

SYLLABUS FOR FIRST SEMESTER 2017

Overview: This course explores relationships between economic theory, identification, estimation and econometric practice. It develops structural approaches for analyzing large cross sectional and longitudinal data sets, by exploiting restrictions derived from the equilibrium dynamic outcomes of economic theory. We investigate empirical content, characterize identification, evaluate alternative estimators and testing procedures, as well as consider counterfactuals. The topics we cover include individual discrete and continuous optimization problems, non-cooperative games, optimal contracting, auctions, market microstructure and competitive equilibrium.

Assessment: There is an in-class midterm test (20 percent) scheduled for Thursday October 18, a final examination (30 percent) scheduled by the Registrar in the interval December 15 - 21, an in-class presentation (20 percent), and two assignments (30 percent). Aside from the two examinations, all work should be done in groups of 2 or 3 (but no larger). You should form a group for study purposes as soon as possible.

Lectures and office hours: Classes meet from 9:30AM to 10:45AM on Mondays and Wednesdays. Office hours are by appointment.

Course material: All course material and scheduling changes are posted at:

<http://comlabgames.com/899/>

DYNAMIC DISCRETE CHOICE

Introduction (September 6)

Aguirregabiria, V., and P. Mira (2010): "Dynamic Discrete Choice Structural Models: A Survey," *Journal of Econometrics*, 156, 38-67.

Arcidiacono, P. and P. Ellickson (2011): "Practical Methods for Estimation of Dynamic Discrete Choice Models", *Annual Review of Economics*, 3, 363-394.

Eckstein, Z. and K. Wolpin (1989): "The Specification and Estimation of Dynamic Stochastic Discrete Choice Models: A Survey," *The Journal of Human Resources*, 24, 562-598.

Miller, R. (1997): "Estimating Models of Dynamic Optimization with Microeconomic Data," in *Handbook of Applied Econometrics*, M. Pesaran and P. Schmidt, editors, Basil Blackwell, Vol. 2, 246-299.

Pakes, A. (1994): "The Estimation of Dynamic Structural Models: Problems and Prospects, Part II. Mixed Continuous-Discrete Control Models and Market Interactions," Chapter 5 of *Advances in Econometrics: Proceedings of the 6th World Congress of the Econometric Society*, edited by J. Lafont and C. Sims, 171-259.

Rust, J. (1994): "Structural Estimation of Markov Decision Processes," in *Handbook of Econometrics, Volume 4*, ed. by R.E. Engle and D. McFadden. Amsterdam: Elsevier-North Holland, Chapter 51, 3081-3143.

Todd, P., M. Keane and K. Wolpin: "The Structural Estimation of Behavioral Models: Discrete Choice Dynamic Programming Methods and Applications," forthcoming in Volume 2, *Handbook of Labor Economics*.

Applying ML: Job Matching with Bayesian Learning (September 11)

Arcidiacono, P. M. Aucejo, A. Maurel and T. Ransom (2016): "College Attrition and the Dynamics of Information Revelation," working paper.

Crawford, G. and M. Shum (2005): "Uncertainty and Learning in Pharmaceutical Demand," *Econometrica*, 73, 1137-1173.

Dillon E., and C. Stanton (2016): "Self-Employment Dynamics and the Returns to Entrepreneurship," working paper.

Hincapé, A. (2016): "Entrepreneurship over the Life Cycle," working paper.

James, J. (2011): "Ability Matching and Occupational Choice," working paper.

Miller, R. (1984): "Job Matching and Occupational Choice," *Journal of Political Economy*, 92, 1086-1020.

Pastorino, E. (2014): "Careers in Firms: Estimating a Model of Job Assignment, Learning, and Human Capital Acquisition," working paper.

Conditional Choice Probabilities (September 13)

Hotz, V. and R. Miller (1993): "Conditional Choice Probabilities and Estimation of Dynamic Models," *Review of Economic Studies*, 60, 497-529.

Rust, J. (1987): "Optimal Replacement of GMC Bus Engines: An Empirical Model of Harold Zurcher," *Econometrica*, 55, 999-1033.

Applying CCP: Human Capital and Durable Goods (September 18)

Khorunzhina, N., and R. Miller (2017): “American Dream Delayed: Shifting Determinants of Homeownership,” working paper.

Dynamic Games (September 20)

Aguirregabiria, V., and P. Mira (2007): “Sequential Estimation of Dynamic Discrete Games,” *Econometrica*, 75, 1-54.

Collard-Wexler, A. (2013): “Demand Fluctuations in the Ready-Mix Concrete Industry,” *Econometrica*, 81, 1003-1037.

Das, S., M. Roberts, and J. Tybout (2007): “Market Entry Costs, Producer Heterogeneity, and Export Dynamics,” *Econometrica*, 75, 837–873.

Gowrisankaran, G. and R. Town (1997): “Dynamic equilibrium in the hospital industry,” *Journal of Economics, Management, and Strategy*, 6, 45-74. 852-874.

Pakes, A., M. Ostrovsky, and S. Berry (2007): “Simple Estimators for the Parameters of Discrete Dynamic Games (with Entry/Exit Examples),” *RAND Journal of Economics*, 38, No. 2, 373-399.

Pesendorfer, M., and P. Schmidt-Dengler (2008): “Asymptotic Least Square Estimators for Dynamic Games,” *Review of Economic Studies*, 75, 901-928.

Ryan, S. (2012): “The Costs of Environmental Regulation in a Concentrated Industry,” *Econometrica*, 80, 1019-1062.

Sweeting, A. (2013): “Dynamic Product Positioning in Differentiated Product Markets: The Effect of Fees for Musical Performance Rights on the Commercial Radio Industry,” *Econometrica*, 81, 1763-1803.

Representation and Identification (September 25 and 27)

Aguirregabiria, V. (2010): “Another Look at the Identification of Dynamic Discrete Decision Processes: an Application to Retirement Behavior,” *Journal of Business & Economic Statistics* 28, 201–218.

Aguirregabiria, V. and J. Suzuki (2014): “Identification and Counterfactuals in Dynamic Models of Market Entry and Exit,” *Quantitative Marketing and Economics*, 12, 267- 304.

Arcidiacono, P. and R. Miller (2015): “Identifying Dynamic Discrete Choice Models off Short Panels,” working paper.

Kalouptsi, M., P. Scott and E. Souza-Rodrigues (2016): "Identification of Counterfactuals in Dynamic Discrete Choice Models," working paper.

Magnac T. and D. Thesmar (2002): "Identifying Dynamic Discrete Decision Processes," *Econometrica*, 70, 801-816.

Norets, A. and X. Tang (2014): "Semi-parametric Inference in Dynamic Binary Choice Models," *The Review of Economic Studies*, 81, 1229–1262.

Finite Dependence (October 2)

Arcidiacono, P. and R. Miller (2016): "Nonstationary Dynamic Models with Finite Dependence," working paper.

Variations on CCP Estimators (October 4)

Aguirregabiria, V., and P. Mira (2002): "Swapping the Nested Fixed Point Algorithm: A Class of Estimators for Discrete Markov Decision Models," *Econometrica*, 70, 1519-1543.

Hotz, V., R. Miller, S. Sanders and J. Smith (1994): "A Simulation Estimator for Dynamic Models of Discrete Choice," *Review of Economic Studies*, 61, 265-289.

Pesendorfer, M., and P. Schmidt-Dengler (2008): "Asymptotic Least Square Estimators for Dynamic Games," *Review of Economic Studies*, 75, 901-908.

Unobserved Heterogeneity Revisited (October 9)

Arcidiacono, P., and R. Miller (2011): "Conditional Choice Probability Estimation of Dynamic Discrete Choice Model with Unobserved Heterogeneity," *Econometrica*, 79, 1823-1867.

Hu, Y. and M. Shum (2012): "Nonparametric identification of dynamic models with unobserved state variables," *Journal of Econometrics*, 171, 32-44.

Kasahara, H., and K. Shimotsu (2009): "Nonparametric Identification and Estimation of Finite Mixture Models of Dynamic Discrete Choices," *Econometrica*, 77, 135-175.

Evaluating Estimators (October 11)

Bajari, P., L. Benkard and J. Levin (2007): "Estimating Dynamic Models of Imperfect Competition," *Econometrica*, 75, 1331-1371.

Bugni, F. and T. Ura (2016): "Inference in Dynamic Discrete Choice Problems under Local Misspecification", working paper.

Hendel, I., and A. Nevo (2006): "Measuring the Implications of Sales and Consumer Inventory Behavior," *Econometrica*, 74, 1637-1674.

Keane, M., and K. Wolpin (1997): "The Career Decisions of Young Men," *Journal of Political Economy*, 105, 473-522.

First Presentation Session (October 16)

Kalouptsi, M. (2014): "Time to Build and Fluctuations in Bulk Shipping," *American Economic Review*, 104, 564-608.

Miller, R. and S. Sanders (1997): "Human Capital Development and Welfare Participation," *Carnegie Rochester Conference Series on Public Policy*, 46, 1-45.

Pakes, A. (1986): "Patents as Options: Some Estimates of the Value of Holding European Patent Stocks," *Econometrica*, 54, 755-784.

Wolpin, K. (1984): "An Estimable Dynamic Stochastic Model of Fertility and Child Mortality," *Journal of Political Economy*, 92, 852-874.

Review (October 18)

Midterm Examination (October 23)

AUCTIONS, CONTRACTS AND MARKETS

Introduction (October 25)

Athey, S. (2001): "Single Crossing Properties and the Existence of Pure Strategy Equilibria in Games of Incomplete Information," *Econometrica*, 69, 861-889.

Athey, S., and P. Haile (2002): "Identification of Standard Auction Models," *Econometrica*, 70, 2107-2140.

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

Athey, S., and P. Haile (2006) "Empirical Models of Auctions," in *Advances in Economics and Econometrics, Theory and Applications: Ninth World Congress, Volume II*, R. Blundell, W. Newey, and T. Persson, eds., Cambridge University Press, 2006, 1-45.

Bidder Valuations (October 30)

Krasnokutskaya, E. (2011): "Identification and Estimation in Procurement Auctions under Unobserved Auction Heterogeneity," *Review of Economic Studies*, 28, 293-327.

Reny, P. (2011): "On the Existence of Monotone Pure-Strategy Equilibria in Bayesian Games," *Econometrica*, 79, 499–553.

Sequential Bidding (November 1)

Groeger, J. (2014): "A Study of Participation in Dynamic Auctions," *International Economic Review*, 55, 1129–1154.

Groeger, J., and R. Miller (2016): "Bidding Frictions in Ascending Auctions," working paper.

M. Pesendorfer, M. and M. Jofre-Bonet (2003): "Estimation of a Dynamic Auction Game," *Econometrica*, 71, 1443-1489.

Limit Order Markets (November 6)

Hollifield, B., R. Miller and P. Sandas (2004): "Empirical Analysis of Limit-Order Markets," *The Review of Economic Studies*, 71, 1027-1063.

Hollifield, B., R. Miller, P. Sandas and J. Slive (2006): "Estimating the Gains from Trade in Limit-Order Markets," *Journal of Finance*, 61, 2753-2804.

Sandas, P. (2001): "Adverse Selection and Competitive Market Making: Empirical Evidence from a Limit Order Market," *Review of Financial Studies*, 14, 705–734.

Procurement (November 8)

Bajari, P., S. Houghton, and S. Tadelis (2014): "Bidding for Incomplete Contracts: An Empirical Analysis of Adaptation Costs," *American Economic Review* 104, 1288{1319.

Kang, K. and R. Miller (2016): "Winning by Default: Why is there so Little Competition in Government Procurement?" working paper.

Krasnokutskaya, E. and K. Seim (2011): "Bid Preference Programs and Participation in Highway Procurement Auctions," *American Economic Review* 101, 2653{2686.

Pure Moral Hazard (November 13)

Gayle, G., and R. Miller (2009): "Has Moral Hazard Become a More Important Factor in Managerial Compensation?" *American Economic Review* 99, 1740-69.

Margiotta, M., and R. Miller (2000): "Managerial Compensation and the Cost of Moral Hazard," *International Economic Review*, 41, 669.719.

Hidden Information (November 15)

Gayle, G., and R. Miller (2015): "Identifying and Testing Models of Managerial Compensation," *The Review of Economic Studies*, 82, 1074-1118. Supplementary Online Appendix

Gayle, G., C. Li, and R. Miller (2016): "Was Sarbanes-Oxley costly: Evidence from Optimal Contracting on CEO Compensation," working paper. Supplementary Online Appendix.

Second Presentation Session (November 20)

Complete Markets (November 22)

Altug, S. and R. Miller (1990): "Household Choices in Equilibrium," *Econometrica*, 58, 543-570.

Hansen, L. and K. Singleton (1982): "Generalized Instrumental Variables Estimation of Nonlinear Rational Expectations Models," *Econometrica*, 50, 1269-1286.

Hansen, L. and K. Singleton (1984): ERRATA, *Econometrica*, 52, 267-268.

Miller, R. and H. Sieg (1997): "A Microeconomic Comparison of Household Behavior between Countries," *Journal of Business and Economic Statistics*, 15, 237-254.

Sieg, H. (2000): "Estimating a Dynamic Model of Household Choices in the Presence of Income Taxation," *International Economic Review*, 41, 637-668.

Townsend, R. (1994): "Risk and Insurance in Village India," *Econometrica*, 62, 539-591.

Human Capital and Nonseparable Preferences (November 27)

Altug, S. and R. Miller (1998): "The Effect of Work Experience on Female Wages and Labour Supply," *The Review of Economic Studies*, 65, 45-85.

Gayle, G. and L. Golan (2012): "Estimating a Dynamic Adverse Selection Model: Labor-Force Experience and the Changing Gender Earnings Gap 1968-97," *Review of Economic Studies*, 79, 227- 267.

Lifecycle Career Concerns (November 29)

Gayle, G., L. Golan, and. R. Miller (2015): "Promotion, Turnover and Compensation in the Executive Labor Market," *Econometrica*, 83, 2293-2369. Supplementary Online Appendix.

Gayle, G., L. Golan, and. R. Miller (2015): "Promotion, Turnover and Compensation in the Executive Labor Market," *Econometrica*, 83, 2293-2369. Supplementary Online Appendix.

Equilibrium Search (December 4)

Eckstein, Z., and K. Wolpin (1990): "Estimating a Market Equilibrium Search Model from Panel Data on Individuals," *Econometrica*, 58, 783-808.

Llull, J. and R. Miller (2015): "Internal Migration in Dual Labor Markets," working paper.

Van den Berg, G. and G. Ridder (1998): "An Empirical Equilibrium Search Model of the Labor Market," *Econometrica*, 66, 1183-1221.

Secular Change and Growth (December 6)

Goettler, R and B. Gordon (2011): "Does AMD Spur Intel to Innovate More?" *Journal of Political Economy*, 119, 1141-1200.

Gowrisnkaran, G. and M. Rysman (2012): "Dynamics of Consumer Demand for New Durable Goods," *Journal of Political Economy*, 120, 1173-1219.

Hamilton, B., R. Miller, A. Hincapie and N. Papageorge (2016): "Innovation and Diffusion of Medical Treatment," working paper.

Igami, M. (2015): "Estimating the Innovator's Dilemma: Structural Analysis of Creative Destruction in the Hard Disk Drive Industry, 1981–1998," *Journal of Political Economy*, forthcoming.

Third Presentation Session (December 11)

Kennan, J. and J. Walker (2011): "The Effect of Expected Income on Individual Migration Decisions," *Econometrica*, 79, 211-251.

Postel-Vinay, F. and J. Robin (2002): "Equilibrium Wage Dispersion with Worker and Employer Heterogeneity," *Econometrica*, 70, 2295-2350.

Rust, J., and C. Phelan (1997): "How Social Security and Medicare Affect Retirement Behavior in a World of Incomplete Markets," *Econometrica*, 65, 781-832.

Review (December 13)