

## ECO2900H1F -- Industrial Organization I

Fall 2016

Tuesday 11 am – 1 pm

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**Office:** Tuesday 4:00 pm – 5:00 pm, or by appointment

### Course Description:

This course introduces students to several important models that are used in empirical IO studies. It emphasizes on a balanced treatment of game theory and econometric techniques. It covers six topics: theory of product differentiation, static games of market entry, industry dynamics, auctions, bundling and nonlinear pricing, and empirical contract theory.

The following books are useful general references for the different topics in this course:

Osborne, Martin J., and Ariel Rubinstein. *A course in game theory*. MIT press, 1994.

Tirole, Jean. *The theory of industrial organization*. MIT press, 1988.

### Grading:

There will be two problem sets and a term paper. Each problem set counts for 25% and the term paper counts for 50%. Collaboration on the problem sets is encouraged, but your responses should be written independently. You are encouraged to type your homework. Make sure to put your name and student number in the front page. Students can either hand in the problem set to the instructor by the end of the lecture on the due date, or hand in it to the receptionist of the economics department at least one day before the due date. No late problem sets will be accepted.

### Topics:

#### A. Produce Differentiation (2 weeks)

This part discusses the theory of product differentiation. The Hotelling model is a standard tool. The Salop model extends it to allow an arbitrary number of firms. The random utility model of Perloff and Salop (1985) is a model of nonlocalized competition, where each firm competes against the market. Chen and Riordan (2007) introduce the spokes model of nonlocalized competition which extends the Hotelling duopoly model.

References:

Anderson, Simon P., Andre De Palma, and Jacques François Thisse. *Discrete choice theory of product differentiation*. MIT press, 1992.

Hotelling, H. (1929). "Stability in Competition", *Economic Journal*, vol. 39, pp. 41-57.

Salop, S.C. (1979). "Monopolistic competition with outside goods", *Bell Journal of Economics*, vol. 10, pp. 141-156.

Perloff, Jeffrey M., and Steven C. Salop. "Equilibrium with product differentiation." *The Review of Economic Studies* 52, no. 1 (1985): 107-120.

Chen, Yongmin, and Michael H. Riordan. "Price and Variety in the Spokes Model\*." *The Economic Journal* 117, no. 522 (2007): 897-921.

## **B. Static Games of Market Entry (2 weeks)**

This part starts with the BR model of entry. We survey the literature on identification of games of complete information and then incomplete information. We also extend the discussion to correlated signals, unobserved heterogeneity and flexible information structures.

References:

Bjorn, Paul A., and Quang H. Vuong. Simultaneous equations models for dummy endogenous variables: a game theoretic formulation with an application to labor force participation. No. 537. 1984.

Dunne, Timothy, Mark J. Roberts, and Larry Samuelson. "Patterns of firm entry and exit in US manufacturing industries." *The RAND journal of Economics* (1988): 495-515.

Bresnahan, Timothy F., and Peter C. Reiss. "Entry in monopoly market." *The Review of Economic Studies* 57, no. 4 (1990): 531-553.

Tamer, Elie. "Incomplete simultaneous discrete response model with multiple equilibria." *The Review of Economic Studies* 70, no. 1 (2003): 147-165.

Berry, Steven, and Peter Reiss. "Empirical models of entry and market structure." *Handbook of industrial organization* 3 (2007): 1845-1886.

Ciliberto, Federico, and Elie Tamer. "Market structure and multiple equilibria in airline markets." *Econometrica* 77, no. 6 (2009): 1791-1828.

Bajari, Patrick, Han Hong, and Stephen P. Ryan. "Identification and estimation of a discrete game of complete information." *Econometrica* 78, no. 5 (2010): 1529-1568.

Bajari, Patrick, Han Hong, John Krainer, and Denis Nekipelov. "Estimating static models of strategic interactions." *Journal of Business & Economic Statistics* (2012).

Aguirregabiria, Victor, and Pedro Mira. "Identification of Games of Incomplete Information with Multiple Equilibria and Common Unobserved Heterogeneity." Working Paper (2015).

Xiao, Ruli. "Identification and Estimation of Incomplete Information Games with Multiple Equilibria." Available at SSRN 2591376 (2015).

Liu, Nianqing, Quang Vuong, and Haiqing Xu. Rationalization and identification of discrete games with correlated types. Working paper, 2013.

Grieco, Paul LE. "Discrete games with flexible information structures: An application to local grocery markets." *The RAND Journal of Economics* 45, no. 2 (2014): 303-340.

Wan, Yuanyuan, and Haiqing Xu. "Semiparametric identification of binary decision games of incomplete information with correlated private signals." *Journal of Econometrics* 182, no. 2 (2014): 235-246.

Kline, Brendan. "Identification of complete information games." *Journal of Econometrics* 189, no. 1 (2015): 117-131.

### **C. Models of Industry Dynamics (2 weeks)**

This part introduces several models of industry dynamics.

References:

Jovanovic, Boyan. "Selection and the Evolution of Industry." *Econometrica* (1982): 649-670.

Hopenhayn, Hugo A. "Entry, exit, and firm dynamics in long run equilibrium." *Econometrica* (1992): 1127-1150.

Hopenhayn, Hugo, and Richard Rogerson. "Job turnover and policy evaluation: A general equilibrium analysis." *Journal of political Economy* (1993): 915-938.

Ericson, Richard, and Ariel Pakes. "Markov-perfect industry dynamics: A framework for empirical work." *The Review of Economic Studies* 62, no. 1 (1995): 53-82.

Pakes, Ariel, and Richard Ericson. "Empirical implications of alternative models of firm dynamics." *Journal of Economic Theory* 79, no. 1 (1998): 1-45.

Doraszelski, Ulrich, and Ariel Pakes. "A framework for applied dynamic analysis in IO." *Handbook of industrial organization* 3 (2007): 1887-1966.

Abbring, Jaap H., Jeffrey R. Campbell, Jan Tilly, and Nan Yang. "Very Simple Markov-perfect industry dynamics." (2016).

### **D. Auctions (2 weeks)**

This part surveys the empirical auction literature. First, we introduce auction types, solution concepts, parameter of interest, revenue equivalence, early parametric approaches. Second, we discuss nonparametric identification and estimation of various auction models. Third, we study the literature on common value auctions and multi-unit auctions.

References:

Krishna, Vijay. *Auction theory*. Academic press, 2009.

Guerre, E., Perrigne, I., & Vuong, Q. (2000): "Optimal Nonparametric Estimation of First-Price Auctions," *Econometrica*, 68(3), 525-574.

Athey, S., & Haile, P. A. (2002): "Identification of standard auction models", *Econometrica*, 70(6), 2107-2140.

Haile, P. A., & Tamer, E. (2003): "Inference with an incomplete model of English auctions", *Journal of Political Economy*, 111(1), 1-51.

Guerre, E., Perrigne, I., & Vuong, Q. (2009): "Nonparametric Identification of Risk Aversion in First-Price Auctions under Exclusion Restrictions", *Econometrica*, 77(4), 1193-1227.

Hortacsu, A., & McAdams, D. (2010): "Mechanism choice and strategic bidding in divisible good auctions: An empirical analysis of the Turkish treasury auction market", *Journal of Political Economy*, 118(5), 833-865.

Krasnokutskaya, E. (2011): "Identification and estimation of auction models with unobserved heterogeneity", *The Review of Economic Studies*, 78(1), 293-327.

Marmer, V., & Shneyerov, A. (2012): "Quantile-based nonparametric inference for first-price auctions", *Journal of Econometrics*, 167(2), 345-357.

Marmer, V., Shneyerov, A., & Xu, P. (2013): "What model for entry in first-price auctions? A nonparametric approach", *Journal of Econometrics*, 176(1), 46-58.

Hu, Y., McAdams, D., & Shum, M. (2013): "Identification of first-price auctions with non-separable unobserved heterogeneity", *Journal of Econometrics*, 174(2), 186-193.

Liu, Nianqing and Luo, Yao (2016): "A Nonparametric Test for Comparing Valuation Distributions in First-Price Auctions", *International Economic Review*, forthcoming.

Luo, Yao, and Wan, Yuanyuan (2016): "Integrated-quantile-based estimation for first price auction models", *Journal of Business & Economic Statistics*, forthcoming.

### **E. Bundling and Nonlinear Pricing (2 weeks)**

This part introduces various models of bundling and nonlinear pricing and several empirical applications. We cover the Maskin and Riley (1984) benchmark model, multiproduct nonlinear pricing, competitive nonlinear pricing, sequential screening and more.

References:

Wilson, Robert B. *Nonlinear pricing*. Oxford University Press, 1993.

Maskin, Eric, and John Riley. "Monopoly with incomplete information." *The RAND Journal of Economics* 15, no. 2 (1984): 171-196.

Ivaldi, Marc, and David Martimort. "Competition under nonlinear pricing." *Annales d'Economie et de Statistique* (1994): 71-114.

Stole, Lars A. "Nonlinear pricing and oligopoly." *Journal of Economics & Management Strategy* 4, no. 4 (1995): 529-562.

Armstrong, Mark. "Multiproduct nonlinear pricing." *Econometrica* (1996): 51-75.

Rochet, Jean-Charles, and Philippe Choné. "Ironing, sweeping, and multidimensional screening." *Econometrica* (1998): 783-826.

Armstrong, Mark. "Price discrimination by a many-product firm." *The Review of Economic Studies* 66, no. 1 (1999): 151-168.

Courty, Pascal, and Li Hao. "Sequential screening." *The Review of Economic Studies* 67, no. 4 (2000): 697-717.

Armstrong, Mark, and John Vickers. "Competitive price discrimination." *RAND Journal of Economics* (2001): 579-605.

Rochet, Jean-Charles, and Lars A. Stole. "Nonlinear pricing with random participation." *The Review of Economic Studies* 69, no. 1 (2002): 277-311.

Rochet, Jean-Charles, and Lars A. Stole. "The economics of multidimensional screening." *Econometric Society Monographs* 35 (2003): 150-197.

Rysman, Marc. "Competition between networks: A study of the market for yellow pages." *The Review of Economic Studies* 71, no. 2 (2004): 483-512.

Leslie, Phillip. "Price discrimination in Broadway theater." *RAND Journal of Economics* (2004): 520-541.

McManus, Brian. "Nonlinear pricing in an oligopoly market: The case of specialty coffee." *The RAND Journal of Economics* 38, no. 2 (2007): 512-532.

Armstrong, Mark, and John Vickers. "Competitive non-linear pricing and bundling." *The Review of Economic Studies* 77, no. 1 (2010): 30-60.

Luo, Yao, Isabelle Perrigne, and Quang Vuong. "Multiproduct Nonlinear Pricing: Mobile Voice Service and SMS", 2012.

Chen, Liang and Yao Luo. "Nonlinear Pricing with Network Effects in Yellow Pages", 2012

Luo, Yao, Isabelle Perrigne, and Quang Vuong. "Structural analysis of nonlinear pricing", 2015.

Luo, Yao, "Bundling and Nonlinear Pricing in Telecommunications", 2015

#### **F. Empirical Contract Theory (2 weeks)**

This part studies empirical contract theory. In particular, we focus on models with adverse selection and moral hazard, such as the CEO market and the insurance market. We cover two important parts: (a) testing for asymmetric information and (b) identification and estimation of contract models.

References:

Bolton, Patrick, and Mathias Dewatripont. *Contract theory*. MIT press, 2005.

Salanié, Bernard. *The economics of contracts: a primer*. MIT press, 2005.

Chiappori, Pierre-Andre. "Econometric models of insurance under asymmetric information." In *Handbook of insurance*, pp. 365-393. Springer Netherlands, 2000.

Chiappori, Pierre-André, and Bernard Salanie. "Testing for asymmetric information in insurance markets." *Journal of political Economy* 108, no. 1 (2000): 56-78.

Perrigne, Isabelle, and Quang Vuong. "Nonparametric identification of a contract model with adverse selection and moral hazard." *Econometrica* 79, no. 5 (2011): 1499-1539.

Aryal, Gaurab, Isabelle Perrigne, and Quang Vuong. "Identification of Insurance Models with Multidimensional Screening." Available at SSRN 2094995 (2012).

Cohen, Alma, and Liran Einav. "Estimating risk preferences from deductible choice." *The American economic review* 97, no. 3 (2007): 745-788.

Finkelstein, Amy, and Kathleen McGarry. "Multiple dimensions of private information: evidence from the long-term care insurance market." *American Economic Review* 96, no. 4 (2006): 938-958.

Gayle, George-Levi, and Robert A. Miller. "Has moral hazard become a more important factor in managerial compensation?." *The American Economic Review* (2009): 1740-1769.

Gayle, George-Levi, and Robert A. Miller. "Identifying and testing models of managerial compensation." *The Review of Economic Studies* (2015): rdv004.