Industrial Organization: basic theory and recent developments

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This course is the second of two courses in the Ph.D. sequence in Industrial Organization. The goal of the sequence is to provide broad general training in the field, introducing you to the central questions around imperfect competition, market structure, innovation, and regulation, as well as the models and empirical methods commonly used to tackle these questions.

The first course, taught by Andrea Pozzi, focuses primarily on empirical methods. The second course, taught by Emilio Calvano and Emanuele Tarantino, begins with basic theory?covering topics such as imperfect competition, search, and innovation. It then progresses to an in-depth exploration of research in digital markets, including AI-powered algorithms and competition, information and privacy, and the economics of platforms.

There will be compulsory problem sets during the course. Final valuation: written exam.

Topics:

- Search
  - Diamond paradox
  - Sequential and non-sequential search model
  - Empirical test of search models
- Static oligopoly games and horizontal mergers
  - Cournot and Bertrand competition and their aggregative games formulation
  - Horizontal mergers in homogeneous and differentiated product markets
  - Empirical model of mergers
- Innovation, patents and antitrust
  - Persistence of monopoly and patent races
  - Antitrust in innovative industries
  - Empirical evidence on killer acquisitions
- Information acquisition and the economics of privacy
  - Experimentation
  - Organization of persuasion
  - Economics of social data

- The economics platforms and digital markets
  - Basics of platforms and two-sided markets
  - Platform design: theory and empirics
  - digital advertising and media industries
  - Platform regulation
- Artificial Intelligence and markets
  - Tools: reinforcement learning and collaborative filtering
  - Application: pricing algorithms
  - Application: algorithmic product recommendations
  - Application: persuading consumers to click

Readings (*=necessary for the lectures, **=introductory readings)

Search

- Anderson and Renault (1999), Pricing, Product Diversity, and Search Costs: A Bertrand-Chamberlin-Diamond Model, RAND Journal of Economics, 30, 719-735.
- *Bergemann, Brooks, and Morris (2021), Search, Information, and Prices, Journal of Political Economy, 129, 2275-2319.
- Baye, Kovenock, and de Vries (1992), It Takes Two to Tango: Equilibria in a Model of Sales, Games and Economic Behavior, 4, 493-510.
- Burdett and Judd (1983), Equilibrium Price Dispersion, Econometrica, 51, 955-969.
- *De Los Santos, Hortacsu, Wildenbeest (2012), Testing Models of Consumer Search Using Data on Web Browsing and Purchasing Behavior, American Economic Review, 102, 2955-2980.
- **Diamond (1971), A Model of Price Adjustment, Journal of Economic Theory, 3, 156-168.
- **Lach (2002), Existence and Persistence of Price Dispersion: An Empirical Analysis, Review of Economics and Statistics, 84, 433-444.
- *Reinganum (1979), A Simple Model of Equilibrium Price Dispersion, Journal of Political Economy, 87, 851-858.
- *Stahl (1989), Oligopolistic Pricing with Sequential Consumer Search, American Economic Review, 79, 700-712.
- *Varian (1980), A Model of Sales, American Economic Review, 70, 651-658.
- *Weitzman (1979), Optimal Search for The Best Alternative, Econometrica, 47, 641-654.
- *Wolinsky (1986), True Monopolistic Competition as a Result of Imperfect Information, Quarterly Journal of Economics, 101, 493-512.

Static oligopoly games and horizontal mergers

- *Azar and Vives (2021), General Equilibrium Oligopoly and Ownership Structure, Econometrica, 89, 999-1048.
- **Asker and Nocke (2021), Collusion, Mergers, and Related Antitrust Issues, Handbook of Industrial Organization Vol 4.
- *Anderson, Erkal and Piccinin (2020), Aggregative Games and Oligopoly Theory: Short-run and Long-run Analysis, Rand Journal of Economics, 51, 470-495.
- Blume (2003), Bertrand Without Fudge, Economics Letters, 78, 167-168.
- *Farrell and Shapiro (1990), Horizontal Mergers: An Equilibrium Analysis, American Economic Review, 80, 107-126.

- Kartik (2011), A Note on Undominated Bertrand Equilibria, Economics Letters, 111, 125-126.
- *Motta and Tarantino (2021), The Effect of Horizontal Mergers, When Firms Compete in Prices and Investments, International Journal of Industrial Organization, 78.
- Nocke and Schutz (2018), Multiproduct-Firm Oligopoly: An Aggregative Games Approach, Econometrica, 86, 523-557.
- Nocke and Whinston (2010), Dynamic Merger Review, Journal of Political Economy, 118, 1201-1251.
- Nocke and Whinston (2013), Merger Policy with Merger Choice, American Economic Review, 103, 1006-1033.
- **Tirole (1988), The Theory of Industrial Organization, MIT Press, Chapter 5.
- *Whinston (2008), Lectures on Antitrust Economics (Cairoli Lectures), MIT Press, Chapter 3.

Innovation, patents and antitrust

- Arrow (1962), Economic Welfare and the Allocation of Resources for Inventions, Princeton University Press.
- *Cunningham, Ederer, and Ma (2021), Killer Acquisitions, Journal of Political Economy, 129, 649-702.
- Eliason (2020), How Acquisitions Affect Firm Behavior and Performance: Evidence from the Dialysis Industry, Quarterly Journal of Economics, 135, 221-267.
- *Gilbert and Newbury (1982), Preemptive Patenting and the Persistence of Monopoly, American Economic Review, 72, 514-526.
- Gilbert and Shapiro (1990), Optimal Patent Length and Breadth, RAND Journal of Economics, 106-112.
- Hopenhayn and Squintani (2021), On the Direction of Innovation, Journal of Political Economy, 129, 1991-2022.
- *Reinganum (1983), Uncertain Innovation and the Persistence of Monopoly, American Economic Review, 73, 741-748.
- *Segal and Whinston (2007), Antitrust in Innovative Industries, American Economic Review, 97, 1703-1730.
- Segal and Whinston (2010), Property Rights.
- Wollmann (2019), Stealth Consolidation: Evidence from an Amendment to the Hart-Scott-Rodino Act, American Economic Review: Insights, 1, 77-94.

Information acquisition and information transmission

- **Bergemann and Bonatti (2019), Markets for Information: An Introduction, Annual Review of Economics, 11, 85-107.
- Henry and Ottaviani (2019), Research and the Approval Process: The Organization of Persuasion, American Economic Review, 109, 911-955.
- *Bergemann, Bonatti, and Gan (2021), The Economics of Social Data, Rand Journal of Economics.
- Bergemann, Bonatti, and Smolin (2019), The Design and Price of Information, American Economic Review, 108, 1-48.
- Bonatti and Cisternas (2020), Consumer Scores and Price Discrimination, Review of Economic Studies, 87, 750-791.
- Che and Horner (2018), Recommender Systems as Mechanisms for Social Learning, Quarterly Journal of Economics, 133, 871-925.
- Ely and Szydlowski (2020), Moving the Goalposts, Journal of Political Economy, 128, 468-506.

Platforms and digital markets

- Armstrong, M. (2006). Competition in two-sided markets. *The RAND Journal of Economics*, 37(3), 668-691.
- Biglaiser, G., Calvano, E., & CrÃ©mer, J. (2019). Incumbency advantage and its value: BIGLAISER et al. *Journal of Economics & Management Strategy*, 28(1), 41?48. https://doi.org/10.1111/jems.12307
- Decarolis, F., & Rovigatti, G. (2021). From mad men to maths men: Concentration and buyer power in online advertising. *American Economic Review*, 111(10), 3299-3327.
- Farronato, C., Fradkin, A., & MacKay, A. (2023). Self-Preferencing at Amazon: Evidence from Search Rankings (No. 30894). National Bureau of Economic Research. https://doi.org/10.3386/w30894
- Hagiu, A., & Jullien, B. (2011). Why do intermediaries divert search? *The RAND Journal of Economics*, 42(2), 337?362. http://www.jstor.org/stable/23046802
- Lee, K. H., & Musolff, L. (2023). Entry into two-sided markets shaped by platform-guided search. Retrieved May 23, 2023, from https://economics.yale.edu/sites/default/files/jmp_entry_into_two-sided_markets_shaped_by_platform-guided.pdf
- Rochet, J., & Tirole, J. (2006). Two-sided markets: a progress report. *The RAND Journal of Economics*, 37(3), 645-667.
- Weyl, E. G. (2010). A Price Theory of Multi-sided Platforms. *The American Economic Review*, 100(4), 1642?1672. https://doi.org/10.1257/aer.100.4.1642

AI and markets

- Agrawal, A., Gans, J., & Goldfarb, A. (2019b). *The Economics of Artificial Intelligence: An Agenda*. University of Chicago Press. https://play.google.com/store/books/details?id=4GyVDwAAQBAJ
- Assad, S., Clark, R., Ershov, D., & Xu, L. (2020). Algorithmic Pricing and Competition: Empirical Evidence from the German Retail Gasoline Market. https://papers.ssrn.com/abstract=3682021
- Banchio, M., & Mantegazza, G. (2022). Artificial intelligence and spontaneous collusion.
- Brown, Z., & MacKay, A. (2021). Competition in Pricing Algorithms, SSRN working paper. https://doi.org/10.2139/ssrn.3485024
- Calvano, E., et al. (2020). Artificial Intelligence, Algorithmic Pricing, and Collusion. *The American Economic Review*, 110(10), 3267?3297. https://doi.org/10.1257/aer.20190623
- Calvano, E., Calzolari, G., Denicolò, V., & Pastorello, S. (2023). Artificial Intelligence, Algorithmic Recommendations and Competition. https://doi.org/10.2139/ssrn.4448010
- Klein, T. (2021). Autonomous algorithmic collusion: Q-learning under sequential pricing. *The RAND Journal of Economics*, 52(3), 538-558.
- O'Connor, J., & Wilson, N. E. (2021). Reduced demand uncertainty and the sustainability of collusion: How AI could affect competition. *Information Economics and Policy*, 54, 100882. https://doi.org/10.1016/j.infoecopol.2020.100882
- Sutton, R. S., & Barto, A. G. (2018). *Reinforcement Learning: An Introduction*. MIT Press. http://www.academia.edu/download/38529120/9780262257053_index.pdf