

## **G31.1802-01**

### **Industrial Organization II (Spring 2009)**

#### **Overview**

This is a course in the Graduate Industrial Organization sequence. It is closely integrated with other courses in the same field at NYU community (i.e. earlier courses by Jovanovic, Asker and Bacarra in Fall 2008).

This course will cover several broad research areas, including: consumer's dynamic demand; two-period game-theoretical model of firm decisions; competitive models of industry dynamics; dynamic oligopoly; productivity and innovation. This course has a strong empirical focus, which requires not only a thorough understanding of the theories, but also a solid grasp of key econometric and computational techniques.

#### **Course Requirements**

1. **Class participation:** the syllabus lists papers with star next to it. This indicates reading is required *before* class. You are expected to actively join the discussion of these papers in class.
2. **Problem sets:** there are two problem sets for the class. The first one is on consumer's dynamic demand. The second one is on competitive models of industry dynamics. There are two options for each problem set. Option 1 is to referee a recent working paper that's listed on our syllabus. Option 2 is an empirical project to replicate key results in papers we discuss in class.
3. **Final Exam:** there will be a take-home exam.

#### **Course Schedule**

Jan 20: Estimation of Dynamic Models: Aguirregabiria and Mira (2008), Rust (1994), Pakes (1986)

Jan 27: Dynamic Demand I, durable goods: Gowrisankaran and Rysman (2007), storable goods: Hendel and Nevo (2006)

Feb 3: Dynamic Demand II, experience goods: Akerberg (2001), Crawford and Shum (2005)

Feb 10: Two Stage Static Game I, Bresnahan and Reiss (1991), Berry (1992), Mazzeo (2002)

Feb 17: Two Stage Static Game II, Pakes, Porter, Ho, Ishii (2006), Ho (2008)

Feb 24: Competitive Model of Industry Dynamics I, selection: Jovanovic (1982), Dunne, Roberts, and Samuelson (1989), Cooley and Quadrini (2001), Cabral and Mata (2003)

March 3: Competitive Model of Industry Dynamics II, innovation: Klette and Kortum (2004), Lentz and Mortensen (2007)

March 10: Dynamic Oligopoly: Maskin and Tirole (1988), Ericson and Pakes (1995), Benkard (2004). Computation: Pakes and McGuire (1994, 2001).

March 24: Estimation of Dynamic Games I, discrete choice: Pakes, Ostrovsky, and Berry (forthcoming), Dunne, Klimek, Roberts, and Xu (2007), Aguirregabiria and Mira (forthcoming), Collard-Wexler (2007)

March 31: Estimation of Dynamic Games II, continuous choice: Bajari, Benkard, and Levin (2007), Ryan (2007)

April 7: Estimation of Dynamic Games III, unobserved heterogeneity

April 14: Productivity I, investment, learning, and R&D: Olley and Pakes (1996), Akerberg, Caves, and Frazer (2007), Benkard (2001), Doraszelski and Jaumandreu (2007)

April 21: Productivity II, market structure and market power: Klette and Griliches (1996), Foster, et al (2007), Syverson (2004), Hsieh and Klenow (2008)

April 28: Class Presentation

## **Industrial Organization**

### **1. Introduction to the Estimation of Dynamic Structural Models**

#### *Methodology*

- \*Aguirregabiria, V. and Mira, P., “Dynamic Discrete Choice Structural Models: A Survey”, 2008
- Rust, J., “Structural Estimation of Markov Decision Process”, Handbook of Econometrics, Volume 4, North-Holland, 1994

#### *Application*

- Pakes, A., “Patents as Options: Some Estimates of the Value of Holding European Patent Stocks”, Econometrica, 54, 755-84, 1986
- Rust, J., “Optimal Replacement of GMC Bus Engines: An Empirical Model of Harold Zurcher”, Econometrica, 55, 999-1033, 1987

### **2. Dynamic Models of Demand**

#### Experience Goods

##### *Application*

- \*Akerberg, D., “Empirically Distinguishing Informative and Prestige Effects of Advertising”, Rand, Summer 2001, 316-333
- Akerberg D., “Advertising, Learning, and Consumer Choice in Experience Good Markets: A Structural Empirical Examination”, IER, August 2003, 1007-1040
- \*Crawford, G., and Shum, M., “Uncertainty and Learning in Pharmaceutical Demand”, Econometrica, 73, July 2005, 1135-1174

#### Storable Goods and Sales

##### *Application*

- \*Hendel, I. and Nevo, A., “Measuring the Implications of Sales and Consumer Stockpiling Behavior”, Econometrica, forthcoming
- Hendel, I. and Nevo, A., “Sales and Consumer Inventory”, Rand, forthcoming
- Erdem, T., Imai, S. and Keane, M., “Consumer Price and Promotion Expectations: Capturing Consumer Brand and Quantity Choice Dynamics under Price Uncertainty”, Quantitative Marketing and Economics, 1, 5-64

#### Durable Goods and Replacement

##### *Application*

- Esteban, S. and Shum, M., “Durable Goods Oligopoly with Secondary Markets: the Case of Automobiles”, Rand, 2008
- \*Gowrisankaran, G. and Rysman, M., “Dynamics of Consumer Demand for New Durable Goods”, working paper, 2007
- Schiraldi, P., “Automobile replacement: A dynamic structural approach”, working paper, 2007
- Gordon, B., “A Dynamic Model of Consumer Replacement Cycles in the PC Processor Industry.”, working paper, Marketing Science, forthcoming

### **3. Two-stage Static Games of Firm Decisions**

#### Firm Entry and Market Structure

##### *Application*

- \*Bresnahan, T.F., and P.C. Reiss, “Entry and Competition in Concentrated Markets”, JPE, 1991, 99 (5)
- \*Berry, S.T., “Estimation of a Model of Entry in the Airline Industry”, Econometrica, 1992, 60 (4)
- \*Berry, S.T. and E. Tamer, “Identification in Models of Oligopoly Entry”, (invited lecture at the 2005 World Congress of the Econometric Society)
- Jia, P., “What Happens When Wal-Mart Comes to Town: An Empirical Analysis of the Discount Retail Industry”, Econometrica, forthcoming

#### Product Positioning

##### *Application*

- \*Mazzeo, M.J., “Product Choice and Oligopoly Market Structure”, Rand, 2002, 33 (2)
- Seim, K., “An Empirical Model of Firm Entry with Endogenous Product-Type Choices”, Rand, 2006, 37 (3)

#### Set Identification and Vertical Relationships

##### *Methodology*

- \*Pakes, A., Porter, J., Ho, K., and J. Ishii, “Moment Inequalities and Their Application”, working paper, Harvard

##### *Application*

- \*Ho, K., “Insurer-Provider Networks in Medicare Market”, forthcoming, AER
- Ciliberto, F. and E. Tamer, “Market Structure and Multiple Equilibria in the Airline Markets”, working paper, Northwestern

### **4. Competitive Industry Dynamics**

#### *Theory*

- \*Jovanovic, B., “Selection and the Evolution of Industry”, Econometrica, 1982, 649-670
- Hopenhayn, H., “Entry, Exit, and Firm Dynamics in Long Run Equilibrium”, Econometrica, 1992, 1127-1150
- \*Klette, T. and Kortum, S., “Innovating Firms and Aggregate Innovation”, JPE, 112 (5), 2004, 986-1018
- \*Cooley, T. and Quadrini, V., “Financial Markets and Firm Dynamics”, AER, 91 (5), 2001

#### *Application*

- \*Dunne, T., Roberts, M. and Samuelson, L., “The Growth and Failure of U.S. Manufacturing Plants”, QJE, November, 1989
- Asplund M. and Nocke, V., “Firm Turnover in Imperfectly Competitive Markets”, Review of Economic Studies, 73 (2), 2006, 295-327
- \*Lentz, R. and Mortensen, D., “An Empirical Model of Growth through Product Innovation”, Econometrica, forthcoming
- \*Cabral, L. and Mata, J., “On the Evolution of Firm Size Distribution, Facts and Theory”, AER, 2003, 1075-1090

## 5. Dynamic Oligopoly

### *Theory*

- Maskin, E. and Tirole, J., “A Theory of Dynamic Oligopoly, I: Overview and Quantity Competition with Large Fixed Costs”, *Econometrica*, 56 (3), 1988, 549-569
- \*Ericson, R. and Pakes, A., “Markov-Perfect Industry Dynamics: A Framework for Empirical Work”, *The Review of Economic Studies*, 62 (1), 1995, 53-82

### *Computation*

- \*Pakes, A. and McGuire, P., “Computing Markov-Perfect Nash Equilibria: Numerical Implications of a Dynamic Differentiated Product Model”, *Rand*, 25, 1994, 555-589
- \*Benkard, L., “A Dynamic Analysis of Wide-bodied Commercial Aircraft”, *Review of Economic Studies*, 2004
- Pakes, A. and McGuire, P., “Stochastic Algorithms, Symmetric Markov-Perfect Equilibrium, and the Curse of Dimensionality”, *Econometrica*, 69 (5), 2001, 1261-1281
- Doralzelski, U. and Pakes, A., “A Framework for Applied Dynamic Analysis in IO”, working paper, Harvard

### *Estimation Methodology*

- \*Aguirregabiria, V. and Mira, P., “Sequential Estimation of Dynamic Discrete Games”, *Econometrica*, forthcoming
- \*Bajari, P., Benkard, L., and Levin, J., “Estimating Dynamic Models of Imperfect Competition”, *Econometrica*, forthcoming
- \*Pakes, A., Ostrovsky, M. and Berry, S., “Simple Estimators for the Parameters of Discrete Dynamic Games (with Entry/Exit Examples)”, *Rand*, forthcoming

### *Application*

- \*Collard-Wexler, A., “Demand Fluctuations and Plant Turnover in the Ready-Mix Concrete Industry”, working paper, NYU
- \*Ryan, S., “The Costs of Environmental Regulation in a Concentrated Industry”, working paper, MIT
- \*Dunne, T., Klimek, S., Roberts, M. and Xu, Y., “Entry and Exit in Geographic Markets”, working paper, Penn State

### *Recent Progress*

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## **6. Market Structure, R&D, and Productivity Evolution**

### Production Function Estimation

#### *Endogeneity*

- \*Olley, S. and Pakes, A., “The Dynamics of Productivity in the Telecommunications Equipment Industry”, *Econometrica*, 64 (6), 1996, 1263-1297
- Levinsohn, J. and Petrin, A., “Estimation Production Functions using Inputs to Control for Unobservables”, *Review of Economic Studies*, 2003, 317-342
- \*Akerberg, D., Caves, K. and Frazer, G., “Structural Identification of Production Functions”, working paper, UCLA

#### *Market Power and Demand Shocks*

- Klette. T. and Griliches, Z., “The Inconsistency of Common Scale Estimators When Output Prices are Unobserved and Endogenous”, *Journal of Applied Econometrics*, 11 (4), 1996, 343-361
- De Loecker, J., “Product Differentiation, Multi-Product Firms, and Structural Estimation of Productivity”, working paper, Princeton
- \*Foster, L., Haltiwanger, J., and Syverson, C., “Relocation, Firm Turnover, and Efficiency: Selection on Productivity or Profitability”, *AER*, forthcoming

### Theory and Evidence of Endogenous Productivity Evolution

- Griliches, Z., “R&D and Productivity: The Econometric Evidence”, 1998
- Benkard, L., “Learning and Forgetting: The Dynamics of Aircraft Production *AER*, 2000
- \*Doraszelski, U. and Jaumandreu, J., “R&D and Productivity: Estimating Production Functions When Productivity Is Endogenous”, working paper, Harvard University

### Theory and Micro-evidence of Reallocation and Productivity

- \*Syverson, Chad, “Market Structure and Productivity: A Concrete Example”, *JPE*, December 2004
- Hsieh, C. and Klenow, P., “Misallocation and Manufacturing TFP in China and India”, working paper, Stanford
- Schmitz, J., “What Determines Productivity? Lessons from the Dramatic Recovery of U.S. and Canadian Ore Industries Following Their Early 1980s Crisis”, *JPE*, June 2005