

Universidad del Rosario  
Facultad de Economía  
Escuela Doctoral

## Program Evaluation

Monday, 9 – 11am, 202 Torre2  
Thursday, 9 – 11am, Auditorio 1 Pedro Fermin

Instructors: Darwin Cortés (DC) and Juan F. Vargas (JFV)  
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### 1 Course Description

This course reviews the main experimental and non-experimental methods used to assess the causal effect of policy interventions and public programs. The first part of the course will concentrate on the theoretical description of the different methods and the assumptions necessary for using each one of them. The second part of the course will combine the review of empirical papers that apply such methods with several Stata sessions on how to implement the techniques in practice. At the end of the course students must hand in a paper applying one or more of the methods discussed in class.

### 2 Assessment

- Written exam 1 (theory part): 25%
- Written exam 2 (practical part): 25%
- Final project: 50%

### 3 Course Delivery

The course consists of both lectures and practical sessions using Stata. The lectures will be based on the suggested textbooks and papers. The practical sessions will be held in the computer room.

### 4 Main Textbooks

- For the theoretical part of the course: Angrist, Joshua and Jorn-Steffen Pischke (2008). *Mostly Harmless Econometrics: An Empiricists's Companion*, Princeton University Press. (MHE)
- For the empirical part: Cameron Colin and Pravin Trivedi (2009). *Microeconometrics using Stata*, Stata Press. (MUS)

## 5 Additional Textbooks

- Cameron Colin and Pravin Trivedi (2007). *Microeconometrics: Methods and Applications*, Cambridge University Press. (C&T)
- Lee, Myoung-Jae (2005). *Microeconometrics for Policy, Program, and Treatment Effects*, Oxford University Press. (LMJ)
- Shadish, William, Thomas Cook and Donald Campbell (2002). *Experimental and Quasi-experimental Designs for Generalized Causal Inference*, Houghton Mifflin. (SCC)
- Wooldridge, Jeffrey (2001). *Econometric Analysis of Cross Section and Panel Data*, MIT Press. (W)

## 6 Contents and Reading List

Students have to read in advance to each lecture at least the readings marked with "\*".

### 6.1 Introduction (DC)

### 6.2 Causal Inference and the Potential Outcomes Framework (JFV)

- \*Holland, P. (1986). "Statistics and Causal Inference", *Journal of the American Statistical Association* 81(396): 945-970 (with discussion)

#### References from the additional textbooks

- C&T 2.7 and 2.8 / LMJ 2.1 / W 18.1 and 18.2

### 6.3 Randomized Experiments (JFV)

- \*MHE 1 and 2
- \*Rubin, D. (1974). "Estimating Causal Effects of Treatments in Randomized and Non-randomized Studies", *Journal of Educational Psychology* 66: 688-701
- \*Campbell, D. (1969). "Reforms as Experiments", *American Psychologist* 24: 409-429
- Duflo, E., R. Glennerster and M. Kremer (2006). "Using Randomization in Development Economics Research: A Toolkit", BREAD Working Paper No. 136
- Meyer, Bruce D. (1995), "Natural and quasi-experiments in economics", *Journal of Business and Economic Statistics* 13 (2): 151-161

#### Empirical applications

- \*Angrist, J., E. Bettinger, E. Bloom, E. King, and M. Kremer (2002). "Vouchers for Private Schooling in Colombia: Evidence from a Randomized Natural Experiment", *American Economic Review* 92 (5): 1535-1558.

- \*Bertrand, M. and S. Mullainathan (2004). "Are Emily and Brendan More Employable than Lakisha and Jamal? A Field Experiment on Labor Market Discrimination", *American Economic Review* 94 (4): 991
- \*Kremer, M. and E. Miguel (2004). "Worms: Identifying Impacts on Education and Health in the Presence of Treatment Externalities", *Econometrica* 72 (1): 159-217
- Angrist, J. and V. Lavy (2009). "The Effect of High-Stakes High School Achievement Awards: Evidence from a Group-Randomized Trial", forthcoming, *The American Economic Review*
- Card, D. and P. K. Robins (2005). "How Important Are 'Entry Effects' In Financial Incentive Programs For Welfare Recipients? Experimental Evidence From The Self-Sufficiency Project", *Journal of Econometrics* 125(1-2): 113-139
- Duflo E. and R. Hanna (2005). "Monitoring Works: Getting Teachers to Come to School", NBER Working Paper # 11880.
- Olken, B. (2007). "Monitoring Corruption: Evidence from a Field Experiment in Indonesia", *Journal of Political Economy* 115 (2): 200-249

#### References from the additional textbooks

- C&T 3.3, 3.4 and 25.1 to 25.3 / LMJ 2.3 / SCC 1 and 8

## 6.4 Regression and Linear Panel (DC)

- \*MHE 3.1 and 3.2
- Angrist, J. and A. Krueger (1999). "Empirical Strategies in Labor Economics", in O. Ashenfelter and D. Card (eds.), *Handbook of Labor Economics* 3, Chapter 23 (read sections 3 and 4)

#### Empirical applications

- \*MUS 8

#### References from the additional textbooks

- C&T 21 / LMJ 2.4 / W 10 and 18.3.1

## 6.5 Matching (JFV)

- \*MHE 3.3.1
- \*Ho, D., K. Imai, G. King and E. Stuart (2007). "Matching as Nonparametric Pre-processing for Reducing Model Dependence in Parametric Causal Inference", *Political Analysis* 15: 199-236
- \*Imbens, G., (2004). "Nonparametric Estimation of Average Treatment Effects under Exogeneity: A Review", *Review of Economics and Statistics* 86 (1): 4-30

### **Empirical applications**

- \*Abadie, A. and Javier Gardeazabal (2003). "The Economic Costs of Conflict: A Case Study of the Basque Country", *American Economic Review* 93 (1): 113–132.
- \*Angrist, J.(1998). "Estimating the Labor Market Impact of Voluntary Military Service Using Social Security Data on Military Applicants", *Econometrica* (March)

### **References from the additional textbooks**

- C&T 25.4 / LMJ 4.1 and 4.2

## **6.6 Propensity Score Methods (DC)**

- \*MHE 3.3.2 and 3.3.3
- \*Rosenbaum, P. and D. Rubin (1983). "The Central Role of the Propensity Score in Observational Studies for Causal Effects", *Biometrika* 70 (1): 41-55
- \*Rosenbaum, P. and R. Rubin (1984). "Reducing Bias in Observational Studies Using Subclassification on the Propensity Score" *Journal of the American Statistical Association* 79 (387): 516-524
- Angrist, J. and J. Hahn (2004). "When to Control for Covariates? Panel-Asymptotic Results for Estimates of Treatment Effects" *Review of Economics and Statistics* (February)
- Hirano, K., G. Imbens and G. Ridder (2003). "Efficient Estimation of Average Treatment Effects Using the Estimated Propensity Score", *Econometrica* 71 (4): 1161-1189.

### **Empirical applications**

- \*Lalonde, R. (1986). "Evaluating the Econometric Evaluations of Training Programs with Experimental Data", *American Economic Review* 76: 604-620
- \*Dehejia, R. and S. Wahba (1999). "Causal Effects in Nonexperimental Studies: Re-evaluating the Evaluation of Training Programs", *Journal of the American Statistical Association* 94

*More readings on the Lalonde debate:*

- Smith, J. and P. Todd (2001). "Reconciling Conflicting Evidence on the Performance of Propensity Score Matching Methods", *American Economic Review* 91
- Smith, J. and P. Todd (2005). "Does Matching Overcome Lalonde's Critique of Non-experimental Estimators?", *Journal of Econometrics* 1-2
- Dehejia, R. (2005). "Practical Propensity Score Matching (Response to Smith and Todd)", *Journal of Econometrics* 1-2
- Heckman, J. and J. Hotz (1989). "Choosing Among Alternative Nonexperimental Methods for Estimating the Impact of Social programs: The Case of Manpower Training", *Journal of the American Statistical Association* 84: 862-8.

### **References from the additional textbooks**

- LMJ 4.3 / W 18.3.2

## 6.7 Instrumental Variables (JFV)

- \*MHE 4.1 and 4.4
- \*Angrist, J., G. Imbens and D. Rubin (1996). "Identification of Causal Effects Using Instrumental Variables", *Journal of the American Statistical Association* 91: 444-472 (with discussion)
- \*Angrist, J. and A. Krueger (2001). "Instrumental Variables and the Search for Identification: From Supply and Demand to Natural Experiments", *Journal of Economic Perspectives* 15 (4): 69-85
- Angrist, J. and G. Imbens (1994). "Identification and Estimation of Local Average Treatment Effects", *Econometrica* 61 (2): 467 - 476
- Heckman, J. (1997). "Instrumental Variables: A Study of Implicit Behavioral Assumptions Used in Making Program Evaluations", *Journal of Human Resources* 32 (3): 441-462

### Empirical applications

- \*MUS 6
- \*Acemoglu, D., S. Johnson and J. A. Robinson (2001). "The Colonial Origins of Comparative Development: An Empirical Investigation", *American Economic Review* 91: 1369– 1401
- \*Angrist, J. (1990). "Lifetime Earnings and the Vietnam Era Draft Lottery: Evidence from Social Security Administrative Records", *American Economic Review* (June)
- \*Angrist, J. and A. Krueger (1991). "Does Compulsory School Attendance Affect Schooling and Earnings?", *Quarterly Journal of Economics* 106 (4): 979-1014
- \*Bennedsen, M., K.M. Nielsen, F. Perez-Gonzalez, and D. Wolfenzon (2007). "Inside the Family Firm: The Role of Families in Succession Decisions and Performance", *Quarterly Journal of Economics* (May)
- \*Miguel, E., S. Satyanath and E. Sergenti (2004). "Economic Shocks and Civil Conflict: An Instrumental Variables Approach" *Journal of Political Economy* 112 (4): 725-753
- Angrist, J. (2005). "Instrumental Variables in Experimental Criminological Research: What, Why, and How" *Journal of Experimental Criminology* 2: 1-22
- Angrist and W. Evans (1998). "Children and their Parents' Labor Supply: Evidence from Exogenous Variation in Family Size", *American Economic Review* 88 (3): 450-477
- Dube, O. and J. F. Vargas (2008). "Commodity Price Shocks and Civil Conflict: Evidence from Colombia", unpublished manuscript, Harvard University.

### References from the additional textbooks

- C&T 4.8, 4.9 and 25.7 / LMJ 5.5 / W 5 and 18.4

## 6.8 Difference in Differences (JFV)

- \*MHE 5
- \*Bertrand, M., E. Duflo, and S. Mullainathan, (2004). "How Much Should We Trust Differences-in-Differences Estimates?" *Quarterly Journal of Economics* 119: 249-275
- Athey, S., and G. Imbens (2006). "Identification and Inference in Nonlinear Difference-in-Differences Models", *Econometrica* 74 (2): 431-497.

### Empirical applications

- \*A. Abadie, A. Diamond, and J. Hainmueller, "Synthetic Control Methods for Comparative Case Studies: Estimating the Effect of California's Tobacco Control Program, NBER Working Paper # 12831 (2007).
- \*Dube, Oeindrila and Juan Vargas (2008) "Commodity Price Shocks and Civil Conflict: Evidence from Colombia" unpublished manuscript Harvard University.
- \*Duflo, Esther, "Schooling and Labor Market Consequences of School Construction in Indonesia: Evidence from an Unusual Policy Experiment," *American Economic Review*, 91 (2001), 795–813
- \*Galiani, S., P. Gertler and E. Schargrodsky (2005). "Water for Life: The Impact of the Privatization of Water Services on Child Mortality", *Journal of Political Economy* 113 (1): 83-120
- Card D., and A. Krueger, (1994). "Minimum Wages and Employment: A Case Study of the Fast-food Industry in New Jersey and Pennsylvania", *American Economic Review* 84 (4): 772-784
- Donohue, J. and S. Levitt (2001). "The Impact of Legalized Abortion on Crime", *Quarterly Journal of Economics* 116 (2): 379-420

### References from the additional textbooks

- C&T 25.5 / LMJ 4.5

## 6.9 Regression Discontinuity Design (DC)

- \*MHE 6
- \*Imbens, G. and T. Lemieux (2008). "The regression discontinuity design—Theory and applications", *Journal of Econometrics* (Special Issue on Regression Discontinuity Design) 142 (2): 611-614
- \*Imbens, G. and T. Lemieux (2008). "Regression Discontinuity Designs: A Guide to Practice", *Journal of Econometrics* (Special Issue on Regression Discontinuity Design) 142 (2): 615-635
- Cook, T. (2008). "Waiting for Life to Arrive: A History of the Regression-Discontinuity Design in Psychology, Statistics, and Economics", *Journal of Econometrics* (Special Issue on Regression Discontinuity Design) 142 (2): 636-654.

- Hahn, J., P. Todd, and W. van der Klaauw (2001). "Identification and Estimation of Treatment Effects with a Regression-Discontinuity Design", *Econometrica* 69: 201-209

### **Empirical applications**

- \*Angrist J. and V. Lavy (1999). "Using Maimonides' Rule to Estimate the Effect of Class Size on Scholastic Achievement", *Quarterly Journal of Economics* (May)
- \*Cortés, D. (2008). "Do more decentralized local governments do better? An evaluation of the 2001 decentralization reform in Colombia", unpublished manuscript
- Barrera, F. L. Linden and M. Urquiola (2007). "The effects of user fee reductions on enrollment: Evidence from a quasi-experiment", unpublished manuscript
- Van Der Klaauw, W. (2002). "Estimating the Effect of Financial Aid Offers on College Enrollment: A Regression-Discontinuity Approach", *International Economic Review* 43 (4)

### **References from the additional textbooks**

- C&T 25.6 / LMJ 3.3

## **6.10 Quantile Treatment Effects (DC)**

- \*MHE 7
- \*Chamberlain, G. (1994). "Quantile regression, censoring, and the structure of wages", in: C. Sims (ed), *Advances in Econometrics Sixth World Congress* 1, Cambridge University Press: 171–209
- Angrist, J., V. Chernozhukov, and I. Fernandez-Val (2006). "Quantile Regression Under Misspecification, with an Application to the U.S. Wage Structure", *Econometrica*
- Chernozhukov, V., I. Fernandez-Val and B. Melly (2008). "Inference of Counterfactual Distributions" MIT Department of Economics, Working Paper 08-16

### **Empirical applications**

- \*MUS 7
- \*Abadie, A., J. Angrist, and G. Imbens (2002). "Instrumental variables estimates of the effect of subsidized training on the quantiles of trainee earnings", *Econometrica* 70 (1):91-117
- Bitler, M., J. Gelbach and H. Hoynes (2006). "What Mean Impacts Miss: Distributional Effects of Welfare Reform Experiments", *American Economic Review* 96 (4): 988-1012
- Buchinsky, M. (1994). "Changes in the U.S. Wage Structure 1963-1987: Application of Quantile Regression", *Econometrica* 62: 405-458

### **References from the additional textbooks**

- SCC 7

## 6.11 Miscellaneous

- \*Imbens, G., and J. Wooldridge (2009). "Recent Developments in the Econometrics of Program Evaluation", *Journal of Economic Literature* 47 (1): 5-86
- \*Banerjee, A. and E. Duflo (2008). "The Experimental Approach to Development Economics", NBER Working Paper # 14467
- \*Deaton, A., (2009). "Instruments of development: Randomization in the tropics, and the search for the elusive keys to economic development", NBER Working Paper # 14690
- \*Heckman, J. and S. Urzua (2009). "Comparing IV with Structural Models: What Simple IV Can and Cannot Identify?", NBER Working Paper # 14706
- \*Imbens, G. (2009). "Better LATE Than Nothing: Some Comments on Deaton (2009) and Heckman and Urzua (2009)", NBER Working Paper # 14896
- \*Ravallion, M. (2009) "Should the Randomistas Rule?", *The Economists' Voice* 6 (2)
- \*Rodrik, D., (2008) "The New Development Economics: We Shall Experiment, But How Shall We Learn?", unpublished manuscript, John F. Kennedy School of Government, Harvard University