

## **6305: APPLIED ECONOMETRICS FOR POLICY ANALYSIS**

### **January-May, 2014**

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Class Timings and Venue : Monday and Tuesday, 9.30 – 11.00 am, Seminar 2  
Office Hours : By appointment

#### **Course Description**

This course introduces students to a range of econometric techniques used to assess impacts of policy changes and programmatic interventions. The goal of this course is three fold, to enable students (1) to critically read literature on impact evaluation and policy analysis, (2) to assess the appropriateness of different techniques for their own research questions and (3) to implement elementary versions of a selection of these techniques in STATA. The emphasis of this course is to expose students to the relevance, scope and the limitations of different techniques to the answer the particular question at hand.

#### **Pre-requisites**

The course is intended for those who already have training in basic statistics and econometrics. It would be especially suitable to those who are designing their research projects or are already doing research.

#### **Textbooks**

There are three main texts for this course.

1. Joshua Angrist and Jorn-Steffen Pischke (2009) *Mostly Harmless Economics: An Empiricist's Companion*, Princeton University Press.
2. Shahidur R. Khandker, Gayatri B. Koolwal, and Hussain Samad (2010) *Handbook on Impact Evaluation: Quantitative Methods and Practices*, World Bank, Washington DC. Available at [http://publications.worldbank.org/index.php?main\\_page=product\\_info&products\\_id=23650](http://publications.worldbank.org/index.php?main_page=product_info&products_id=23650)
3. William R Shadish; Thomas D Cook; Donald T Campbell (2009) *Experiments and Quasi Experiments for Generalized Causal Inference*, Second Edition, Houghton and Mifflin.

Other texts that will be used for specific topics include:

1. Colin Cameron and Pravin Trivedi (2005) *Microeconometrics: Methods and Applications*, Cambridge University Press
2. Jeffrey M. Wooldridge (2010) *Econometric Analysis of Cross Section and Panel Data*, 2nd Edition, The MIT Press. The first edition will suffice.
3. Jeffrey M. Wooldridge (2012) *Introductory Econometrics: A Modern Approach*, 4th Edition, India Edition, Cengage Learning.

Apart from these, several key papers that demonstrate use of these different techniques will be assigned as required reading from time to time. Other papers cover critical commentaries on methods.

## Course Outline

The course will first review some basic econometrics and then focus on methodological approaches to empirical analysis before taking up specific approaches in detail. A brief syllabus is provided below. A detailed syllabus and reading list is attached at the end of this document.

- I. Causal Reasoning and Research Design
- II. Overview of Regression Basics
  - A. EXPERIMENTAL APPROACH**
- III. Randomized Experiments – Use and Abuse
  - B. NON EXPERIMENTAL APPROACH**
- IV. Selection on Observables Designs
  1. Regression methods
  2. Matching techniques and Propensity Score
  3. Quantile Regression
- V. Selection on Unobservables Designs
  1. Linear panel data models. Fixed-effects and random effects models.
  2. Difference in Differences models, Triple Differences.
  3. Heckman selection corrections and control function approaches.
  4. Instrumental Variables
  5. Regression Discontinuity Research Design
  6. Interrupted Time Series and Pipeline Methods
- VI. Field Surveys

## Evaluation

Evaluation will take place throughout the course and students will be assigned a combination of one in-class quizz (30%), one take home assignment and/or one class presentation (30%) and an end-semester exam (40%). The exact pattern of evaluation will be decided once the course convenes. In all evaluations, I reserve the right to a viva voce to determine the authenticity of your efforts.

## Auditing the Course

If you decide that you would like to audit the course for some reason, please let me know within a week from the first lecture.

## Special Needs

If you need any special arrangement because you are physically challenged (or otherwise) please contact me and I will accommodate your request according to the institute guidelines. If you are unwell and are therefore unable to take an exam, please inform me before the exam and I will try to explore alternatives (e.g. a makeup exam) in accordance with the institute rules.

## Ethical Issues

Students are strongly encouraged to discuss and collaborate on work where this is explicitly allowed. Such sharing often enables effective learning of difficult material. Where this is not allowed, students are expected to turn in original work that is independently undertaken without the support or help of others. There is a zero tolerance policy for plagiarism and strong action will be taken against students suspected of the same.

## **SYLLABUS AND READING LIST**

In class, I will indicate which readings are optional.

### **I. Causal Reasoning and Research Design**

Chapter 1, Shadish, Campbell and Cook

Chapters 1 and 2, Angrist and Pischke

Chapter 2 and 3, Cameron and Trivedi

Chapter 25. Cameron and Trivedi. Treatment Evaluation. Review Chapter

Holland, Paul W., "Statistics and Causal Inference", *Journal of the American Statistical Association*, 1986, 81, 945-960.

Rubin, Donald B., "Statistics and Causal Inference: Comment: Which Ifs Have Causal Answers?" *Journal of the American Statistical Association*, 1986, 81, 961-962.

Freedman, David A., "From Association to Causation: Some Remarks on the History of Statistics," *Statistical Science*, 1999, 14, 243-258.

Freedman, David A., "Statistical Models and Shoe Leather," *Sociological Methodology*, 1991, 21, 291-313.

DiNardo, John, "Natural Experiments or Quasi-Natural Experiments," in *New Palgrave Dictionary of Economics*".

Rosenzweig, Mark R. and Kenneth I. Wolpin, "Natural "Natural Experiments" in Economics," *Journal of Economic Literature*, December 2000, 38, 827-874.

Ravallion, Martin "Evaluation in the Practice of Development" *The World Bank Research Observer*, vol. 24, no. 1 (February 2009)

Ravallion, M. (2001). The mystery of the vanishing benefits: An introduction to impact evaluation. *The World Bank Economic Review*, 15(1), 115-140.

### **A. EXPERIMENTAL METHODS**

### **II. Introduction to Randomized Experiments**

Chapter 3. Khandkher, Koolwal, Samad

Chapter 8, 9, 10. Shadish Cook and Campbell

Esther Duflo, Rachel Glennerster, Michael Kremer. Chapter 61 Using Randomization in Development Economics Research: A Toolkit, Review Article. *Handbook of Development Economics*, Volume 4, 2007, Pages 3895-3962.

# Chattopadhyay, R. and E. Duflo, 2004. Women as Policy Makers, *Econometrica*, 72, 1409-1443.

# Miguel, E. and M. Kremer, 2004, Worms: Identifying Impacts on Education and Health in the Presence of Treatment Externalities, *Econometrica* 72, 159-217

\*Mani, A., Mullainathan, S., Shafir, E., & Zhao, J. (2013). Poverty impedes cognitive function. *Science*, 341(6149), 976-980.

#Bertrand, Marianne and SendhilMullainathan, "Are Emily and Greg more employable than Lakisha and Jamal? A field experiment on labor market discrimination," *American Economic Review*, 2004, 94, (4), 991-1013.

### ***Randomized Experiments revisited: Use and Abuse***

Barrett, C. B., & Carter, M. R. The power and pitfalls of experiments in development economics: some non-random reflections. *Applied economic perspectives and policy*, 2010, 32(4), 515-548.

Deaton, Angus. "Instruments, randomization, and learning about development." *Journal of Economic Literature*, 2010, 48.2:424-455.

Burtless, Gary, "The Case for Randomized Field Trials in Economic and Policy Research," *Journal of Economic Perspectives*, Spring 1995, 9 (2), 63-84.

Heckman, James J., and Jeffrey A. Smith. 1995. "Assessing the Case for Social Experiments." *Journal of Economic Perspectives*, 9(2): 85-110.

Small Changes, Big Results, Boston Review, Special Issue, March-April 2011, "[http://www.bostonreview.net/BR36.2/ndf\\_behavioral\\_economics\\_global\\_development.php](http://www.bostonreview.net/BR36.2/ndf_behavioral_economics_global_development.php)"

Sudha Narayanan (2011) "The Poverty Trap" Book review of Esther Duflo and Abhitjit Banerjee "Poor Economics" *Biblio*, June, 2011 New Delhi, India

## **B. NON-EXPERIMENTAL METHODS**

### **III. Overview of Regression Basics**

Properties of Estimators, OLS, Violation of Classical Assumptions, Omitted Variable Bias, Monte Carlo Simulation Methods.

#### ***III.1. Regression Methods***

Yule, G. Udny, "An Investigation into the Causes of Changes in Pauperism in England, During the Last Two Intercensal Decades (Part I.)," *Journal of the Royal Statistical Society*, 1899,62, 249-295.

#Krueger, Alan, "How Computers Have Changed the Wage Structure: Evidence from MicroData," *Quarterly Journal of Economics*, 1993, 108, 33-60.

#DiNardo, John E. and Jorn-Steffen Pischke, "The Returns to Computer Use Revisited: Have Pencils Changed the Wage Structure Too?" *Quarterly Journal of Economics*, 1997, 112, 291-30

Munnell, Alicia H., Geoffrey M. B. Tootell, Lynn E. Brown, and James McEneaney, "Mortgage Lending in Boston: Intrepreting the HMDA Data," *American Economic Review*, 1996, 86 (1), 25-53.

#Fryer, Roland G. and Steven D. Levitt, "The Causes and Consequences of Distinctively Black Names," *Quarterly Journal of Economics*, August 2004, 119 (3), 767-805.

## **IV. Selection on Observables Designs**

### ***IV.1. The Propensity Score and Matching Techniques***

Chapter 4.Khandkher, Koolwal, Samad

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

Rosenbaum, Paul and Donald Rubin, "Reducing Bias in Observational Studies Using Sub-classification on the Propensity Score," *Journal of the American Statistical Association*, 1984, 79, 516-524.

Marco Caliendo and Sabine Kopeinig, Some Practical Guidance for the Implementation of Propensity Score Matching, mimeo. 2005

#Almond, Douglas, Kenneth Y. Chay, and David S. Lee, "The Costs of Low BirthWeight," *Quarterly Journal of Economics*, 2002.

Jalan, Jyotsna & Ravallion, Martin, "Does piped water reduce diarrhea for children in rural India?," *Journal of Econometrics*, 2003, Vol. 112(1), pages 153-173, January.

Dehejia, Rajeev H and Sadek Wahba, "Propensity Score-Matching Methods for Non-experimental Causal Studies," *The Review of Economics and Statistics*, Feb 2002, 84 (1), 151-161.

Heckman, J.J., Ichimura, H. and Todd, P.E., "Matching As An Econometric Evaluation Estimator: Evidence from Evaluating a Job Training Programme", *Review of Economic Studies*, 1997, 64, 605-654.

Rubin, D.B. , "Bias Reduction Using Mahalanobis-Metric Matching", *Biometrics*, 1980, 36, 293-298.

Cochran, W. and Rubin, D.B., "Controlling Bias in Observational Studies", *Sankhya*, 1973, 35, 417-446.

#### **IV.2. Decomposition and 'Counterfactual-Distribution' Estimation Techniques**

DiNardo, John, "Propensity Score Reweighting and Changes in Wage Distributions," 2002. Mimeo, University of Michigan.

Kline, Patrick, "Blinder-Oaxaca as a Reweighting Estimator," UC Berkeley mimeo, 2010.

#DiNardo, John, Nicole M. Fortin, and Thomas Lemieux, "Labor Market Institutions and the Distribution of Wages, 1973-1992: A Semi-parametric Approach," *Econometrica*, 1996, 64, 1001-1044.

Fortin, N, Thomas Lemieux, and Sergio Firpo, "Decomposition methods in economics," National Bureau of Economics Research Working Paper, Jan 2010, (WP 16045).

#### **IV.3. Synthetic Control Methods**

Abadie, A., Diamond, A., & Hainmueller, J. (2010). Synthetic control methods for comparative case studies: Estimating the effect of California's tobacco control program. *Journal of the American Statistical Association*, 105(490).

#Abadie, A., & Gardeazabal, J. (2003). The economic costs of conflict: A case study of the Basque Country. *American economic review*, 113-132.

#### **IV.4. Critical Assessments of these Methods**

LaLonde, Robert, "Evaluating the Econometric Evaluations of Training Programs with Experimental Data," *American Economic Review*, 1986, 76, 604-620.

Smith, Jeffrey and Petra Todd, "Does Matching Overcome LaLonde's Critique of Non-experimental Methods?," *Journal of Econometrics*, 2005, 125, 305-353.

Fraker, Thomas and Rebecca Maynard, "The Adequacy of Comparison Group Designs for Evaluations of Employment-Related Programs," *The Journal of Human Resources*, Apr 1987, 22 (2), 194-227.

Arceneaux, Kevin, Alan S. Gerber, and Donald P. Green, "Comparing Experimental and Matching Methods Using a Large-Scale Voter Mobilization Experiment," *Political Analysis*, 2006, 14, 37-62.

#### **IV.4. Quantile Regression**

Chapter 8. Khandkher, Koolwal, Samad

Chapter 7, Quantile Regression Angrist and Pischke

Koenker, Roger and Kevin F. Hallock, "Quantile Regression," *Journal of Economic Perspectives*, 2001, 15, 143-156.

#Bitler, Marianne, Jonah B Gelbach, and Hilary W Hoynes, "Welfare Reform and Children's Living Arrangements," *Journal of Human Resources*, 2006, 41 (1), 1-27.

Machado, Jose and Jose Mata, "Counterfactual Decomposition of Changes in Wage Distributions Using Quantile Regression," *Journal of Applied Econometrics*, May 2005, 20(4), 445-465.

### **V. Selection on Unobservables Designs**

#### **V.1. Linear panel data models. Fixed-effects and random effects models**

Ch 13, 14 Wooldridge Econometrics

Chapter 5 Angrist and Pischke

Chapter 21 Cameron and Trivedi

#### **V.2. Difference in Differences models, Triple Differences**

Chapter 5: Khandkher, Koolwal, Samad

Chapter 5 Angrist and Pischke

Card, David and Alan B. Krueger, "Minimum wages and employment: A case study of the fast-food industry in New Jersey and Pennsylvania," *American Economic Review*, 1994, 84, 772-793.

Autor, David H, "Outsourcing at Will: The Contribution of Unjust Dismissal Doctrine to the Growth of Employment Outsourcing," *Journal of Labor Economics*, Jan 2003, 21 (1), 1-42.

Jacobson, Louis, Robert LaLonde, and Daniel Sullivan, "Earnings Losses of Displaced Workers," *The American economic review*, Sep 1993, 83 (4), 685-709.

#Ravallion, M., Galasso, E., Lazo, T., & Philipp, E. What Can Ex-participants Reveal about a Program's Impact? *Journal of Human Resources*, 2005, 40(1), 208-230

Chay, Kenneth Y., Patrick McEwan, and Miguel Urquiola, "The Central Role of Noise in Evaluating Interventions that Use Test Scores to Rank Schools," *American Economic Review*, 2005.

Bertrand, Marianne, Esther Duflo, and Sendhil Mullainathan, "How Much Should We Trust Differences-in-Differences Estimates," *Quarterly Journal of Economics*, 2004, 119(1), 249-275.

#### **V.3. Control function approaches, Heckman's Correction Model.**

Chapter 14 and 16.5 Cameron and Trivedi. Limited Dependent Variable Models

Chapter 17 Wooldridge for basics. Limited Dependent Variable Models

#### **V.4. Instrumental Variables**

Chapter 15, Wooldridge for basics

Chapter 6, Khandkher, Koolwal, Samad

## Chapter 4 Angrist and Pischke

#Angrist, Joshua D., "Lifetime Earnings and the Vietnam Era Draft Lottery: Evidence from Social Security Administrative Records," *American Economic Review*, June 1990, 80 (3), 313-336.

Angrist, Joshua D., Guido Imbens, and Donald Rubin, "Identification of Causal Effects Using Instrumental Variables," *Journal of the American Statistical Association*, 1996, 91, 444-455.

Angrist, Joshua D. and Alan Krueger, "Instrumental Variables and the Search for Identification: From Supply and Demand to Natural Experiments," *Journal of Economic Perspectives*, 2001, 15, 69-86.

Bound, John, David Jaeger, and Regina Baker, "Problems with Instrumental Variables Estimation When the Correlation Between the Instruments and the Endogenous Explanatory Variable is Weak," *Journal of the American Statistical Association*, 1995, 90 (430), 443-450.

Kling, Jeffrey, "Interpreting Instrumental Variables Estimates of the Return to Schooling," *Journal of Business and Economic Statistics*, 2001, 19, 358-364.

Manning, Alan, "Instrumental Variables for Binary Treatments with Heterogeneous Treatment Effects: A Simple Exposition," *Contributions to Economic Analysis & Policy*, 2004, 3, 1-14.

Card, David, "The Causal Effect of Education on Earnings," in Orley Ashenfelter and David Card, eds., *Handbook of Labor Economics*, Vol. 3A, North Holland, 1999.

### **V.6. Regression Discontinuity Research Design**

Chapter 7. Shadish Cook and Campbell

Chapter 7. Khandkher, Koolwal, Samad

Chapter 6 Angrist and Pischke

Thistlewaite, Donald and Donald Campbell, "Regression-Discontinuity Analysis: An Alternative to the Ex Post Fact Experiment," *Journal of Educational Psychology*, 1960, 51, 309-317.

Imbens, Guido W. and Thomas Lemieux, "Regression Discontinuity Designs: A Guide to Practice," *Journal of Econometrics*, 2007.

Lee, David S. and Thomas Lemieux, "Regression Discontinuity Designs in Economics," *Journal of Economic Literature*, 2010, 48, 281-355.

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

\*Lee, David S., "Randomized Experiments from Non-random Selection in U.S. House Elections," 2008.

Keys, Benjamin, Tanmoy Mukherjee, Amit Seru, and Vikrant Vig, "Did Securitization Lead to Lax Screening? Evidence from Subprime Loans," December 2008. University of Michigan. mimeo.

### **V.7. Interrupted Time Series and Pipeline Methods**

Chapter 6, Shadish Cook and Campbell

#Jensen, R. The digital divide: Information (technology), market performance, and welfare in the South Indian fisheries sector. *The quarterly journal of economics*, 2007, 122(3), 879-924.