Topics in Applied Econometrics

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This course covers topics in econometrics and empirical modeling that are likely to be useful to applied researchers working with cross-section and panel data.

Course requirements and grading: Students are expected to do the readings. In addition, there are 4 graded problem sets, which must be handed in on time for course credit.

Readings are listed below by subject area ([*]=in the reading packet; [J]=available through JSTOR; [L]=MIT libraries e-journal; [W]=mimeo on the web; NBER working papers are available from www.nber.org). Articles for the first and second halves are in separate packets.

FIRST HALF (Angrist)

Parts I-IV correspond to Empirical Strategies lecture notes distributed in class.

I. REGRESSION AND THE CEF

[*]G. Chamberlain, "Panel Data," *The Handbook of Econometrics*, Volume II, Chapter 22, Amsterdam: North-Holland, 1983, 1248-1318.

W. Newey and D. McFadden, ``Large Sample Estimation and Hypothesis Testing," Chapter 36 in *The Handbook of Econometrics*, Volume IV, Amsterdam: North-Holland, 1994.

J. Wooldridge, Chapters 1-4 in *Econometric Analysis of Cross-Section and Panel Data*, Cambridge: The MIT Press, 2002.

II. CAUSALITY, REGRESSION, REGRESSION VS. MATCHING

[*]J. Angrist and A. Krueger, "Empirical Strategies in Labor Economics," Chapter 23 in O. Ashenfelter and D. Card, eds., *The Handbook of Labor Economics*, Volume III, North Holland, 1999.

[J]J. Angrist, "Estimating the Labor Market Impact of Voluntary Military Service Using Social Security Data on Military Applicants," *Econometrica*, 66[2], March 1998, 249-88.

C. Seltzer and S. Jablon, "Effects of Selection on Mortality," *American Journal of Epidemiology* 100(5), 1974.

[J]P. Holland, "Statistics and Causal Inference," *JASA* 81[396], December 1986, 945-970, [*]with discussion.

[J]D. Rubin, "Comment: Neyman (1923) and Causal Inference in Experiments and Observational Studies," *Statistical Science* 5[4], November 1990, 472-480. Also, Neyman (1923) translated in same issue.

Rubin, D. B., 1974, "Estimating Causal Effects of Treatments in Randomized and Nonrandomized Studies," *Journal of Educational Psychology, 66*, 688-701.

[*]Rubin, D. B., 1977, "Assignment to Treatment Group on the Basis of a Covariate," *Journal of*

Educational Statistics 2[1], Spring 1977 1-26.

[1]Rubin, D. B., 1978, "Bayesian Inference for Causal Effects: The Role of Randomization," *Annals of Statistics* 6[1], January 1978, 34-58.

[1]Haavelmo, Trygve, "The Probability Approach in Econometrics", *Econometrica* 12, July 1944. iii-iv, 1-115.

Rosenbaum, R., "Choice as an Alternative to Control in Observational Studies," *Statistical Science* 14 [3] (1999), 259-304.

*Donald T. Campbell, "Reforms as Experiments," *American Psychologist* 24 (April 1969), 409-429.

III. ESTIMATING THE EFFECT OF TRAINING PROGRAMS

[1]R. Lalonde, "The Promise of Public Sector-Sponsored Training Programs," *The Journal of Economic Perspectives* 9[2], Spring 1995, 149-168.

Burghardt, John, *et al*, "Does Job Corps Work? Summary of the National Job Corps Study," Princeton: Mathematica Policy Research, June 2001.

L. Orr, *et al*, *Does Training for the Disadvantaged Work? Evidence From the National JTPA Study*, Washington, DC: The Urban Institute Press, 1996.

[1]O. Ashenfelter and D. Card, "Using the Longitudinal Structure of Earnings to Estimate the Effect of Training Programs on Earnings," *The Review of Economics and Statistics* 67[4], November 1985, 648-66.

[1]R. LaLonde, "Evaluating the Econometric Evaluations of Training Programs with Experimental Data," *American Economic Review* 76[4], September 1986, 604-620.

[1]J. Heckman and J. Hotz, "Choosing Among Alternative Nonexperimental Methods for Estimating the Impact of Social programs: The Case of Manpower Training," *JASA* 84[408], December 1989, 862-8.

*R. Dehejia and S. Wahba, "Causal Effects in Nonexperimental Studies: Re-evaluating the Evaluation of Training Programs," *JASA* 94[448], Dec 1999, 1053-63.

[1]P. Rosenbaum and R. Rubin, "Reducing Bias in Observational Studies Using Subclassification on the Propensity Score," *JASA* 79[387], September 1984, 516-524.

[1]Rosenbaum, P. R. And D. B. Rubin, 1983, "The Central Role of the Propensity Score in Observational Studies for Causal Effects," *Biometrika* 70[1], April 1983, 41-55.

*J. Smith and P. Todd, "Reconciling Conflicting Evidence on the Performance of Propensity Score Matching Methods," *American Economic Review* 91[2], May 2001, 112-19.

*R. Dehejia, "Was There a Riverside Miracle? A Hierarchical Framework for Evaluating Programs with Grouped Data," *JBES* 21[1], January 2003, 1-11.

V. J. Hotz, G. Imbens, and J. Mortimer, " Predicting the Efficacy of Future Training Programs Using Past Experiences," NBER Technical Working Paper 238, 1999.

IV. INSTRUMENTAL VARIABLES

A. Models with constant effects; the Wald estimator, grouping, and Two-Sample IV

*J. Angrist and A. Krueger, "Instrumental Variables and the Search for Identification," *Journal of Economic Perspectives* 15[4], Fall 2001, 69-85.

*W. Newey, "Generalized Method of Moments Specification Testing," *Journal of Econometrics* 29[3], September 1985, 229-56.

*J. Angrist, "Grouped Data Estimation and Testing in Simple Labor Supply Models," *Journal of Econometrics* 47 (February/March 1991): 243–266.

[1]W. Newey and K. West, "Hypothesis Testing with Efficient Method of Moments Estimation," *International Economic Review 28,* October 1987, 777-787.

[1]J. Angrist and A. Krueger, "The Effect of Age at School Entry on Educational Attainment: An Application of Instrumental Variables with Moments from Two Samples," *JASA* 87[418], June 1992, 328-36.

*J. Angrist and A. Krueger, "Split-Sample Instrumental Variables Estimates of the Returns to Schooling," *JBES* 13[2], April 1995, 225-35.

[1]J. Angrist, "Lifetime Earnings and the Vietnam Era Draft Lottery: Evidence from Social Security Administrative Records," *American Economic Review* 80[3], June 1990, 313-36.

Wooldridge, 2002, Chapter 5.

B. Instrumental Variables with Heterogeneous Potential Outcomes

[1]G. Imbens and J. Angrist, "Identification and Estimation of Local Average Treatment Effects," *Econometrica* 62[2], March 1994, 467-75.

[1]J. Angrist, G. Imbens, and D. Rubin, "Identification of Causal effects Using Instrumental Variables," with comments and rejoinder, *JASA* 91[434], June 1996, 444-55.

[1]J. Angrist and G. Imbens, "Two-Stage Least Squares Estimation of Average Causal Effects in Models with Variable Treatment Intensity," *JASA* 91[434], June 1995, 444-55.

[1]J. Angrist and A. Krueger, "Does Compulsory Schooling Attendance Affect Schooling and Earnings?," *Quarterly Journal of Economics* 106[4], November 1991, 979-1014.

J. Angrist and G. Imbens, "Sources of Identifying Information in Evaluation Models," NBER Technical Working Paper No. 117, 1991.

[J]J. Angrist, G. Imbens, K. Graddy, "The Interpretation of Instrumental Variables Estimators in Simultaneous Equations Models with an Application to the Demand for Fish," *Review of Economic Studies* 67[3], July 2000, 499-528.

[*]A. Abadie, "Semiparametric Estimation of Instrumental Variables Estimation of Treatment Response Models," *Journal of Econometrics* 113[2], 2003, 231-263.

[*]J. Angrist, "Treatment Effect Heterogeneity in Theory and Practice," *The Economic Journal* 114, March 2004, C52-C83.

[J]A. Goldberger, "Structural Equations Methods in the Social Sciences," *Econometrica* 40[6], November 1972, 979-1002.

J. Hausman, "Specification and Inference in Simultaneous Equations Models," Chapter 7 in *The Handbook of Econometrics*.

D. Card, "The Causal Effect of Education on Earnings," *The Handbook of Labor Economics, Volume IIIA*, Elsevier Science Publishers, 1999.

Wooldridge, 2002, Chapter 18.

C. Additional IV Examples

[*]McClellan, Mark, "Does More Intensive Treatment of Myocardial Infarction in the Elderly Reduce Mortality? An Instrumental Variables Analysis," *Journal of the American Medical Association* 272[11], September 1994, 859-866.

[L]A. Krueger, "Experimental Estimates of Education Production Functions," *Quarterly Journal of Economics*, May 1999.

[J]Permutt, T. and J. Hebel, "Simultaneous–Equation Estimation in a Clinical Trial of the Effect of Smoking on Birth Weight," *Biometrics*, 45[2], June 1989, 619-622.

[*]Powers, D.E. and S.S. Swinton, "Effects of Self-Study for Coachable Test Item Types," *Journal of Educational Psychology*, 76, 1984, 266-78.

V. MISCELLANEOUS TOPICS

A. Bias of 2SLS

[J]J. Bound, D. Jaeger, and R. Baker, "Problems with Instrumental Variables Estimation when the Correlation Between the Instruments and the Endogenous Regressors is Weak," *JASA* 90[430], June 1995, 443-50.

[*]J. Angrist and A. Krueger, "Split-Sample Instrumental Variables Estimates of the Returns to Schooling," *JBES* 13[2], April 1995, 225-35.

[J]A. R. Hall, G. D. Rudebusch, D. W. Wilcox, "Judging Instrument Relevance in Instrumental Variables Estimation," *International Economic Review* 37[2], May 1996, 283-296.

[L]J. Angrist, G. Imbens, and A. Krueger, "Jackknifed Instrumental Variables Estimation," *Journal of Applied Econometrics* 14[1], Jan-Feb 1999, 57-67.

G. Chamberlain and G. Imbens, "Hierarchical Bayes Models with Many Instrumental Variables," NBER Technical Working Paper 204, September 1996.

[J]G. Imbens and D. Rubin, "Bayesian Inference for Causal Effects in Randomized Experiments with Noncompliance," *Annals of Statistics* 25[1], February 1997, 305-327.

*S. Donald and W. Newey, "Choosing the Number of Instruments," *Econometrica* 69[5], September 2001, 1161-91.

Bowden and Turkington, *Instrumental Variables*, Cambridge University Press, 1984, Section 4.8

P.C.B. Phillips, 1983, "Exact Small-Sample Theory in the Simultaneous Equations Model," Chapter 8 in the Handbook of Econometrics.

B. Clustering and the Moulton problem

Grouped Trials and Data

*B. Moulton, "Random Group Effects and the Precision of Regression Estimates," *Journal of Econometrics* 32[3], August 1986, 385-97.

[J]K. Liang, and Scott L. Zeger, "Longitudinal Data Analysis Using Generalized Linear Models," *Biometrika* 73[1], April 1986, 13-22.

*Z. Feng, P. Diehr, A. Peterson, and D. McLerran, "Selected Statistical issues in Group Randomized Trials," *Annual Review of Public Health* 22, May 2001, 167-87.

Cornfeld, J., "Randomization by Group: A Formal Analysis," *American Journal of Epidemiology* 198 (1978), 100-2.

Gail, M.H., S. Mark, R. Carroll, S. Green, and D. Pee, "On Design Considerations and Randomization-Based Inference for Community Intervention Trials," *Statistics in Medicine* 15 (1996), 1069-1092.

P. Rosenbaum, Chapters 2 and 3 (on exact inference for treatment effects) in *Observational Studies*, New York: Springer, 1995.

J. Angrist and V. Lavy, "The Effect of High School Matriculation Awards: Evidence From Randomized Trials," NBER Working Paper 9389, December 2002.

Serial Correlation and Differences-in-Differences

[W]Donald, S., and K. Lang, "Inference with Differences-in-Differences and Other Panel Data," Boston University Department of Economics, mimeo, March 2001.

Bertrand, Marianne, E. Duflo, and S. Mullainathan, "How Much Should We Trust Differences-in-Differences Estimates?" NBER Working Paper 8841, March 2002.

[W]C. Hansen, "Generalized Least Squares Estimation in Differences-in-Differences and Other Panel Models," MIT Department of Economics, mimeo, March 2003.

C. Limited Dependent Variables and Quantile Treatment Effects

[*]J. Angrist, "Estimation of Limited-Dependent Variable Models with Binary Endogenous Regressors: Simple Strategies for Empirical Practice," with discussion, *JBES,* 19[1], January 2001, 2-16.

[*]A. Abadie, J. Angrist, and G. Imbens, "Instrumental Variables Estimation of the Effect of Subsidized Training on the Quantiles of Trainee Earnings," *Econometrica* 70[1], November, 2001, 91-117.

[J]J. Angrist and W. Evans, "Children and their Parents' Labor Supply: Evidence from Exogenous Variation in Family Size," *American Economic Review* 88[3], June 1998, 450-477.

D. The Propensity Score Paradox

[J]J. Hahn, "On the Role of the Propensity Score in Efficient Estimation of Average Treatment Effects," *Econometrica* 66[2], March 1998, 315-31.

[*]J. Angrist and J. Hahn, "When to Control for Covariates? Panel-Asymptotic Results for Estimates of Treatment Effects," *Review of Economics and Statistics* 86[1], February 2004, forthcoming.

[*]K. Hirano, G. Imbens, and G. Ridder, "Efficient Estimation of Average Treatment Effects Using the Estimated Propensity Score," *Econometrica,* 71[4], July 2003, 1161-1189.

E. Regression-Discontinuity Methods

[L]J. Angrist and V. Lavy, "Using Maimonides' Rule to Estimate the Effect of Class Size on Student Achievement," *QJE,* May 1999.

Thistlewaithe, D.L., and D.T. Campbell, "Regression-Discontinuity Analysis: An Alternative to the Ex Post Facto Experiment," *Journal of Educational Psychology* LI (1960), 309-317.

Trochim, William K., *Research Design for Program Evaluation: The Regression-Discontinuity Approach*, (Beverly Hills: Sage, 1984).

[*]van der Klaauw, Wilbert, "Estimating the Effect of Financial Aid Offers on College Enrollment: A Regression–Discontinuity Approach," *International Economic Review* 43[4], November 2002, 1249-87.

[*]J.Hahn, P. Todd, and W. van der Klauuw, "Estimation of Treatment Effects with a Quasi-Experimental Regression-Discontinuity Design," *Econometrica* 69[1] (January 2001): 201-9.

[w]Porter, Jack R., "Estimation in the Regression Discontinuity Model," Harvard Department of Economics, mimeo, May 2003.