**Graduate Economics Module, 395A-03** **Andrew Sweeting**
**Location TBA, Th 1:30-4:30**
**Spring 2010, Jan 14 – Feb 25**

## Entry and Discrete Choice Games

This course focuses on empirical methods for estimating discrete choice games, often called the 'entry game literature'. The first lecture will provide motivation by discussing the theoretical entry literature and some interesting empirical facts. The rest of the course will look at different approaches to estimating discrete choice games in both static and dynamic settings. The focus will be on Industrial Organization applications, although I am happy to discuss other topics that are interesting to the class, as these methods are now widely applied in Marketing, Public, Environmental, Urban and Development contexts. Some knowledge of demand models, dynamic programming and game theory will be assumed.

There are two things I expect students to learn during the course:

(1) how to estimate simple economic models and what is the reasoning behind commonly made assumptions;
(2) that interesting applied questions that can be answered using these types of models.

I would hope that most students taking the course also actively participate in the IO lunch group to be run after the junior job market. Students should also attend any IO talks given by outside speakers.

**Problem Sets and Presentations:** empirical exercises and class presentations will determine your grade for the course. The problem sets are vital for understanding what is going on, and are not optional extras. I am happy for you to work in small groups of two or three people, but each student must submit their own write-up of the results. The empirical work can be done in STATA or MATLAB, but feel free to use other languages if you are more familiar with them.

Depending on enrollment, two students will present an empirical paper each week. One student will present the paper, while the other will offer a constructive critique similar to a referee report. The students should prepare the presentation together and we'll flip a coin to decide who does what on the day. Total presentation time should be 30-40 minutes, although this may vary with the paper. All students will be expected to participate in discussion. I have chosen papers with interesting empirical content so try to emphasize what we learn (or don't learn?), as well as technical aspects.

**Reading List:** for each lecture I have identified (***) a small number of papers that will be covered in some detail. The other papers may be discussed briefly or not at all. I can make suggestions for further reading for anyone who is interested.

There is no required textbook, but all IO economists should cherish their copy of

J. Tirole, *The Theory of Industrial Organization*, MIT Press, 1988

The following are also useful references:

D. Ackerberg, L. Benkard, S. Berry and A. Pakes, Econometric Tools for Analyzing Market Outcomes, http://www.stanford.edu/~lanierb/research/tools8l-6-8.pdf

V. Aguirregabiria and P. Mira, Dynamic Discrete Choice Structural Models: A Survey, http://individual.utoronto.ca/vaguirre/wpapers/survey_annalsje.pdf

**LECTURE 1, JAN 14: THEORETICAL BACKGROUND & INTRODUCTION TO EMPIRICS**

**Presentation:** P. Ellickson, "Supermarkets as A Natural Oligopoly", mimeo, 2004, http://www.econ.duke.edu/~paule/SupermarketsAsNO.pdf

there is some overlap with

P. Ellickson, "Does Sutton Apply to Supermarkets?", RAND, 2007, 43-59

but focus on the natural oligopoly paper.

**a. Theory**

*** Tirole, chapters 7, 8

*** N.G. Mankiw and M.D. Whinston, "Free Entry and Social Inefficiency," RAND Journal of
Economics, 1986, 48-58, http://links.jstor.org/sici?sici=0741-6261%28198621%2917%3A1%3C48%3AFEASI%3E2.0.CO%3B2-O

J. Sutton, Sunk Costs and Market Structure, 1991, MIT Press, chapters 1-3 and industry studies in chapters 6, 8, 9

J. Sutton, Technology and Market Structure, 2001, MIT Press

*** J. Sutton, "One Smart Agent", RJE, 1997, 605-628, http://links.jstor.org/sici?sici=0741-6261%28199724%2928%3A4%3C605%3AOSA%3E2.0.CO%3B2-N

T. Bresnahan, "Sutton's Sunk Costs and Market Structure: Price Competition, Advertising, and
the Evolution of Concentration: Review Article," RJE, 1992, 23(1), 137-52,

J. Sutton, "Gibrat's Legacy", JEL, 1992, 35(1), 40-59, http://links.jstor.org/sici?sici=0022-0515%28199703%2935%3A1%3C40%3AGL%3E2.0.CO%3B2-C
(more details of Sutton's model of the size distribution are contained in Technology and Market Strucutre and an LSE STICERD working paper EI/9 "The Size Distribution of Businesses, Part I", 1995)

**b. Empirical**

*** T. Dunne, M. Roberts and L. Samuelson, "Patterns of Firm Entry and Exit in US Manufacturing", 1988, RJE, 495-515, http://links.jstor.org/sici?sici=0741-6261%28198824%2919%3A4%3C495%3APOFEAE%3E2.0.CO%3B2-0

Bart J. Bronnenberg, Sanjay K. Dhar, and Jean Pierre H. Dubé, “Brand History, Geography, and the Persistence of Brand Shares”, JPE, 2009, 87–115

*** J. Chevalier, “Capital Structure and Product Market Competition: Empirical Evidence from the Supermarket Industry”, American Economic Review, 1995, 85(3), 415-435.

**LECTURE 2, JAN 21, STATIC ENTRY GAMES WITH COMPLETE INFORMATION**

**Presentation and Related Empirical Problem Set:** S. Berry and J. Waldfogel, “Free Entry and Social Inefficiency in Radio Broadcasting” Rand Journal of Economics, 30 (Autumn 1999), 397-420

T. Bresnahan and P. Reiss, “Entry in Monopoly Markets,” Review of Economic Studies, 1990,
531-53

*** T. Bresnahan and P. Reiss, “Entry and Competition in Concentrated Markets,” Journal of Political Economy, 99 (October 1991), pp. 977-1009

*** S. Berry, “Estimation of a Model of Entry in the Airline Industry”, Econometrica, 1992, 889-918,

*** M. Mazzeo, “Product Choice and Oligopoly Market Structure,” RAND Journal of Economics, 2002, 221-42

*** P. Bajari, H. Hong and S. Ryan, “Identification and Estimation of Discrete Games of Complete Information”, Econometrica, forthcoming (may cover in lecture 3)
http://www.econ.umn.edu/~bajari/published/discrete.pdf

T. Bresnahan and P. Reiss , “Measuring the Importance of Sunk Costs”, Annales d'Economie et de Statistique, 1994, 34, 181-217

**LECTURE 3, JAN 28, MULTIPLE EQUILIBRIA AND INCOMPLETE (BUT COMPLETE INFORMATION) MODELS**

**Presentation:** P. Jia, “What Happens when Wal-Mart Comes to Town?”, Econometrica, 2008, 1263-1316
(the focus is not multiple equilibria, but discuss and think about how the problem is approached)

*** F. Ciliberto and E. Tamer, Market Structure and Multiple Equilibria in Airline Markets", Econometrica, forthcoming,
http://faculty.wcas.northwestern.edu/~ett094/market.pdf

*** A. Pakes, J. Porter, K. Ho and J. Ishii, "Moment Inequalities and Their Application", 2006, Harvard

A. Pakes, "Alternative Models for Moment Inequalities", 2009, Harvard (Frisch lecture given at Econometric Society World Congress)

*** J. Ishii, "Compatibility, Competition, and Investment in Network Industries: ATM Networks in the Banking Industry", 2005,
http://www.econ.yale.edu/seminars/apmicro/am06/ishii-060427.pdf
(note: a revised version is coming out in RAND, but for our purpose the earlier version is more interesting)

*** A. Pakes and R. Lee, "Multiple Equilibria and Selection by Learning in an Applied Setting", mimeo, Harvard,
http://www.economics.harvard.edu/faculty/pakes/files/MultipleEquilibria.pdf
(this is a follow-up to the Ishii paper)

K. Ho, "Insurer-Provider Networks in the Medical Care Market", AER, forthcoming

K. Kawai and Y. Watanabe (2009), 'Identifying Strategic Voting Behavior', 2009, mimeo, Kellogg School of Management

**LECTURE 4, FEB 4, DYNAMIC GAMES WITH INCOMPLETE INFORMATION: MOTIVATION AND COMPUTATION**

**Presentation:** L. Benkard, "Learning and Forgetting: the Dynamics of Aircraft Production", AER, 2000, 1034-1054

*** R. Ericson and A. Pakes, "Markov-Perfect Industry Dynamics: A Framework for Empirical Work", Review of Economic Studies, 1995, 53-82

*** A. Pakes and P. McGuire, "Computing Markov-Perfect Nash Equilibria: Numerical Implications of a Dynamic Differentiated Product Model", RAND, 1994, 555-588.

U. Doraszelski and K. Judd, "Avoiding the Curse of Dimensionality in Dynamic Stochastic Games", 2007, mimeo, Harvard

G. Weintraub, C.L. Benkard, and B. Van Roy (2008), "Computational Methods for Oblivious Equilibrium"

D. Besanko, U. Dorazelski, Y. Kryukov and M. Satterthwaite, “Learning, Organizational Forgetting and Industry Dynamics”, 2008, forthcoming *Econometrica* http://www.economics.harvard.edu/faculty/doraszelski/files/learning.pdf

**Problem Set: Computation and Estimation of a Simple Dynamic Game**

## LECTURE 5, FEB 11, ESTIMATION OF STATIC GAMES OF INCOMPLETE INFORMATION

**Presentation:** P. Ellickson and S. Misra, “Supermarket Pricing Strategies”, Marketing Science, 2008, 811 – 828 (may want to look at the Bajari, Hong et al. paper)

*** K. Seim, “Spatial Differentiation and Firm Entry: The Video Retail Industry," RAND, 2006, 619-640

*** P. Bajari, H. Hong, J. Krainer, D. Nekipelov, “Estimating Static Models of Strategic Interactions”, 2009, forthcoming, JBES, http://www.econ.umn.edu/~bajari/published/static.pdf

*** C-L Su and K. Judd, “Constrained Optimization Approaches to Estimation of Structural Models”, http://papers.ssrn.com/sol3/papers.cfm?abstract_id=1085394 (note: for ease of explanation we may discuss method in a demand estimation setting, in which case see Dube, Fox and Su, “Improving the Numerical Performance of BLP Static and Dynamic Discrete Choice Random Coefficients Demand Estimation”, NBER WP 14991)

*** A. Sweeting, “The strategic timing incentives of commercial radio stations: An empirical analysis using multiple equilibria”, RAND, 2009, 710-742

## LECTURE 6, FEB 18, ESTIMATION OF DYNAMIC GAMES OF INCOMPLETE INFORMATION : ALTERNATIVE APPROACHES

(a) Finite Horizon

**Presentation:** P. Schmidt-Dengler, “The Timing of New Technology Adoption: The Case of MRI”, 2006, http://personal.lse.ac.uk/schmidt1/mri_june.pdf

(b) Infinite Horizon (will be our focus)

*** V. Aguirregabiria and P. Mira, “Sequential Estimation of Dynamic Discrete Games”, Econometrica, 2007, 1-53

M. Pesendorfer and P. Schmidt-Dengler, “Sequential Estimation of Dynamic Discrete Games: A Comment”, forthcoming, Econometrica

*** P. Bajari, L. Benkard, J. Levin, " Estimating Dynamic Models of Imperfect Competition", Econometrica, 2007, 1331-1370

S. Berry, M .Ostovsky and A. Pakes, "Simple estimators for the parameters of discrete dynamic games (with entry/exit examples)", RAND, 2007, 373-399

M. Pesendorfer and P. Schmidt-Dengler, "Asymptotic Least Squares Estimators for Dynamic Games", Review of Economic Studies, 2008, 901-928

P. Arcidiacono, P. Bayer, J. Blevins and P. Ellickson, "Estimation of Dynamic Discrete Choice Models in Continuous Time", 2009, Duke

**LECTURE 7, FEB 25, ESTIMATION OF DYNAMIC GAMES OF INCOMPLETE INFORMATION : EMPIRICAL EXAMPLES**

(more examples may be added)

**Presentation:** S. Ryan, "The Costs of Environmental Regulation in a Concentrated Industry", 2009, MIT, http://econ-www.mit.edu/files/1166

Y. Takahashi, "Estimating a War of Attrition: The Case of the US Movie Theater Industry", 2009, Wisconsin

*** A. Collard-Wexler, "Demand Fluctuations and Plant Turnover in Ready-Mix Concrete", NYU

*** C. Snider, "Predatory Incentives and Predation Policy: The American Airlines Case", UCLA, http://www.econ.umn.edu/~snider/JMP_nov_12.pdf