

**ECON 60303**  
**ECONOMETRICS II**

<http://www.nd.edu/~wevans1/ecoe60303.htm>

*Department of Economics*  
*University of Notre Dame*  
*Spring 2013*

**Instructor:**

Bill Evans  
Office: 913 Flanner  
Phone: 574-631-7039  
email: [wevans1@nd.edu](mailto:wevans1@nd.edu)

Time: 1:30pm – 3:30pm, Monday/Wednesday  
Class Room: 313 Hammes-Mowbray  
Office Hours: 2:00pm – 4:00pm Tuesday  
9:00am – 11:00am Thursday  
and by appointment

**Course description and goals:**

The purpose of this course is to expose students to econometric techniques frequently used by economists working with cross-sectional and/or panel data. I will cover ten broad topics: i) panel data, ii) correlated errors, clustering and the “Moulton” problem, iii) instrumental variables estimation, iv) regression discontinuity, v) Non-linear optimization and maximum likelihood models, vi) discrete data, vii) limited dependent variables, viii) duration data, iv) matching estimators, and v) quantile regressions. For each topic, course time will be split evenly between theory and examples. I will first present a standard textbook treatment of the topic. Next, we will discuss a number of papers that have used the techniques outlined in class. Students will be expected to read the assigned papers and be able to discuss not only the econometric techniques used but also the basic economic issues as well. I also have sample STATA and/or Matlab programs that estimate each of the techniques we consider. On the class web page is a 20 page handout that outlines Stata. From your other first-year classes you should be intimately familiar with Matlab.

**Textbook and course readings:**

*Required:*

William Greene, *Econometric Analysis*, Prentice Hall, 2007, ISBN-13: 978-0135132456

Joshua Angrist and Jorn Steffen Pischke, *Mostly Harmless Econometrics: An Empiricist’s Companion*, Princeton University Press, 2009, ISBN-13: 978-9-691-12035-5.

*Recommended:*

Jeffrey Wooldridge, *Econometric Analysis of Cross-Sectional and Panel Data*, MIT Press, 2002. ISBN-10: 0-262-23219-7.

A. Colin Cameron and Pravin K. Trivedi, *Microeconometrics: Methods and Applications*, Cambridge University Press, 2005, ISBN-13: 978-0-521-84805-3

I have selected Greene for the class textbook, primarily because you used it the first semester. It is a solid cookbook that has extensive coverage of topics and a nice bibliography. The book is a little dated in that it covers lots of time series econometrics (that nobody uses anymore) and it does not cover more

recent cross-sectional topics such as quantile regressions, propensity score matching, etc. Despite being rather broad, the book is lacking on intuition. Therefore, the other required book is Angrist and Pischke's *Mostly Harmless Econometrics*, a fantastic book that should be read cover-to-cover by any young applied micro economist. The book provides an excellent mix of statistical detail, econometric intuition and practical instruction. The topic coverage is limited but covers about 60 percent of the topics in this course, which are also the bulk of econometric tools used in the vast majority of applied micro economics. I wish there was an econometrics textbook this well done when I was in graduate school.

I have also listed two recommended textbooks. Wooldridge is a classic econometrics textbook that examines many cross-sectional topics in detail. He derives estimators, talks about their finite sample and asymptotic properties and provides some nice examples. The book has a great coverage of topics for applied micro and is a standard reference for applied micro economists. Cameron and Trivedi is a reference for model applied micro econometrics. It covers both old (panel data, IV) and the new topics (bootstrapping, quantile regressions, clustered standard errors, etc.) and it has a nice blend of statistical intuition and mathematical rigor.

Electronic versions of the class readings are available on the course web page. Some of the links take you directly to JSTOR which is only accessible through a university IP address. Others are downloadable from my web page. To comply with federal copy write laws, these files are password protected with the login/password being your NetId/password combination.

**Prerequisites:**

A course comparable to a first-year graduate econometrics sequence or permission of the instructor.

**Expectations:**

Students are expected to attend class, to read the reading prior to class, to NOT be late to class, to participate in classroom discussions, to hand in assignments when due, and to NOT engage in academic dishonesty.

**Grading:**

Grades for the course will be based on weekly problem sets (25 percent of the course grade), a midterm (25 percent) and a cumulative final exam (25 percent) and a replication exercise (25 percent of the course grade).

*Exams:* The midterm exam is scheduled for Wednesday, March 7th, at the regular class time, while the final exam is scheduled for Thursday, May 9, from 4:15pm – 6:15pm. The midterm is set in stone. The date of the final may be changed based on when your other finals are – we need to coordinate.

*Problem sets*

The problem sets will have two types of questions. The first will be exam-type questions that ask you to “prove” or “show.” For the second type of question, you will be given data and asked to estimate an econometric model. To assist you in your programming and to provide you with a better understanding of the techniques we will be discussing, I will distribute sample programs for each topic. The programs will be written in either Matlab or STATA and the programs are available on the class web page. You will be given anywhere from one to two weeks to complete each problem set, depending on the difficulty of the problem set. You may work on the problem sets in a group but each student is required to hand in their own answers.

### *Replication Project*

Students will be required to replicate, or attempt to replicate, results from a paper published in a refereed journal. For this exercise, I want you to select a paper where the original data is available on the Web. So for example, any paper that uses data from the Current Population Survey, National Health Interview Survey, or the Census Public Use Micro Samples, would be great since this data is downloadable from various web pages. You are forbidden to email a researcher and ask for their data or their code. I want you to start with original sources and construct the sample, then try to reproduce the results. This assignment is due by noon on the final day of class. You cannot work on the replication exercise in a group but you can ask your colleagues for advice/suggestions. The grades for the assignment will be based not only on the clarity of your analysis but the quality of your writing. Please see the complete description of the project on the class web page.

### **Reading List ECO 60303 Spring 2013**

#### **I. A Brief Review of Linear Models**

Greene, Chapters 2-4

Angrist and Pischke, Chapters 2-3

Wooldridge, Chapters 2-4

#### **II. Panel Data: Fixed and Random Effects, Difference-in-difference models**

Greene, Chapter 8 (The Generalized Regression Model)

Greene, Chapter 9 (Models for Panel Data)

Angrist and Pischke, Chapter 5

Wooldridge, Chapter 7 (Generalized Least Squares) and Chapter 10 (Panel Data)

Hausman, J., "Specification Tests in Econometrics," *Econometrica*, 46, 1978, pp. 69-85.

Hausman, J., and W. Taylor, "Panel Data and Unobserved Individual Effects," *Econometrica*, 49, 1981, pp. 1377-1398.

Meyer, B., W.K. Viscusi, and D. Durbin, "Worker' Compensation and Injury Duration: Evidence from a Natural Experiment," *American Economic Review*, 1995 Vol. 85, 322-40.

Angrist, J. and A.B. Krueger, "Empirical Strategies in Labor Economics," *Handbook in Labor Economics*, edited by Orley Ashenfelter and David Card, 1999, 1277-1366.

- Meyer, B., "Natural and Quasi-experiments in Economics," *Journal of Business and Economic Statistics*, 12, 1995, 151-161.
- Cook, P., and G. Tauchen, "The Effect of Liquor Taxes on Heavy Drinking," *Bell Journal of Economics*, 13, 1982, 379-389.
- Dranove, D., et al. "Is More Information Better? The Effects of "Report Cards" on Health Care Providers," *Journal of Political Economy*, 2003, 111(3), 555-588.
- Almond, D., K. Chay, D. Lee, "The Costs of Low Birth Weight," *Quarterly Journal of Economics*, 120, 2005, 1031-1084.
- William N. Evans and Diana S. Lien, "Does Prenatal Care Improve Birth Outcomes? Evidence from the PAT Bus Strike," *Journal of Econometrics* 2005, 125, 207-239.
- Geronimus, A., and S. Korenman, "The Socioeconomic Consequences of Teen Childbearing Reconsidered," *Quarterly Journal of Economics*, 1992, 1187-1213.
- Card, D., and A.B. Krueger, "Minimum Wages and Employment: A Case Study of the Fast Food Industry in New Jersey and Pennsylvania," *American Economic Review*, September 1994, 722-794.
- J.H. Tyler, R.J. Murnane, and J.B. Willett, "Estimating the Labor Market Signaling Value of the GED." *Quarterly Journal of Economics*, v115, n2 (May 2000): 431-68.
- Heckman, James and V. Joseph Hotz, "Choosing Among Alternative Nonexperimental Methods for Estimating the Impact of Social Programs: The Case of Manpower Training." *Journal of the American Statistical Association*. 84:1989, 862-880
- Card, David and Sullivan, Daniel G. "Measuring the Effect of Subsidized Training Programs on Movements in and out of Employment," *Econometrica* v56, n3 (May 1988): 497-530
- Linden, Leigh L. and Jonah Rockoff. "Estimates of the Impact of Crime Risk on Property Values from Megan's Laws." *American Economic Review* 2008, 98(3): 1103-27.
- Acemoglu, D., J. Angrist, "Consequences of Employment Protection? The Case of the American with Disabilities Act," *Journal of Political Economy*, 109(5), 2001.

### **III. Correlated Errors**

Greene, Section 8.8

Angrist and Pischke, Chapter 8

Cornfeld, J., "Randomization by Group: A Formal Analysis," *American Journal of Epidemiology*, 108(1978), 100-2.

Liang, K., and S.L. Zeger, "Longitudinal Data Analysis Using Generalized Linear Models,"

*Biometrika*, 73(1986) 13-22.

Moulton, B.R., "An Illustration of a Pitfall in Estimating the Effects of Aggregate Variables on Micro Units," *Review of Economics and Statistics*, 72 (May, 1990), pp. 334-338.

Kloek, T., "OLS Estimation in a Model Where a Microvariable is Explained by Aggregates and Contemporaneous Disturbances," *Econometrica*, 49 (1981), 205-207.

Moulton, B.R., "Random Group Effects and the Precision of Regression Estimates," *Journal of Econometrics*, 32(1986), 385-97.

Bertrand, M., E. Duflo, and S. Mullainathan, "How Much Should We Trust Difference in Difference Estimates," *Quarterly Journal of Economics*, 119(1), 2004, 249-276.

Wooldridge, J., "Cluster Sample Methods in Applied Econometrics," *American Economic Review Papers and Proceedings* 2005 93(2): 133-138.

Cameron, A. Colin, Douglass Miller, and Jonah B. Gelbach, "Bootstrap-Based Improvements for Inference with Clustered Standard Errors," *Review of Economics and Statistics*, 2008 90(3): 414-427.

#### **IV. Instrumental Variables Models**

Greene, Chapters 12 and 13 (IV and Systems of equations)

Greene, Chapter 15 (Generalized Method of Moments)

Angrist and Pischke, Chapter 4

Wooldridge, Chapters 5 and 6.

Permut, Thomas, and J. Richard Hebel. "Simultaneous-Equation Estimation in a Clinical Trial of the Effect of Smoking on Birth Weight," *Biometrics*, June 1989, 45: pp 619-622.

Sexton, Mary and J. Richard Hebel. "A Clinical Trial of Change in Maternal Smoking and Its Effect on Birth Weight" *JAMA*, February 17, 1984, 251(7): pp 911-915.

Krueger A.B., "Experimental Estimates of Education Production Functions," *Quarterly Journal of Economics* 1999, 114(2): 497-532.

Angrist, J.D., G.W. Imbens, and D.B. Rubin, "Identification of Causal Effects Using Instrumental Variables," *Journal of the American Statistical Association*, 91, June 1996, 444-455.

Bound, J., D. A. Jaeger, and R.M. Baker, "Problems with Instrumental Variables Estimation When The Correlation Between the Instruments and The Endogenous Explanatory Variables is Weak," *Journal of the American Statistical Association*, 90, June 1995, 443-50.

Stock JH, Wright JH, Yogo M, "A Survey of Weak Instruments and Weak Identification in Generalized Method of Moments," 20(4), 2002, 518-530.

Hausman, J., "Specification and Estimation of Simultaneous Equation Models," in Z. Griliches and M. Intriligator, *Handbook of Econometrics*, 1983.

Angrist, J.D., "Lifetime Earnings and the Vietnam Era Draft Lottery: Evidence from Social Security Administrative Records," *American Economic Review*, 80, 1990, 313-336.

Angrist, J.D., and A.B. Krueger, "Does Compulsory Schooling Affect Schooling and Earnings?" *Quarterly Journal of Economics*, 106, 1991, 979-1014.

Angrist, J.D., and W.N. Evans, "Children and Their Parents' Labor Supply: Evidence from Exogenous Variation in Family Size," *American Economic Review*, June 1998, vol 88, 450-477.

William N. Evans and Jeanne Ringle, "Can Higher Cigarette Taxes Improve Birth Outcomes?" *Journal of Public Economic*, 72, 1999, 135-154.

W.G Howell, et al., "Test Score Effects of School Vouchers in Dayton, Ohio, New York City and Washington, DC: Evidence from Randomized Field Trials," August 2000.

Heckman, J., "Randomization as an Instrumental Variable," *Review of Economics and Statistics*, 1996, 336-341.

## V. **Regression Discontinuity Design**

Angrist and Pischke, Chapter 7

Campbell, D.T., "Reforms as Experiments," *American Psychologist*, 24(4), 1969, 409-429.

Imbens GW, Lemieux T, "Regression Discontinuity Design: A Guide to Practice," 142(2008), 615-635.

Lee, D.S., D. Card, "Regression Discontinuity Inference with Specification Error," *Journal of Econometrics*, 142(2008), 655-674.

Hahn, J. P. Todd, W. van der Klaauw, "Identification and Estimation of Treatment Effects with a Regression Discontinuity Design," *Econometrica*, 69(1), 2001, 201-09.

Chay, K., P. McEwan, M. Urquiola, "The Central Role of Noise in Evaluating Interventions that Use Test Scores to Rank Schools," *American Economic Review*, 95(4), 2005, 1237-1258.

Oreopoulos, Philip. "Estimating Average and Local Average Treatment Effects of Education When Compulsory Schooling Laws Really Matter" *American Economic Review*, 91(1), 2006, 152-175.

Clark, Damon, and Heather Royer. 2012. "The Effect of Education on Adult Mortality and Health: Evidence from Britain." *NBER Working Paper #16013* (Forthcoming, *American*

*Economic Review*).

Van der Klaauw, W., "Estimating the Effect of Financial Aid Offers on College Enrollment: A Regression Discontinuity Approach," *International Economic Review*, 43(4), 2002, 1249-87.

Van der Klaauw, W., "Breaking the link between poverty and low student achievement: An Evaluation of Title I," *Journal of Econometrics*, 142 (2008), 731-756.

Card, David, Carlos Dobkin, Nicole Maestas, "Does Medicare Save Lives." *Quarterly Journal of Economics*, 124(2), May 2009, 597-636.

Card, D., C. Dobkin, N. Maestas, "The Impact of Nearly Universal Insurance Coverage on Health Care Utilization and Health: Evidence from Medicare," *American Economic Review*, 2008, 98(5), 2242-58

Dinardo, J., D.S. Lee, "Economic Impacts of New Unionization on Private Sector Employers: 1984-2001," *Quarterly Journal of Economics*, 119(4), 1328-1441.

Angrist, J.D., V. Lavy, "Using Maimonides' Rule to Estimate the Effect of Class Size on Scholastic Achievement," *Quarterly Journal of Economics*, 114(2), 1999, 533-575.

Matsudaira, Jordan, "Mandatory Summer School and Student Achievement" *Journal of Econometrics*, 2008, 142(2): 829-850.

Matsudaira, Jordan, "Sinking or Swimming: Evaluating the Impact of English Immersion versus Bilingual Education." Working Paper, Cornell University, December 2005.

## **VI. Maximum Likelihood Estimation and Nonlinear Optimization**

Greene, Chapter 16 (Maximum Likelihood Estimation)

Greene, Appendix E (Computation and Optimization)

A simple example we will follow: Count data models: Greene, Chapter 25

Wooldridge, Chapter 12, Section 12.7 (Non-linear optimization)

Wooldridge, Chapter 13 (Maximum likelihood models)

Quandt, R.E., "Computational Problems and Methods," in Z. Griliches and M. Intriligator, eds., *Handbook of Econometrics*, Amsterdam: North Holland, 1983.

## **VII. Models with Discrete Dependent Variables**

Greene, Chapter 23 (Discrete Choice Models)

Greene, Chapter 25 (Count data models)

Wooldridge, Chapter 15 (Discrete Data), Chapter 19 (Count Data)

Ashenfelter, O., and D. Bloom, "Models of Arbitrator Behavior: Theory and Evidence," *American Economic Review*, March 1984, p.111-124.

Evans, W., M. Farrelly, and E. Montgomery, "Do Workplace Smoking Bans Reduce Smoking?" *American Economic Review*, September 1999, 89(4), 728-747.

Warner, J. and S. Pleeter, "The Personal Discount Rate: Evidence from Military Downsizing Programs." *American Economic Review*, March 2001, 91(1), 33-53.

List, J., "Does market Experience Eliminate Market Anomalies?" *Quarterly Journal of Economics*, February 2003, 118(1): 41-71.

Gropp, R., J.K. Scholz, and M. White. "Personal Bankruptcy and Credit Supply and Demand." *Quarterly Journal of Economics*, February 1997, 112(1), 217-251.

Evans, W., and R. Schwab, "Finishing High School and Starting College: Do Catholic Schools Make a Difference?" *Quarterly Journal of Economics*, November 1995.

Hausman, J., B. Hall, and Griliches, "Econometric Models for Count Data with an Application to the Patents-R.D. Relationship," *Econometrica*, 52, 1984, 909-938.

Hausman, J., and D. Wise, "A Conditional Probit Model for Qualitative Choice: Discrete Decisions Recognizing Interdependence and Heterogeneous Preferences," *Econometrica*, 46, 1978, pp.403-426.

Gupta, S., G van Houtven, M. Cropper, "Paying for Permanence: An Economic Analysis of EPA's Cleanup Decisions at Superfund Sites," *RAND Journal of Economics*, 27(3), 1996, 563-582.

## **VIII. Truncated and Censored Data, Sample Selection**

Greene, Chapter 24.

Wooldridge, Chapter 16 and 17..

Heckman, J., "Shadow Prices, Market Wages, and Labor Supply," *Econometrica*, 42, 1974, pp. 679-94.

Heckman, J., "Sample Selection as a Specification Error," *Econometrica*, 47, 1979, pp. 153-161.

Heckman, J., and R. Robb, "Alternative Methods for Solving the Problem of Selection Bias in Evaluation the Impacts of Treatments on Outcomes," *Drawing Inferences from Self-Selected Samples*, ed. H. Wainer, 1986, 63-107.

Heckman, et al., "Characterizing Selection Bias Using Experimental Data," *Econometrica*, 66,



September 1998, 1017-1098.

Vella, Francis, "Estimating Models with Sample Selection Bias: A Survey," *Journal of Human Resources*, v33, n1 (Winter 1998).

Leung, Sui-Fai and Shihti Yu, "On the Choice Between Sample Selection and Two Part Models," *Journal of Econometrics*, 72(1/2) 107-28.

Lalonde, R. J., "Evaluating the Econometric Evaluations of Training Programs with Experimental Data," *American Economic Review*, 76, 1986, 604-619.

Duan, Naihua, *et al.*, "A Comparison of Alternate Models for the Demand For Medical Care," *Journal of Business and Economic Statistics*, 1, 1983, 115-127.

Evans, W.N., M.C. Farrelly, "The Compensating Behavior of Smokers: Taxes, Tar and Nicotine," *RAND Journal of Economics*, 29(3), 1998, 578-595.

Manning, W., *et al.*, "Health Insurance and the Demand for Medical Care: Evidence from a Randomized Experiment," *American Economic Review*, 77, 1987, 251-277.

## **IX. Duration Data**

Greene, Chapter 25.

Wooldridge, Chapter 20.

Solon, G., "Work Incentive Effects of taxing unemployment Benefits," *Econometrica*, 53, 1985, 295-306.

Meyer, B., "Unemployment Insurance and Unemployment Spells," *Econometrica*, 58, 1990, 757-82.

Kiefer, N., "Economic Duration Data and Hazard Functions," *Journal of Economic Literature*, 26, 1988, 649-679.

Javier Espinosa and William N. Evans, "Marriage Selection or Marriage Protection?" *Journal of Health Economics*, 2008, 27 (5), 1326-1342.

## **X. Matching methods**

Angrist and Pischke (2009), Chapter 3

Imbens, Guido and Jeff Wooldridge. 2007. "What's New in Econometrics: Estimation of Average Treatment Effects Under Unconfoundness." NBER Summer Institute.

Dehejia, Rajeev and Sadek Wahba. 1999. "Causal Effects in Nonexperimental Studies:

Reevaluating the Evaluation of Training Programs.” *Journal of the American Statistical Association*, 94(448): 1053-10.

Dehejia, Rajeev and Sadek Wahba. 2002. “Propensity Score Matching Methods for Nonexperimental Causal Studies.” *Review of Economics and Statistics* 84(1): 151-161.

Smith, Jeffrey and Petra Todd. 2005. “Does Matching Overcome LaLonde’s Critique of Nonexperimental Methods?” *Journal of Econometrics* 125(1-2): 305-353.

Dehejia, Rajeev. 2005. “Practical Propensity Score Matching: A Reply to Smith and Todd.” *Journal of Econometrics* 125(1-2): 355-364.

Caliendo, Marco and Sabine Kopeinig. 2006. “Some Practical Guidance for the Implementation of Propensity Score Matching.” *Journal of Economic Surveys* 22(1): 31-72.

Busso, Matias, John DiNardo and Justin McCrary. 2008. “Finite Sample Properties of Semi-Parametric Estimators of Average Treatment Effects.” Working paper, University of California at Berkeley.

**XI. Quantile regressions (final two days of the semester, to be taught by Andreas Hagemann)**

Angrist and Pischke, Chapter 7

Koenker, Roger and Gilbert Bassett, Jr. 1978. “Regression Quantiles.” *Econometrica*, 46(1): 33-50.

Koenker, Roger and Kevin Hallock. 2001. “Quantile Regression.” *Journal of Economic Perspectives* 15(4): 143-156.

Buchinsky, Moshe. 1994. “Changes in the Wage Structure 1963-1987: Application of Quantile Regression.” *Econometrica* 62(2): 405-458.

Buchinsky, Moshe. 1998. “Recent Advances in Quantile Regression Models: A Practical Guide for Empirical Research.” *Journal of Human Resources* 33: 88-126.