Insurance Industry," *AER* 2012.

- * Igami, Mitsuru, and Kosuke Uetake. "Mergers, innovation, and entry-exit dynamics: Consolidation of the hard disk drive industry, 1996–2016." *The Review of Economic Studies* 87, no. 6 (2020): 2672-2702.
- Bresnahan, Timothy F. "The oligopoly solution concept is identified." *Economics Letters* 10, no. 1-2 (1982): 87-92.
- Backus, Matthew, Christopher Conlon, and Michael Sinkinson. Common ownership and competition in the ready-to-eat cereal industry. No. w28350. National Bureau of Economic Research, 2021.
- Clark, Robert, and Mario Samano. "Incentivized Mergers and Cost Efficiency: Evidence from the Electricity Distribution Industry." *Available at SSRN 3703127* (2020).

6. Vertical Markets: Theory and Empirics

Theory

- * Tirole, Chapter 4
- * Whinston (2006) Lectures on Antitrust Economics Chapter 4
- Rey and Tirole (1986) "The Logic of Vertical Restraints", *AER*, 76, 921-939
- Bernheim and Whinston (1998) "Exclusive Dealing", *JPE*, 106(1), 64-103
- Fumagalli and Motta (2006) "Exclusive Dealing and Entry when Buyers Compete", *AER*
- Joskow (2005), "Vertical Integration", *Handbook of New Institutional Economics*, available at <http://econ-www.mit.edu/files/5510>.
- McAfee and Schwarz (1994), "Opportunism in Multilateral Vertical Contracting: Nondiscrimination, Exclusivity, and Uniformity", *AER*
- Nocke and White (2007), "Do Vertical Mergers Facilitate Upstream Collusion?", *AER*
- Rasmusen, Ramseyer and Wiley (1991) "Naked Exclusion", *AER* 81(5), 1137-1145
- Rey and Tirole (2007) "Primer on Foreclosure", *Handbook of IO Vol 3*, available at <http://idei.fr/doc/by/tirole/primer.pdf>
- Segal and Whinston (2000) "Exclusive contracts and protection of investments", *RAND*
- Whinston (2000), "Tying, Foreclosure, and Exclusion", *AER*

Empirics

- * Ho (2009) "Insurer Provider Networks in the Medical Care Market", *AER*
- * Hastings (2004) "Vertical relationships and competition in the retail gasoline markets" *AER* (see also *AER* comment: Taylor Kreisle Zimmerman (2010))
- Akerberg and Botticini (2002) "Endogenous Matching and the Empirical Determinants of Contractual Form", *JPE*

- Chipty (2001) "Vertical Integration, Market Foreclosure and Consumer Welfare", AER 91(3) 428-453
- Crawford, Lee, Whinston, Yurukoglu (2014), "The Welfare Effects of Vertical Integration in Multichannel Television Markets"
- Gilbert and Hastings (2005) "Vertical Integration in Gasoline Supply: An Empirical Test of Raising Rivals' Costs", JIE
- Ho (2006) "Welfare Effects of Restricted Hospital Choice", JAE
- Villas-Boas (2007), "Vertical Relationships between Manufacturers and Retailers: Inference with Limited Data", ReStud.

7. Two-sided Markets: Theory and Empirics

Theory

- * Armstrong, M. (2006): "Competition in Two-Sided Markets," RAND, 37(3), 668-691.
- Rochet, J. and J. Tirole (2006): "Two-Sided Markets: A Progress Report," RAND, 37(3), 645-667.
- Weyl, G. (2010): "A Price Theory of Multi-sided Platforms," AER, 100(4), 1642-72.
- Jullien, B. and A. Pavan (2013): "Platform Competition under Dispersed Information," working paper.

Empirics

- * Rysman (2004) "Competition Between Networks: A Study of the Market for Yellow Pages", RESTUD.
- Chou Shy (1990) "Network Effects without Network Externalities", IJIO.
- Nair Chintagunta Dube (2004) "Empirical Analysis of Indirect Network Effects in the Market for Personal Digital Assistants", QME.
- Lee (2013) "Vertical Integration and Exclusivity in Platform and Two-Sided Markets", AER.

8. Bargaining: Theory and Empirics

Theory

- * Horn, Henrick, and Asher Wolinsky. "Bilateral monopolies and incentives for merger." The RAND Journal of Economics, 19.3 (1988): 408-419.
- Collard-Wexler, Allan, Gautam Gowrisankaran, and Robin S. Lee. "Nash-in-Nash bargaining: a microfoundation for applied work." Journal of Political Economy, 127.1 (2019): 163-195.
- Shaked, Avner, and John Sutton. "Involuntary unemployment as a perfect equilibrium in a bargaining model." Econometrica, 52.6 (1984): 1351-1364.

Empirics

- * Crawford Yurukoglu (2012) "The Welfare Effects of Bundling in Multichannel Television", AER
- Gowrisankran Nevo Town (forthcoming), "Mergers When Prices Are Negotiated: Evidence from the Hospital Industry", AER.
- Grennan (2012), "Bargaining Ability and Competitive Advantage: Empirical Evidence from Medical Devices", AER
- Ho Lee (2013), "Insurer Competition and Negotiated Hospital Prices", mimeo.

9. Models of Networks

- * Aguirregabiria, Victor, Robert Clark, and Hui Wang. "Diversification of geographic risk in retail bank networks: evidence from bank expansion after the Riegle - Neal Act." *The RAND Journal of Economics* 47, no. 3 (2016): 529-572.
- * Aguirregabiria, Victor, and Chun-Yu Ho. "A dynamic oligopoly game of the US airline industry: Estimation and policy experiments." *Journal of Econometrics* 168, no. 1 (2012): 156-173.
- * Holmes, Thomas J. "The diffusion of Wal-Mart and economies of density." *Econometrica* 79, no. 1 (2011): 253-302.
- * Fajgelbaum, Pablo D., and Edouard Schaal. "Optimal transport networks in spatial equilibrium." *Econometrica* 88, no. 4 (2020): 1411-1452.
- * Brancaccio, Giulia, Myrto Kalouptsi, and Theodore Papageorgiou. "Geography, transportation, and endogenous trade costs." *Econometrica* 88, no. 2 (2020): 657-691.
- Chen, Yanyou. *Network Structure and Efficiency Gains from Mergers: Evidence from US Freight Railroads*. Technical report, Working paper, 2022.
- Yuan, Zhe. "Network competition in the airline industry: A framework for empirical policy analysis." Available at SSRN 3246222 (2020).
- Molinari, F., et al. (2019): "Econometrics with partial identification," *The Handbook of Econometrics*. (Section 3.4)
- De Paula, Áureo, Seth Richards-Shubik, and Elie Tamer. "Identifying preferences in networks with bounded degree." *Econometrica* 86, no. 1 (2018): 263-288.
- Ishii, J. (2005): "Compatibility, competition, and investment in network industries: ATM networks in the banking industry," Unpublished working paper.

Proposed Schedule

Week	Topics	Note
Week 1: Sep. 3	<ul style="list-style-type: none"> Introduction to Course and IO Overview 	
Week 2: Sep. 10	<ul style="list-style-type: none"> Demand estimation: overview and product space approach 	Problem set 1 will be handed-out
Week 3: Sep. 17	<ul style="list-style-type: none"> Demand estimation: characteristics space approach (discrete choice and BLP) 	
Week 4: Sep. 24	<ul style="list-style-type: none"> Production functions 	
Week 5: Oct. 1	<ul style="list-style-type: none"> Industry dynamics 	
Week 6: Oct. 8	<ul style="list-style-type: none"> Market: horizontal merger and vertical markets, theory 	Problem set 1 due at 11:59pm Oct. 7
Week 7: Oct. 15	<ul style="list-style-type: none"> Market: vertical markets, empirics 	
Week 8: Oct. 22	No class.	Problem set 2 will be handed-out
Week 9: Oct. 29 Reading Week	<ul style="list-style-type: none"> Bargaining, theory & empirics 	
Week 10: Nov. 5	<ul style="list-style-type: none"> Market: two-sided market, theory 	
Week 11: Nov. 12	<ul style="list-style-type: none"> Market: two-sided market, empirics 	
Week 12: Nov. 19	<ul style="list-style-type: none"> Models of Networks I 	Problem set 2 due at 11:59pm Nov. 18
Week 13: Nov. 26	<ul style="list-style-type: none"> Models of Networks II 	
Week 14	Final Exam	Time and location TBA