ECO 2901
INDUSTRIAL ORGANIZATION II

University of Toronto. Department of Economics. Winter 2019

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Class meetings: Thursdays, 9am to 11am. Room: WO-25 (Woodsworth College Residence).
Office hours: Tuesdays & Thursdays 2pm to 3pm.

COURSE DESCRIPTION

This course deals with Empirical Industrial Organization. It covers topics related to **econometric models and empirical applications** of competition in industries. We study empirically the determinants of firms' behaviour and market outcomes in the context of problems of price and quantity competition, investment, innovation, product design, networks, or market entry/exit. The course focuses on research papers using **empirical games** to investigate firms' strategies and competition, and how firms' **information and beliefs** play a fundamental role in the nature of competition and on market outcomes and welfare. The covered topics include recent research that relax standard assumptions of firms' rational expectations and allow for **firms' limited information, biased beliefs, and learning**. The course emphasizes the importance of combining data, economic models, and appropriate identification strategies and econometric techniques to answer empirical questions in economics.

MEETINGS

- We have a 2-hours lecture every Thursday from 9am to 11am in room WO-25.
- We do have class on **Thursday, February 21st**, during Reading Week.
- We have Final Exam in class the last week of the term, on **Thursday, April 4th**.

EVALUATION

Your final grade will be based on the following requirements.

- **Final exam (50%)**. The final exam will cover all the material in the course and it is closed-book. The exam will be on **Thursday, April 4th**, in class.

- **Problem set (50%)**. I will distribute the problem set online on Thursday, February 21st. Your completed problem set is **due on Thursday, March 7th.**

TOPICS

I. Static Models of Competition in Prices or Quantities
II. Static Models of Market Entry and Spatial Location
III. Dynamic Games of Oligopoly Competition

OUTLINE AND REFERENCES

PART I: STATIC MODELS OF COMPETITION IN PRICES OR QUANTITIES

Topic 1: Cournot competition and Conjectural Variations with homogeneous product

- Aguirregabiria, V. (2018): "Empirical Industrial Organization: Models, Methods and Applications," Chapter 4.
- Bresnahan, T. (1982): "The Oligopoly Solution Concept is Identified," *Economics Letters*, 10, 87-92.
- Genesove, D. and W. P. Mullin (1998): "Testing static oligopoly models: Conduct and cost in the sugar industry, 1890-1914," *The Rand Journal of Economics*, 29 (2), 355–377.
- Puller, S. (2009): "Estimation of competitive conduct when firms are efficiently colluding: addressing the Corts critique," *Applied Economics Letters*, 16, 1497-1500.

Topic 2: Bertrand competition with differentiated product

- Bresnahan, T. (1987): "Competition and Collusion in the American Automobile Market: The 1955 Price War," *Journal of Industrial Economics*, 35, 457-482.
- Nevo, A. (2001): "Measuring Market Power in the Ready-to-Eat Cereal Industry," *Econometrica*, 69(2), 307-342.

Topic 3: Conjectural Variations with differentiated product

- Ciliberto, F. and J. Williams (2014): "Does multimarket contact facilitate tacit collusion? Inference on conduct parameters in the airline industry," *The RAND Journal of Economics*, Vol. 45, No. 4, 764-791.
- Michel, C. and S. Weiergraeber (2018): "Estimating Industry Conduct in Differentiated Products Markets: The Evolution of Pricing Behavior in the RTE Cereal Industry," manuscript.

Topic 4: Empirical models of price / quantity competition with incomplete information

- Vives, X. (2002): "Private Information, Strategic Behavior, and Efficiency in Cournot Markets," *The RAND Journal of Economics*, 33(3), 361-376.
- Armantier, O. and O. Richard (2003): "Exchanges of Cost Information in the Airline Industry," *The RAND Journal of Economics*, Vol. 34, No. 3, pp. 461-477.
- Armantier, O., J.P. Florens, J.F. Richard (2008): "Approximation of Nash equilibria in Bayesian games," *Journal of Applied Econometrics*, 23(7), 965-981.
- Gardete, P. (2016). Competing under asymmetric information: The case of dynamic random access memory manufacturing. Management Science, 62, 3291-3309.

PART II: STATIC MODELS OF MARKET ENTRY AND SPATIAL COMPETITIO

Topic 5: Estimation of market entry models: complete and incomplete information

- Aguirregabiria, V. (2018): "Empirical Industrial Organization: Models, Methods and Applications," Chapter 5.
- Berry, S. and E. Tamer (2007): "Identification in Models of Oligopoly Entry," in Advances in Economics and Econometrics: Theory and Applications, Ninth World Congress, vol. 2, R. Blundell, W.K. Newey and T. Persson, eds., Cambridge Univ. Press.
- Bajari, P., H. Hong, J. Krainer and D. Nekipelov (2007): "Estimating Static Models of Strategic Interactions," *Journal of Business & Economic Statistics*, 28(4), 469-482.
- Bresnahan, T. and P. Reiss (1991): "Econometric Models of Discrete Games," *Journal of Econometrics*, 48, 57-81.
- Tamer, E. (2003): "Incomplete Simultaneous Discrete Response Model with Multiple Equilibria," *Review of Economic Studies*, 70(1), 147-165.
- Ciliberto, F. and E. Tamer (2009): "Market Structure and Multiple Equilibria in Airline Markets," *Econometrica*, 77(6), 1791-1828.

Topic 6: Market entry and spatial competition

- Aguirregabiria, V. and J. Suzuki (2016): "Empirical Models of Market Entry and Spatial Competition in Retail Industries," in *Handbook on the Economics of Retail and Distribution*, Emek Basker (editor).
- Seim, K. (2006): "An Empirical Model of Firm Entry with Endogenous Product-Type Choices," RAND Journal of Economics 37(3).
- Jia, P. (2008): "What Happens when Wal-Mart comes to town? Empirical Analysis of the Discount Retailing Industry," *Econometrica*.

Topic 7: Relaxing assumptions on information structure in discrete choice games

- Grieco, P. (2014): "Discrete games with flexible information structures: An application to local grocery markets," *The RAND Journal of Economics*, *45*(2), 303-340.
- Aguirregabiria, V. and P. Mira (2018): "Identification of Games of Incomplete Information with Multiple Equilibria and Unobserved Heterogeneity," manuscript.
- Magnolfi, L., and C. Roncoroni (2018): "Estimation of Discrete Games with Weak Assumptions on Information," manuscript.

Topic 8: Static games of incomplete incomplete information with non-equilibrium beliefs

- Aradillas-Lopez, A., & Tamer, E. (2008): "The identification power of equilibrium in simple games," *Journal of Business & Economic Statistics*, 26, 261-283.
- Goldfarb, A., & Xiao, M. (2011): "Who thinks about the competition? Managerial ability and strategic entry in US local telephone markets," *American Economic Review*, 101, 3130-3161.
- Aguirregabiria, V., & Xie, E. (2017): "Identification of Biased Beliefs in Games of Incomplete Information Using Experimental Data," manuscript.
- Hortacsu, A., Luco, F., Puller, S. & Zhu, D. (2017). Does strategic ability affect efficiency? Evidence from electricity markets. NBER Working Paper, No. 23526. National Bureau of Economic Research.

PART III: DYNAMIC GAMES OF OLIGOPOLY COMPETITION

Topic 9: The structure and estimation of dynamic games of oligopoly competition

- Ericson, R. and A. Pakes (1995): "Markov-Perfect Industry Dynamics: A Framework for Empirical Work," *Review of Economic Studies,* 62, 53-82.
- Aguirregabiria, V. (2018): "Empirical Industrial Organization: Models, Methods and Applications," Chapter 9.
- Aguirregabiria, V. and A. Nevo (2013): "Recent Developments in Empirical IO: Dynamic Demand and Dynamic Games," in Advances in Economics and Econometrics, Volume 3, D. Acemoglu, M. Arellano, and E. Dekel (eds.)
- Aguirregabiria, V. and P. Mira (2007): "Sequential Estimation of Dynamic Discrete Games," *Econometrica*, 75, 1-53.

Topic 10: Dynamic games of innovation

- Pakes, A. and P. McGuire (1994): "Computing Markov-perfect Nash Equilibria: Numerical Implications of a Dynamic Differentiated Product Model," *Rand Journal of Economics*, 25, 555-589.
- Goettler, R. and B. Gordon (2011): "Does AMD spur Intel to innovate more?" *Journal of Political Economy*, 119(6), 1141-1200.
- Igami, M (2017): "Estimating the Innovator's Dilemma: Structural Analysis of Creative Destruction in the Hard Disk Drive Industry," *Journal of Political Economy*, 125(3), 798-847

Topic 11: Dynamic games with non-equilibrium beliefs

- Aguirregabiria, V. and J. Jeon (2018): "Firms' Beliefs and Learning: Models, Identification, and Empirical Evidence," *Review of Industrial Organization*, forthcoming.
- Aguirregabiria, V., & Magesan, A. (2018): "Identification and estimation of dynamics games when players beliefs are not in equilibrium, working paper," manuscript.
- An, Y., Hu, Y., & Xiao, R. (2018): "Dynamic decisions under subjective expectations: A structural analysis," manuscript. Department of Economics. Johns Hopkins University.
- Ellison, S., Snyder, C., & Zhang, H. (2018): "Costs of managerial attention and activity as a source of sticky prices: Structural estimates from an online market," Manuscript. MIT, Department of Economics.

Topic 12: Dynamic games with firms' learning

- Asker, J., Fershtman, C., Jeon, J., & Pakes, A. (2016): "The competitive effects of information sharing," NBER Working Paper, No. 22836. National Bureau of Economic Research.
- Doraszelski, U., Lewis, G., & Pakes, A. (2018): "Just starting out: Learning and equilibrium in a new market," *American Economic Review*, 108, 565-615.
- Fershtman, C., & Pakes, A. (2012): "Dynamic games with asymmetric information: A framework for empirical work," *Quarterly Journal of Economics*, 127, 1611-1661.
- Jeon, J. (2017): "Learning and investment under demand uncertainty in container shipping," Manuscript, Department of Economics, Boston University.

CLASS SCHEDULE & REQUIRED READINGS BEFORE CLASS

WEEK- DATE	TOPIC
Week 1: Jan. 10	Topic 1: Cournot competition and Conjectural Variations with homogeneous product
Week 2: Jan. 17	Topic 2: Bertrand competition with differentiated product
Week 3: Jan. 24	Topic 3: Conjectural Variations with differentiated product
Week 4: Jan. 31	Topic 4: Empirical models of price / quantity competition with incomplete information
Week 5: Feb. 7	Topic 5: Estimation of market entry models: complete and incomplete information
Week 6: Feb. 14	Topic 6: Market entry and spatial competition
Week 7: Feb. 21	Topic 7: Relaxing assumptions on information structure in discrete choice games **Problem set will be handed-out**
Week 8: Feb. 28	Topic 8: Static games of incomplete incomplete information with non-equilibrium beliefs
Week 9: Mar. 7	Topic 9: The structure and estimation of dynamic games of oligopoly competition **Problem set is due**
Week 10: Mar. 14	Topic 10: Dynamic games of innovation
Week 11: Mar. 21	Topic 11: Dynamic games with non-equilibrium beliefs
Week 12: Mar. 28	Topic 12: Dynamic games with firms' learning
Week 13: Apr. 4	**FINAL EXAM**