Instructor Yanyou Chen
Email yanyou.chen@utoronto.ca
Day/Time Tu 11:00AM - 1:00PM
Location Sidney Smith Hall, Room 2117 (SS 2117)
Office Max Gluskin House 310 (GE 310)
Office Hours Tu 2:00PM - 3:00PM

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
  - Dynamic demand
- Production Functions
- Market Structure
  - Antitrust and horizontal merger
  - Vertical markets: theory and empirics
  - Two-sided markets: theory and empirics
- IO Topics
  - Bargaining: theory and empirics
  - Empirical Auction
  - Models of Networks

Meetings

We have a 2-hours lecture every Tuesday from 11am to 1pm in room SS-2117 (Sidney Smith Hall).

- Lectures will be delivered in-person **and** livestreams are available (links to livestream will be emailed before each class). There are **no** recordings of the lectures.
- Caveat: the delivery method is subject to change depends both on efficiency of course delivery and the changing situation of COVID-19.

Assessment

The grades will be determined by **attendance (10%),** and **three problem sets (30% each)**. The secret to a successful researcher in IO is like everything else, practice, practice, practice. In the first class I will explain how the three problems are designed and why it may help you better understand each topic.

- **Attendance**

In the course outline, each week I list papers with a star (*) next to them, this indicates reading is required before class. The starred papers will be discussed in class and inability to discuss these

papers will reflect badly on you. More importantly, you won't get much for the class without reading the papers.

- **Problem sets**

There will be three 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.

You are allowed to collaborate and discuss your work with you classmates. However, 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.

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.

- *Modern Industrial Organization* (by Carlton and Perloff), *Industrial Organization* (by Oz Shy) and *Introduction to Industrial Organization* (by Luis Cabral) are some nice undergraduate texts. Give it a try if you want to see what the simplest possible version of a model looks like. Some people call those books good bedtime reading.

- 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 (in parenthesis). Papers that are starred (*) will be covered in class and you are **required** 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.

Introduction (1)

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).

Demand Estimation (3)

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. Dynamic Demand (Single-agent dynamics and CCP)

- * Hendel, I. and Nevo, A., "Measuring the Implications of Sales and Consumer Stockpiling Behavior", Econometrica, Vol. 74, No. 6 (Nov., 2006), 1637-1673.
- * Bajari, Patrick, C. Lanier Benkard, and Jonathan Levin. "Estimating Dynamic Models of Imperfect Competition." Econometrica 75.5 (2007): 1331-1370.
- Aguirregabiria, Victor and Mira, "Dynamic discrete choice structural models: A survey", Journal of Econometrics, 156.1 (2010): 38-67.
- Aguirregabiria, Victor and Aviv Nevo. "Recent Developments in Empirical IO: Dynamic Demand and Dynamic Games" Advances in Economics and Econometrics: Theory and Applications: Tenth World Congress, 2013.
- Hotz, V. Joseph, and Robert A. Miller. "Conditional Choice Probabilities and the Estimation of Dynamic Models." The Review of Economic Studies 60.3 (1993): 497-529.
- Hotz, V. Joseph, Robert A. Miller, Seth Sanders, and Jeffrey Smith. "A Simulation Estimator for Dynamic Models of Discrete Choice." The Review of Economic Studies 61.2 (1994): 265-289.
- Pakes, Ariel, Michael Ostrovsky, and Steven Berry. "Simple estimators for the parameters of discrete dynamic games (with entry/exit examples)." RAND Journal of Economics 38.2 (2007): 373-399.
- Aguirregabiria, Victor and Pedro Mira. "Sequential Estimation of Dynamic Discrete Games." Econometrica 75.1 (2007): 1-53.

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

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

- Ryan, Stephen P. "The Costs of Environmental Regulation in a Concentrated Industry." Econometrica 80.3 (2012): 1019-1061.

- Igami, Mitsuru. "Estimating the Innovator's Dilemma: Structural Analysis of Creative Destruction in the Hard Disk Drive Industry, 1981-1998." Journal of Political Economy 125.3 (2019).

- Kalouptsidi, Myrto. "Time to Build and Fluctuations in Bulk Shipping." American Economic Review 104.2 (2014): 564-608.

Production Function (1)

5. Production Functions

- * Ackerberg, 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.

Market Structure (3)

6. 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.

7. 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
- Bernhein 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))
- Ackerberg 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.

8. 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.

IO Topics (4)

9. 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.

10. Empirical Auction I

- * Hendricks, Kenneth, and Robert H. Porter. "An empirical study of an auction with asymmetric information." The American Economic Review (1988): 865-883.
- * Porter, Robert H., and J. Douglas Zona. "Detection of bid rigging in procurement auctions." Journal of political economy 101, no. 3 (1993): 518-538.
- Myerson, Roger B. "Optimal auction design." Mathematics of operations research 6, no. 1 (1981): 58-73.
- Klemperer, Paul. Auctions: theory and practice. Princeton University Press, 2004. (first chapter in particular).
- John Asker’s Lecture notes on Auctions (http://www.johnasker.com/Auctions%20I.pdf).

11. Empirical Auction II

- * Laffont, Jean-Jacques, Herve Ossard, and Quang Vuong. "Econometrics of first-price auctions." *Econometrica: Journal of the Econometric Society* (1995): 953-980.
- * Guerre, Emmanuel, Isabelle Perrigne, and Quang Vuong. "Optimal nonparametric estimation of first-price auctions." Econometrica 68, no. 3 (2000): 525-574.
- Luo, Y., & Wan, Y. (2018): “Integrated-quantile-based estimation for first-price auction models.” Journal of Business & Economic Statistics, 36(1), 173-180.
- Luo, Y., Perrigne, I., & Vuong, Q. (2018): “Auctions with ex post uncertainty”. The RAND Journal of Economics, 49(3), 574-593.
- Paarsch, Harry J., and Han Hong. "An introduction to the structural econometrics of auction data." MIT Press Books 1 (2006).
- Athey, Susan, and Philip A. Haile. "Nonparametric approaches to auctions." Handbook of econometrics 6 (2007): 3847-3965.
- Hendricks, Ken, and Robert H. Porter. "An empirical perspective on auctions." Handbook of Industrial Organization 3 (2007): 2073-2143.

- Asker, John. "A study of the internal organization of a bidding cartel." American Economic Review 100, no. 3 (2010): 724-62.

12. 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.
- * Fajgelbaum, Pablo D., and Edouard Schaal. "Optimal transport networks in spatial equilibrium." Econometrica 88, no. 4 (2020): 1411-1452.
- Brancaccio, Giulia, Myrto Kalouptsidi, and Theodore Papageorgiou. "Geography, transportation, and endogenous trade costs." Econometrica 88, no. 2 (2020): 657-691.
- 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	HW
Week 1: Sep. 15	• Introduction to Course and IO Overview	
Week 2: Sep. 22	• Demand estimation: overview and product space approach	
Week 3: Sep. 29	• Demand estimation: characteristics space approach (discrete choice and BLP)	Problem set 1 will be handed-out
Week 4: Oct. 6	• Demand estimation: dynamic demand	Problem set 1 due at 11:59pm Oct. 11
Week 5: Oct.13	• Production functions	
Week 6: Oct.20	• Market: anti-trust and horizontal merger	Problem set 2 will be handed-out
Week 7: Oct. 27	• Market: vertical markets, theory & empirics	
Week 8: Nov. 3	• Market: two-sided market, theory & empirics	Problem set 2 due at 11:59pm Nov. 15
Week 9: Nov. 17	• Bargaining, theory & empirics	
Week 10: Nov. 24	• Empirical auction I	Problem set 3 will be handed-out
Week 11: Dec. 1	• Empirical auction II	
Week 12: Dec. 8	• Models of Networks	
Week 13	**No Final Exam**	Problem set 3 due at 11:59pm Dec. 13