

**Advanced Econometrics I
Economics 245A**

Course Goals:

To provide training in frontier econometric methods, and the application of these methods, at the intersection of computer science, economics, environmental science, geography and statistics.

Course Structure:

Meetings: MW 2:00-3:15 in North Hall 2212

Course Begins: Monday September 26

Course Concludes: Wednesday November 30

Research Topic Paper Due: Friday December 2

Requirements:

Journal Article Presentations (40%): You will be asked to report on journal articles. Your report should state the main goals of the paper, summarize how the goals are achieved, offer a critique and propose extensions. You will present each report in an assigned 30 minute class slot and turn in a written report (essentially a summary and critique) of 5 pages, due one week after your presentation.

Research Topic Presentations (60%): You will be asked to take charge of a research topic. In doing so, you will read a number of papers on the topic and prepare a 15 page paper. In addition to a synthesis of current knowledge, your paper should propose and discuss research questions that advance topic knowledge. You will present your paper in an assigned class slot of 40 minutes (reduced from 75 minutes due to increased enrollment). Your paper is due by noon on Friday of the last week of class.

Readings:

A suitable library for background reading on the topics includes, in addition to the texts by Hayashi and Ruud:

J. Angrist and J. Pischke, *Mostly Harmless Econometrics*. Princeton, 2009.

J. Wooldridge, *Econometric Analysis of Cross Section and Panel Data*. MIT, 2002.

Access to articles: Most articles are available through [library](#). To access readings through this link when away from campus, refer to [configure](#) to configure your computer. Articles not (yet) published in journals indexed by the library are accessible directly from this syllabus via [author](#) links.

Area 1: Credible Inference in Linear Models

Topic 1-1 [Credible Inference](#)

- Holland, P. 1991 “Statistics and Causal Inference” *Journal of the American Statistical Association* 81, 945-960.
- Freedman, D. 1991 “Statistical Models and Shoe Leather” *Sociological Methodology* 21, 291-313.
- Ashenfelter, O. and A. Kruger 1994 “Estimates of the Economic Return to Schooling from a New Sample of Twins” *American Economic Review* 84, 1157-1173.
- DiNardo, J. and J. Pischke 1997 “The Returns to Computer Use Revisited: Have Pencils Changed the Wage Structure Too?” *Quarterly Journal of Economics* 112, 291-303.
- Popper, K. 1998 “Science: Conjectures and Refutations” in *Philosophy of Science: The Central Issues* (M. Curd and J. Cover eds.), W.W. Norton, 3-10. [Popper](#)
- Angrist, J. and A. Kruger 1999 “Empirical Strategies in Labor Economics” in *Handbook of Labor Economics* Volume 3A (O. Ashenfelter and D. Card eds.), Elsevier, Chapter 23. [Angrist and Kruger](#)

Topic 1-2 [Measurement of Social Interactions and Peer Effects](#)

Background: Wooldridge 11.5

- Goldberger, A. 1989 “Economic and Mechanical Models of Intergenerational Transmission” *American Economic Review* 79, 504-513.
- Manski, C. 1989 “Anatomy of the Selection Problem” *Journal of Human Resources* 24, 343-360.
- Chamberlain, G. 1990 “Distinguished Fellow: Arthur S. Goldberger and Latent Variables in Economics” *Journal of Economic Perspectives* 4, 125-152.
- Manski, C. 1993 “Identification of Endogenous Social Effects: The Reflection Problem” *Review of Economic Studies* 60, 531-542.
- Brock, W. and S. Durlauf 2001 “Discrete Choice with Social Interactions” *Review of Economic Studies* 68, 235-260.
- Moffitt, R. 2001 “Policy Interventions, Low-Level Equilibria and Social Interactions” in *Social Dynamics* (S. Durlauf and H. Young eds.), MIT Press.
- Angrist, J. and K. Lang 2004 “Does School Integration Generate Peer Effects? Evidence from Boston’s Metco Program” *American Economic Review* 94, 1613-1634.
- Falk, A. and A. Ichino 2006 “Clean Evidence on Peer Effects” *Journal of Labor Economics* 24, 39-57.
- Kling, J., J. Liebman and L. Katz 2007 “Experimental Analysis of Neighborhood Effects” *Econometrica* 75, 83-119.
- Duflo, E., P. Dupas and M. Kremer 2008 “Peer Effects and the Impact of Tracking: Evidence from a Randomized Evaluation in Kenya” *NBER Working Paper Series*. [Duflo, Dupas and Kremer](#)
- Graham, B. 2008 “Identifying Social Interactions Through Conditional Variance Restrictions” *Econometrica* 76, 643-660.
- Lee, L., X. Liu and X. Lin 2008 “Specification and Estimation of Social Interaction Models with Network Structure, Contextual Factors, Correlation and Fixed Effects” *Economics Department Working Paper Series, Ohio State*.
- Lynham, J. 2008 “Information Spillovers Among Resource Extractors” *Economics Department Working Paper Series, UC Santa Barbara*. [Lynham](#)
- Mas, A. and E. Moretti 2009 “Peers at Work” *American Economic Review* 99, 112-145.
- Carpenter, J. and E. Seki 2010 “Do Social Preferences Increase Productivity? Field Experimental Evidence from Fishermen in Toyama Bay” *Economic Inquiry* forthcoming. [Carpenter and Seki](#)

- Graham, B., G. Imbens and G. Ridder 2010 “Measuring the Effects of Segregation in the Presence of Social Spillovers: A Nonparametric Approach” *Economics Department Working Paper Series, NYU*. [Graham, Imbens and Ridder](#)
- Huang, C. 2010 “Intra-Household Effects on Demand for Telephone Service: Empirical Evidence” *Economics Department Working Paper Series, National Taiwan University*. [Huang](#)
- Duflo, E., P. Dupas and M. Kremer 2011 “Peer Effects, Teacher Incentives and the Impact of Tracking: Evidence from a Randomized Evaluation in Kenya” *American Economic Review* 101, 1739-1774.

Networks

- Background:* Wasserman, D. and K. Faust *Social Network Analysis* (1994: Cambridge)
- Freeman, L. 2001 “Graphical Techniques for Exploring Social Network Data” *Sociology Department Working Paper Series, UC Irvine*. [Freeman](#)
- Conley, T. and G. Topa 2002 “Socio-Economic Distance and Spatial Patterns in Unemployment” *Journal of Applied Econometrics* 17, 303-327.
- Burt, R. 2004 “Structural Holes and Good Ideas” *American Journal of Sociology* 110, 349-399.
- Bramoullé, Y., H. Djebbari and B. Fortin 2009 “Identification of Peer Effects through Social Networks” *Journal of Econometrics* 150, 41-55.
- Copic, J., M. Jackson and A. Kirman 2009 “Identifying Community Structures from Network Data via Maximum Likelihood Methods” *B.E. Journal of Theoretical Economics* 9:1, Contributions Article 30.
- Visualization software: UCINET (see Phillip Babcock for more information).

Topic 1-3 [Average Treatment Effects](#)

- Background:* Imbens, G. and J. Wooldridge 2007 “Estimation of Average Treatment Effects Under Unconfoundedness” *Lecture Notes, NBER*. [Imbens and Wooldridge Lecture 1](#) [IW Lecture 1 Slides](#)
- Background:* Heckman, J. and E. Vytlačil 2007 “Econometric Evaluation of Social Programs, Part I: Causal Models, Structural Models and Econometric Policy Evaluation” in *Handbook of Econometrics* Volume 6B, J. Heckman and E. Leamer editors. [Heckman and Vytlačil Handbook](#)
- Rubin, D. 1974 “Estimating Causal Effects of Treatments in Randomized and Nonrandomized Studies” *Journal of Educational Psychology* 66, 688-701.
- Rubin, D. 1977 “Assignment to Treatment Group on the Basis of a Covariate” *Journal of Educational Statistics* 2, 1-26.
- Rubin, D. 1978 “Bayesian Inference for Causal Effects: The Role of Randomization” *Annals of Statistics* 6, 34-58.
- Rosenbaum, P. 1987 “The Role of a Second Control Group in an Observational Study” *Statistical Science* 2, 292-306.
- Heckman, J. and V. Hotz 1989 “Choosing Among Alternative Nonexperimental Methods for Estimating the Impact of Social Programs” *Journal of the American Statistical Association* 84, 862-874.
- Angrist, J. 1990 “Lifetime Earnings and the Vietnam Era Draft Lottery: Evidence from Social Security Administration Records” *American Economic Review* 80, 313-335.
- Rubin, D. 1990 “Formal Modes of Statistical Inference for Causal Effects” *Journal of Statistical Planning and Inference* 25, 279-292.
- Angrist, J. and A. Krueger 1991 “Does Compulsory School Attendance Affect Schooling and Earnings?” *Quarterly Journal of Economics* 106, 979-1014.
- Heckman, J. 1991 “Randomization and Social Policy Evaluation” *NBER Working Paper Series*. [Heckman 1991](#)

- Heckman, J., J. Smith and N. Clements 1997 “Making the Most Out of Programme Evaluations and Social Experiments: Accounting for Heterogeneity in Programme Impacts” *Review of Economic Studies* 64, 487-535.
- Angrist, J. 1998 “Estimating the Labor Market Impact of Voluntary Military Service using Social Security Data on Military Applications” *Econometrica* 66, 249-288.
- Hahn, J. 1998 “On the Role of the Propensity Score in Efficient Semiparametric Estimation of Average Treatment Effects” *Econometrica* 66, 315-331.
- Heckman, J. and E. Vytlacil 2001 “Policy-Relevant Treatment Effects” *American Economic Review* 91, 107-111.
- Abadie, A. 2002 “Bootstrap Tests of Distributional Treatment Effects in Instrumental Variable Models” *Journal of the American Statistical Association* 97, 284-292.
- Hirano, K., G. Imbens and G. Ridder 2003 “Efficient Estimation of Average Treatment Effects using the Estimated Propensity Score” *Econometrica* 71, 1161-1189.
- Imbens, G. 2004 “Nonparametric Estimation of Average Treatment Effects under Exogeneity: A Review” *Review of Economics and Statistics* 86, 4-29.
- Aakvik, A., J. Heckman and E. Vytlacil 2005 “Estimating Treatment Effects for Discrete Outcomes when Responses to Treatment Vary: An Application to Norwegian Vocational Rehabilitation Programs” *Journal of Econometrics* 125, 15-51.
- Chay, K. and M. Greenstone 2005 “Does Air Quality Matter? Evidence from the Housing Market” *Journal of Political Economy* 113, 376-424.
- Heckman, J. and E. Vytlacil 2005 “Structural Equations, Treatment Effects and Econometric Policy Evaluation” *Econometrica* 73, 669-738.
- Angrist, J., E. Bettinger and M. Kremer 2006 “Long-Term Educational Consequences of Secondary School Vouchers: Evidence from Administrative Records in Columbia” *American Economic Review* 96, 847-862.
- Angrist, J. and S. Chen 2007 “Long-Term Consequences of Vietnam-Era Conscript: Schooling, Experience and Earnings” *NBER Working Paper Series*. [Angrist and Chen](#)
- Vytlacil, E. and N. Yildiz 2007 “Dummy Endogenous Variables in Weakly Separable Models” *Econometrica* 75, 757-779.
- Davis, L. 2008 “The Effect of Driving Restrictions on Air Quality in Mexico City” *Journal of Political Economy* 116, 38-81.
- Florens, J., J. Heckman, C. Meghir and E. Vytlacil 2008 “Identification of Treatment Effects Using Control Functions in Models with Continuous, Endogenous Treatment and Heterogeneous Effects” *Econometrica* 76, 1191-1206.
- Li, Q., J. Racine and J. Wooldridge 2008 “Estimating Average Treatment Effects with Continuous and Discrete Covariates: The Case of Swan-Ganz Catheterization” *American Economic Review* 98, 357-362.
- Currie, J. and R. Walker 2009 “Traffic Congestion and Infant Health: Evidence from E-ZPass” *NBER Working Paper Series*. [Currie and Walker](#)
- Imbens, G. and J. Wooldridge 2009 “Recent Developments in the Econometrics of Program Evaluation” *Journal of Economic Literature* 47, 5-86.
- Angrist, J. 2009 “Treatment Effects Notes” *Lecture Notes MIT*. [Angrist Lecture Notes](#)
- Lee, D. 2009 “Training, Wages and Sample Selection: Estimating Sharp Bounds on Treatment Effects” *Review of Economic Studies* 76, 1071-1102.
- Rothstein, J. 2009 “Teacher Quality in Educational Production: Tracking, Decay and Student Achievement” *Economics Department Working Paper Series, Princeton*. [Rothstein](#)
- Card, D., A. Mas, E. Moretti and E. Saez 2010 “Inequality at Work: The Effect of Peer Salaries on Job Satisfaction” *NBER Working Paper Series*. [Card, Mas, Moretti and Saez](#)

- Carneiro, P., J. Heckman and E. Vytlacil 2010 “Evaluating Marginal Policy Changes and the Average Effect of Treatment for Individuals at the Margin” *Econometrica* 78, 377-394.
- Chiburis, R. 2010 “Semiparametric Bounds on Treatment Effects” *Journal of Econometrics* 159, 1525-1550.
- Damrongplasit, K., C. Hsiao and X. Zhao 2010 “Decriminalization and Marijuana Smoking Prevalence: Evidence from Australia” *preprint Journal of Business and Economic Statistics*. [Damrongplasit et al.](#)
- Heckman, J., S. Moon, R. Pinto, P. Savelyev and A. Yavitz 2010 “Analyzing Social Experiments as Implemented: A Reexamination of the Evidence from the HighScope Perry Preschool Program” *Quantitative Economics* 1, 1-46.
- Khan, S. and E. Tamer 2010 “Irregular Identification, Support Conditions and Inverse Weight Estimation” *Econometrica* 78, 2021-2042.
- Bravo, F. and D. Jacho-Chavez 2011 “Empirical Likelihood for Efficient Semiparametric Average Treatment Effects” *Econometric Reviews* 30, 1-24.

Topic 1-4 Local Average Treatment Effects and [Instrumental Variables](#)

- Background:* Imbens, G. and J. Wooldridge 2007 “Instrumental Variables with Treatment Effect Heterogeneity: Local Average Treatment Effects” *Lecture Notes, NBER*. [Imbens and Wooldridge Lecture 5 IW Lecture 5 Slides](#)
- Angrist, J. and A. Krueger 1992 “The Effect of Age at School Entry on Educational Attainment: An Application of Instrumental Variables with Moments from Two Samples” *Journal of the American Statistical Association* 87, 328-336.
- Angrist, J. and G. Imbens 1995 “Two-Stage Least Squares Estimation of Average Causal Effects in Models with Variable Treatment Intensity” *Journal of the American Statistical Association* 90, 430-442.
- Angrist, J., G. Imbens and D. Rubin 1996 “Identification of Causal Effects Using Instrumental Variables” *Journal of the American Statistical Association* 91, 444-455.
- Angrist, J. and V. Lavy 1999 “Using Maimonides’ Rule to Estimate the Effect of Class Size on Scholastic Achievement” *Quarterly Journal of Economics* 114, 533-575.
- Manski, C. and J. Pepper 2000 “Monotone Instrumental Variables: With an Application to the Returns to Schooling” *Econometrica* 68, 997-1010.
- Stock, J. and F. Trebbi 2003 “Who Invented Instrumental Variable Regression?” *Journal of Economic Perspectives* 17, 177-194.
- Chao, J., N. Swanson, J. Hausman, W. Newey and T. Woutersen 2009 “Asymptotic Distribution of JIVE in a Heteroskedastic IV Regression with Many Instruments” *Economics Department Working Paper Series, MIT*. [Chao et alia](#)
- Hausman, J., W. Newey, T. Woutersen, J. Chao and N. Swanson 2009 “Instrumental Variable Estimation with Heteroskedasticity and Many Instruments” *Economics Department Working Paper Series, Johns Hopkins*. [Hausman et alia](#)
- Heckman, J. and S. Urzua 2009 “Comparing IV with Structural Models: What Simple IV Can and Cannot Identify” *NBER Working Paper Series*. [Heckman and Urzua](#)
- Kreider, B. and S. Hill 2009 “Partially Identifying Treatment Effects with an Application to Covering the Uninsured” *Journal of Human Resources* 44, 409-449.
- Manski, C. and J. Pepper 2009 “More on Monotone Instrumental Variables” *Econometrics Journal* 12, S200-S216.
- Chalakov, K. 2010 “Identification of Local Treatment Effects Using a Proxy for an Instrument” *Economics Department Working Paper Series, Boston College*. [Chalakov](#)
- Hong, H. and D. Nekipelov 2010 “Semiparametric Efficiency in Nonlinear LATE Models” *Quantitative Economics* 1, 279-304.

Imbens, G. 2010 “Better LATE Than Nothing: Some Comments on Deaton (2009) and Heckman and Urzua (2009)” *Journal of Economic Literature* 48, 399-423.

Topic 1-5 Control Functions and Instrumental Variables

Background: Imbens, G. and J. Wooldridge 2007 “Control Function and Related Methods” *Lecture Notes, NBER*. [Imbens and Wooldridge Lecture 6](#) [IW Lecture 6 Slides](#)

Heckman, J. 1978 “Dummy Endogenous Variables in a Simultaneous Equation System” *Econometrica* 46, 931-959.

Altonji, J. and R. Matzkin 2005 “Cross Section and Panel Data Estimators for Nonseparable Models with Endogenous Regressors” *Econometrica* 73, 1053-1102.

Altonji, J. T. Elder and C. Taber 2005 “Selection on Observed and Unobserved Variables: Assessing the Effectiveness of Catholic Schools” *Journal of Political Economy* 113, 151-184.

Abrevaya, J., J. Hausman and S. Khan 2010 “Testing for Causal Effects in a Generalized Regression Model with Endogenous Regressors” *Econometrica* 78, 2043-2061.

Topic 1-6 [Regression Discontinuity](#)

Background: Imbens, G. and J. Wooldridge 2007 “Regression Discontinuity Designs” *Lecture Notes, NBER*. [Imbens and Wooldridge Lecture 3](#) [IW Lecture 3 Slides](#)

Thistlethwaite, D. and D. Campbell 1960 “Regression-Discontinuity Analysis: An Alternative to the Ex Post Facto Experiment” *Journal of Educational Psychology* 51, 309-317.

Cleveland, W. 1979 “Robust Locally Weighted Regression and Smoothing Scatterplots” *Journal of the American Statistical Association* 74, 829-836.

Black, S. 1999 “Do Better Schools Matter? Parental Valuation of Elementary Education” *Quarterly Journal of Economics* 114, 577-599.

Hahn, J., P. Todd and W. Van Der Klaauw 2001 “Regression Discontinuity” *Econometrica* 69, 201-209.

Porter, J. 2003 “Estimation in the Regression Discontinuity Model” *Economics Department Working Paper Series, Harvard*. [Porter RD](#)

McCrary, J. and H. Royer 2006 “The Effect of Female Education on Fertility and Infant Health: Evidence from School Entry Policies Using Exact Date of Birth” *Economics Department Working Paper Series, Santa Barbara*. [McCrary and Royer](#)

Oreopoulos, P. 2006 “Estimating Average and Local Average Treatment Effects of Education when Compulsory Schooling Laws Really Matter” *American Economic Review* 96, 152-175.

Ludwig, J. and D. Miller 2007 “Does Head Start Improve Children's Life Chances? Evidence from a Regression Discontinuity Design” *Quarterly Journal of Economics* 122, 159-208.

Almond, D. and J. Doyle 2008 “After Midnight: A Regression Discontinuity Design in Length of Postpartum Hospital Stays” *NBER Working Paper Series*. [Almond and Doyle](#)

Card, D., C. Dobkin and N. Maestas 2008 “The Impact of Nearly Universal Insurance Coverage on Health Care Utilization: Evidence from Medicare” *American Economic Review* 98, 2242-2258.

Imbens, G. and T. Lemieux 2008 “Regression Discontinuity Designs: A Guide to Practice” *Journal of Econometrics* 142, 615-635.

Lee, D. 2008 “Randomized Experiments from Non-Random Selection in U.S. House Elections” *Journal of Econometrics* 142, 675-697.

McCrary, J. 2008 “Manipulation of the Running Variable in the Regression Discontinuity Design: A Density Test” *Journal of Econometrics* 142, 698-714.

- Almond, D., Y. Chen, M. Greenstone and H. Li 2009 “Winter Heating or Clean Air? Unintended Impacts of China’s Huai River Policy” *American Economic Review* 99, 184-190.
- Card, D., D. Lee and Z. Pei 2009 “Quasi-Experimental Identification and Estimation in the Regression Kink Design” *Economics Department Working Paper Series, Princeton*. [Card, Lee and Pei](#)
- Carpenter, C. and E. Moretti 2009 “The Effect of Alcohol Consumption on Mortality: Regression Discontinuity Evidence from the Minimum Drinking Age” *AEJ Applied Economics* 1, 164-182.
- Clark, D. 2009 “The Performance and Competitive Effects of School Autonomy” *Journal of Political Economy* 117, 745-783.
- Frandsen, B. 2009 “A Nonparametric Estimator for Local Quantile Treatment Effects in Regression Discontinuity Design” *Economics Department Working Paper Series, MIT*. [Frandsen](#)
- Grainger, C. 2009 “Redistricting and Polarization in California: Who Draws the Lines?” *Journal of Law and Economics* forthcoming. [Grainger](#)
- Imbens, G. and K. Kalyanaraman 2009 “Optimal Bandwidth Choice for the Regression Discontinuity Estimator” *NBER Working Paper Series*. [Imbens and Kalyanaraman](#)
- Bollinger, B., P. Leslie and A. Sorensen 2010 “Calorie Posting in Chain Restaurants” *Business School Working Paper Series, Stanford*. [Bollinger, Leslie and Sorensen](#)
- Lee, D. and T. Lemieux 2010 “Regression Discontinuity Designs in Economics” *Journal of Economic Literature* 48, 281-355.
- Heckman, J. 2010 “Building Bridges between Structural and Program Evaluation Approaches to Evaluating Policy” *Journal of Economic Literature* 48, 356-398.
- Hanna, R. and P. Oliva 2011 “The Effect of Pollution on Labor Supply: Evidence from a Natural Experiment in Mexico City” *Economics Department Working Paper Series, UC Santa Barbara*. [Hanna and Oliva](#)

Topic 1-7 [Difference-in-Differences Estimation](#)

- Background:* Imbens, G. and J. Wooldridge 2007 “Difference in Differences Estimation” *Lecture Notes, NBER*. [Imbens and Wooldridge Lecture 10](#) [IW Lecture 10 Slides](#)
- Ashenfelter, O. and D. Card 1985 “Using the Longitudinal Structure of Earnings to Estimate the Effect of Training Programs” *Review of Economics and Statistics* 67, 648-660.
- Imbens, G. and J. Hellerstein 1999 “Imposing Moment Restrictions from Auxiliary Data by Weighting” *Review of Economics and Statistics* 81, 1-14.
- Abadie, A. 2005 “Semiparametric Difference-in-Differences Estimators” *Review of Economic Studies* 72, 1-19.
- Athey, S. and G. Imbens 2006 “Identification and Inference in Nonlinear Difference-in-Difference Models” *Econometrica* 74, 431-498.

Topic 1-8 [Linear Panel Data Models](#)

- Background:* Imbens, G. and J. Wooldridge 2007 “Linear Panel Data Models” *Lecture Notes, NBER*. [Imbens and Wooldridge Lecture 2](#) [IW Lecture 2 Slides](#)
- Chamberlain, G. 1982 “Multivariate Regression Models for Panel Data” *Journal of Econometrics* 18, 5-46.
- Deschenes, O. and M. Greenstone 2007 “The Economic Impacts of Climate Change: Evidence from Agricultural Output and Random Fluctuations in Weather” *American Economic Review* 97, 354-385.
- Stock, J. and M. Watson 2008 “Heteroskedasticity-Robust Standard Errors for Fixed Effects Panel Data Regression” *Econometrica* 76, 155-174.
- Bates, D. 2009 “Linear Mixed Model Implementation in lme4” *Statistics Department Working Paper Series, Wisconsin*. [Bates 2009a](#)

Bates, D. 2009 “Penalized Least Squares versus Generalized Least Squares Representations of Linear Mixed Models” *Statistics Department Working Paper Series, Wisconsin*. [Bates 2009b](#)

Topic 1-9 Nonlinear Panel Data Models

Background: Imbens, G. and J. Wooldridge 2007 “Nonlinear Panel Data Models” *Lecture Notes, NBER*.
[Imbens and Wooldridge Lecture 4](#) [IW Lecture 4 Slides](#)

Chernozhukov, V., I. Fernandez-Val, J. Hahn and W. Newey 2009 “Identification and Estimation of Marginal Effects in Nonlinear Panel Models” *Economics Department Working Paper Series, MIT*.
[Chernozhukov et alia 2009a](#)

Chernozhukov, V., I. Fernandez-Val and W. Newey 2009 “Quantile and Average Effects in Nonseparable Panel Models” *Economics Department Working Paper Series, MIT*. [Chernozhukov et alia 2009b](#)

Wooldridge, J. 2009 “Correlated Random Effects Models with Unbalanced Panels” *Economics Department Working Paper Series, Michigan State*. [Wooldridge](#)

Topic 1-10 Matching

Rosenbaum, P. and D. Rubin 1983 “The Central Role of the Propensity Score in Observational Studies for Causal Effects” *Biometrika* 70, 41-55.

Greenstone, M. and E. Moretti 2004 “Bidding for Industrial Plants: Does Winning a 'Million Dollar Plant' Increase Welfare?” *Economics Department Working Paper Series, UC Berkeley*. [Greenstone and Moretti](#)

Abadie, A. and G. Imbens 2006 “Large Sample Properties of Matching Estimators for Average Treatment Effects” *Econometrica* 74, 235-267.

Abadie, A. and G. Imbens 2008 “On the Failure of the Bootstrap for Matching Estimators” *Econometrica* 76, 1537-1557.

Shaikh, A., M. Simonsen, E. Vytlacil and N. Yildiz 2009 “A Specification Test for the Propensity Score using its Distribution Conditional on Participation” *Journal of Econometrics* 151, 33-46.

Topic 1-11 Randomization Design in Field Experiments

Manning, W., J. Newhouse, N. Duan, E. Keeler and A. Liebowitz 1987 “Health Insurance and the Demand for Medical Care: Evidence from a Randomized Experiment” *American Economic Review* 77, 251-277.

Heckman, J. and J. Smith 1995 “Assessing the Case for Social Experiments” *Journal of Economic Perspectives* 9, 85-110.

Manski, C. 1997 “Monotone Treatment Effects” *Econometrica* 65, 1311-1334.

Wooldridge, J. 1999 “Asymptotic Properties of Weighted M-Estimators for Variable Probability Samples” *Econometrica* 67, 1385-1406.

Manning, W. and J. Mullahy 2001 “Estimating Log Models: To Transform or not to Transform?” *Journal of Health Economics* 20, 461-494.

Manning, W., A. Basu and J. Mullahy 2005 “Generalized Modeling Approaches to Risk Adjustment of Skewed Outcomes Data” *Journal of Health Economics* 24, 465-488.

Duflo, E., R. Glennerster and M. Kremer 2006 “Using Randomization in Development Economics Research: A Toolkit” in *Handbook of Development Economics*, T. Schultz editor. [Duflo, Glennerster and Kremer](#)

Levitt, S. and J. List 2007 “What do Laboratory Experiments Measuring Social Preferences Reveal About the Real World?” *Journal of Economic Perspectives*, 21(2), 153-174.

- Levitt, S. and J. List 2009 “Field Experiments in Economics: The Past, the Present and the Future” *European Economic Review*, 53, 1-18.
- Rosenbaum, P. 2007 “Confidence Intervals for Uncommon but Dramatic Responses to Treatment” *Biometrics* 63, 1164-1171.
- Bruhn, M. and D. McKenzie 2009 “In Pursuit of Balance: Randomization in Practice in Development Field Experiments” *American Economic Journal: Applied Economics* 1, 200-232.
- Deaton, A. 2009 “Instruments of Development: Randomization in the Tropics and the Search for the Elusive Keys to Economic Development” *Economics Department Working Paper Series, Princeton*. [Deaton](#)
- Hahn, J. and K. Hirano 2009 “Design of Randomized Experiments to Measure Social Interaction Effects” *Economics Department Working Paper Series, UCLA*. [Hahn and Hirano](#)
- Hirano, K. and J. Porter 2009 “Asymptotics for Statistical Treatment Rules” *Econometrica* 77, 1683-1702.
- Karlan, D. and J. Zinman 2009 “Observing Unobservables: Identifying Information Asymmetries with a Consumer Credit Field Experiment” *Econometrica* 77, 1993-2008.
- Levitt, S. and J. List 2009 “Field Experiments in Economics: The Past, the Present and the Future” *European Economic Review* 53, 1-18.
- Acemoglu, D. 2010 “Theory, General Equilibrium and Political Economy in Development Economics” *Journal of Economic Perspectives* 24, 17-32.
- Deaton, A. 2010 “Instruments, Randomization and Learning about Development” *Journal of Economic Literature* 48, 424-455.
- Fan, Y. and S. Park 2010 “Sharp Bounds on the Distribution of Treatment Effects and their Statistical Inference” *Econometric Theory* 26, 931-951.
- List, J., S. Sadoff and M. Wagner 2010 “So You Want to Run an Experiment, Now What? Some Simple Rules of Thumb for Optimal Experimental Design” *NBER Working Paper*. [List, Sadoff and Wagner](#)
- Bandiera, O., I. Barankay and I. Rasul 2011 “Field Experiments with Firms” *Journal of Economic Perspectives* 25, 63-82.
- Card, D., S. Della Vigna and U. Malmendier 2011 “The Role of Theory in Field Experiments” *Economics Department Working Paper Series, UC Berkeley*. [Card, Della Vigna and Malmendier](#)

Topic 1-12 Weak Instruments and IV

- Fieller, E. 1932 “The Distribution of the Index in a Normal Bivariate Population” *Biometrika* 24, 428-440.
- Fieller, E. 1954 “Some Problems in Interval Estimation” *Journal of the Royal Statistical Society Series B* 16, 175-185.
- Nagar, A. 1959 “The Bias and Moment Matrix of the General k -Class Estimators of the Parameters in Simultaneous Equations” *Econometrica* 27, 575-595.
- Kinal, T. 1980 “The Existence of Moments of k -Class Estimators” *Econometrica* 48, 241-249.
- Nelson, C. and R. Startz 1990 “The Distribution of the Instrumental Variables Estimator and Its t -Ratio When the Instrument Is a Poor One” *Journal of Business* 63, 125-140.
- Newey, W. 1990 “Efficient Instrumental Variables Estimation of Nonlinear Models” *Econometrica* 58, 809-837.
- Buse, A. 1992 “The Bias of Instrumental Variables Estimators” *Econometrica* 60, 173-180.
- Bound, J., D. Jaeger and R. Baker 1995 “Problems with Instrumental Variables Estimation when the Correlation Between the Instruments and the Endogenous Explanatory Variable is Weak” *Journal of the American Statistical Association* 90, 443-450.
- Staiger, D. and J. Stock 1997 “Instrumental Variables Regression with Weak Instruments” *Econometrica* 65, 557-586.

- Andrews, D., M. Moreira and J. Stock 2006 “Optimal Two-Sided Invariant Similar Tests for Instrumental Variables Regression” *Econometrica* 74, 715-752.
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Area 2: Accurate Measures of Validity

Topic 2-1 [Heteroskedasticity-Consistent Standard Error Estimation](#)

Computational Exercise For the given cross-section data sets, which standard error estimator should you report (and how many)? Can you use the standard error estimators to deduce which of the two data sets has more pronounced heteroskedasticity?

The two comma delimited data sets are:

[HCSE Data Set 1](#) [HCSE Data Set 2](#)

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- Sun, Y. 2009 “Autocorrelation Robust Mean Inference with Optimal Orthonormal Bases” *Economics Department Working Paper Series, UC San Diego*. [Sun 2009a](#)
- Sun, Y. 2009 “Robust Multivariate Trend Inference in the Presence of Nonparametric Autocorrelation” *Economics Department Working Paper Series, UC San Diego*. [Sun 2009b](#)
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Topic 2-2 [Cluster Sampling](#)

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- Background:* Cameron, C., J. Gelbach and D. Miller 2008 “Bootstrap-Based Improvements for Inference with Clustered Errors” *Lecture Notes, UC Davis*. [Cameron, Gelbach and Miller One Way Lecture](#)
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Topic 2-4 Subsampling

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- Politis, D. and J. Romano 1994 “Large Sample Confidence Regions Based on Subsamples under Minimal Assumptions” *Annals of Statistics* 22, 2031-2050.
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Area 3: Broadening the Linear Model

Topic 3-1 [Bivariate](#) and [Multivariate](#) Response Models

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Topic 3-2 [Econometrics of Geography and Spatial Demography](#)

Background: Cressie, N. *Statistics for Spatial Data*

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Topic 3-3 [Missing Data](#)

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Topic 3-4 **Bounds and [Partial Identification](#)**

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[Cointegration](#)
[Nonlinearities in Financial Data](#)

Background: Hamilton, J. *Time Series Analysis* (1994: Princeton University)

Background: Watson, M. 2007 “Time Series Overview and Frequency Domain Descriptive Statistics” *Lecture Notes, NBER*. [TS Lecture 1 Slides](#)

Background: Watson, M. 2007 “The Functional Central Limit Theorem and Testing for Time Varying Parameters” *Lecture Notes, NBER*. [TS Lecture 2 Slides](#)

Background: Stock, J. 2007 “Weak Instruments, Weak Identification and Many Instruments: Part I” *Lecture Notes, NBER*. [TS Lecture 3 Slides](#)

Background: Stock, J. 2007 “Weak Instruments, Weak Identification and Many Instruments: Part II” *Lecture Notes, NBER*. [TS Lecture 4 Slides](#)

Background: Watson, M. 2007 “The Kalman Filter, Nonlinear Filtering and Markov Chain Monte Carlo” *Lecture Notes, NBER*. [TS Lecture 5 Slides](#)

Background: Watson, M. 2007 “Specification and Estimation of Models with Stochastic Time Variation” *Lecture Notes, NBER*. [TS Lecture 6 Slides](#)

Background: Stock, J. 2007 “Recent Developments in Structural VAR Modeling” *Lecture Notes, NBER*. [TS Lecture 7 Slides](#)

Background: Stock, J. 2007 “Econometrics of DSGE Models” *Lecture Notes, NBER*. [TS Lecture 8 Slides](#)

Background: Watson, M. 2007 “Heteroskedasticity and Autocorrelation Consistent Standard Errors” *Lecture Notes, NBER*. [TS Lecture 9 Slides](#)

Background: Watson, M. 2007 “Forecast Assessment” *Lecture Notes, NBER*. [TS Lecture 10 Slides](#)

Background: Stock, J. 2007 “Forecasting and Macro Modeling with Many Predictors, Part I” *Lecture Notes, NBER*. [TS Lecture 11 Slides](#)

Background: Stock, J. 2007 “Forecasting and Macro Modeling with Many Predictors, Part II” *Lecture Notes, NBER*. [TS Lecture 12 Slides](#)

Background: [References for TS Lectures](#)

Topic 3-27 Econometric Analysis of Game Theory

Bajari, P., H. Hong and S. Ryan 2010 “Identification and Estimation of a Discrete Game of Complete Information” *Econometrica* 78, 1529-1568.

Topic 3-28 Empirical Likelihood

Owen, A. 1988 “Empirical Likelihood Ratio Confidence Intervals for a Single Functional” *Biometrika* 75, 237-249.

Hall, P. and B. Scala 1990 “Methodology and Algorithms of Empirical Likelihood” *International Statistical Review* 58, 109-127.

Owen, A. 1990 “Empirical Likelihood Ratio Confidence Regions” *Annals of Statistics* 18, 90-120.

Kitamura, Y. 2001 “Asymptotic Optimality of Empirical Likelihood for Testing Moment Restrictions” *Econometrica* 69, 1661-1672.

Newey, W. and R. Smith 2004 “Higher Order Properties of GMM and Generalized Empirical Likelihood Estimators” *Econometrica* 72, 219-255.

Ragusa, G. 2011 “Minimum Divergence, Generalized Empirical Likelihoods and Higher-Order Expansions” *Econometric Reviews* 30, 406-456.

Topic 3-29 Survey Design

Background: Cochran, W. *Sampling Techniques* (1973: Wiley)

Background: American Statistical Association – Survey Research Methods Section

Rivers, D. and D. Bailey 2009 “Inference from Matched Samples in the 2008 U.S. National Elections” *Proceedings of the Survey Research Methods Section, ASA*. [Rivers and Bailey](#)

Additional Research Topics*Binary Response Models*

How does one test for conditional heteroskedasticity of unknown form in a probit or logit model?

Bootstrap

Improve on Huitema et al. paper where inference on coefficient in linear model with AR(1) errors: key issue - dependence may not be AR(1) so there parametric correction would not work well; could use modern HAC methods, could use block bootstrap - other issues - use size-adjusted power to compare methods, could use studentized or percentile confidence intervals

Cluster Samples

In constructing clustered standard errors, how large can the ratio, of group size to the number of groups, be and still have accurate critical values from standard asymptotic theory? Two

issues here, constant group size that gets large relative to G and variable group size with the largest dominating the sample.

For a cluster sample, if the regressor of interest varies within groups (x_{ig}), can we use group averages to consistently estimate the coefficient on this regressor?

Does it make sense to cluster on time (such as years) rather than cross section (such as states) given the assumption that clusters are uncorrelated?

Difference-in-Differences

If there are unequal numbers of observations before and after treatment, how should we best collapse the data to estimate the treatment effect? (Should we remove observations, to have the same number of observations before and after treatment?)

Heteroskedasticity-Consistent Standard Errors

Can we establish, analytically, that the expected value of the classic se estimator is lower than the expected value of a heteroskedasticity-corrected standard error for mild heteroskedasticity?

Can we establish analytically that the variance of the classic se estimator is lower than the variance of a heteroskedasticity-corrected standard error in general?

Peer Effects

David Card's 2011 paper on risky behavior uses techniques from IO to estimate multiple equilibria models and he estimates both correlated effects and peer effects. Why, when both correlated and peer effects are in the model, do the peer effects have a positive estimate and the correlated effects have a negative estimate? (See also Huang 2010 on cellphone use.)

Bryan Graham's 2010 paper (with Imbens and Ridder) uses nonparametric analysis to obtain peer effect measures. How accurate, in finite samples, are the standard error estimators they propose?

Missing Data

Consider a panel observed for two periods with measurements x_1 in period 1 and x_2 in period 2. We observe all individuals in the panel in period 1, which yields an estimate of the marginal density of x_1 . Some individuals leave the panel in period 2, so we cannot directly estimate the joint density of x_1 and x_2 . If these individuals are replaced (via a refreshment sample), we obtain x_2^* and can estimate the marginal density of x_2^* . How can the estimates of the marginal density be used to inform the estimation of the joint density?

Bryan Graham's 2010 paper (with Imbens and Ridder) uses nonparametric analysis to obtain peer effect measures. How accurate, in finite samples, are the standard error estimators they propose?

Regression Discontinuity

To avoid discrete jumps in covariates, especially at the threshold, can stratified random sampling help?

What if the assignment rule, to treatment, is unknown? Could we use an estimated rule as an instrument in fuzzy RD?

If covariates jump at the threshold, can we obtain reliable inference from RD?

In selecting bandwidth, Imbens and Kalyanaraman note that h may not tend to 0 for some distributions. Are these distributions relevant for empirical work and, if they are, how do we control bias?

How to test for a break-point in nonparametric regression discontinuity models? (see Ludwig and Miller, 2007)

Treatment Effects

In treatment and control analysis, how does the analysis vary if the control group resembles the post-treatment group rather than the pre-treatment group? (That is, what if the control group consists of observations that have been treated by a different, earlier, treatment?)

How do we measure treatment effects for heterogeneous treatments?

How are the measurements of the effect of treatment impacted by some of the treatment groups failing to complete treatment?

If an instrument should have only a local effect, such as the law governing the age of dropping out of high school, could we test the validity of the instrument by checking for correlation between the instrument and the education choices of those who do not drop out of high school?

Symbolic Data Analysis

How to apply either the bootstrap or subsampling to get measures of uncertainty for interval data or other forms of symbolic data.

Research Tools

Statistical Computing in R

1. The R Project for Statistical Computing: R manual, FAQs and many links

<http://www.r-project.org/>

2. Econometrics in R: 50 pages of pdf file. This pdf file covers basic commands for regression.

<http://cran.r-project.org/doc/contrib/Farnsworth-EconometricsInR.pdf>

3. Using R to Teach Econometrics: 14 page pdf file. Pros and cons about R

<http://robjhyndman.com/papers/R.pdf>