

COURSE DESCRIPTION

This course will examine econometric methods for evaluating effects of program interventions. Typical interventions that might be of interest include job training or other active labor market programs, education programs (such as school subsidy programs), or health programs.

The first part of the course will examine ex post evaluation methods that are applicable after the program has been implemented and data are available on persons who participated in the program and possibly also on a group of people who did not participate. We consider both the case where the program was randomly assigned and when assignment was not random. We will consider questions related to implementation and design of randomized experiments and methods for nonexperimental data, including regression estimators, matching estimators, control function estimators, regression discontinuity methods, IV and LATE estimators, and MTE estimators.

The second part of the course will consider methods for ex ante evaluation, that is, methods for evaluating programs that do not yet exist or for evaluating modified versions of existing programs. These methods typically make more extensive use of structural models. We will consider mainly static and dynamic discrete choice finite horizon models as frameworks for social policy evaluation.

It is recommended that students who take this course have a good background with microeconomic methods, including panel data methods and nonparametric regression/density estimation.

Ex post evaluation

- 1: The evaluation problem, random assignment
- 2: Regression estimators
- 3: Review of kernel density and regression estimators, Matching Methods
- 4: Control function, Instrumental variables, Local Average Treatment Effects
- 5: Marginal Treatment Effects, Regression Discontinuity

Ex ante evaluation

- 6: Use of static and dynamic discrete choice models for ex ante evaluation
- 7: Estimating Discrete Choice Dynamic Programming models and examples

RECOMMENDED READINGS

The main references are class notes and the following book chapters:

- Heckman, James J., Lalonde, Robert J. and Smith, James A. (1999): The Economics and Econometrics of Active Labor Market Programs in *Handbook of Labor Economics*, Volume 3A, eds. Orley C. Ashenfelter and David Card.
- Todd, Petra E. (2005): Evaluating Social Programs with Endogenous Program Placement and Selection of the Treated, draft of chapter under preparation for Handbook of Development Economics, downloadable from <http://athena.sas.upenn.edu/petra/papers/hae.pdf>
- Imbens, Guido and Jeffrey M. Wooldridge (2008): "Recent Developments in the Econometrics of Program Evaluation," NBER working paper #14251.
- Keane, Michael, Todd, Petra E. and Wolpin, Kenneth I. "The Structural Estimation of Behavioral Models: Discrete Choice Dynamic Programming Methods and Applications, 2010, *Handbook of Labor Economics*, ed. David Card and Orley Ashenfelter, Volume 2, Elsevier, p. 332-461.

OTHER RECOMMENDED READINGS

(1) *Ex Post Evaluation Methods*

Matching estimators

- Abadie, Alberto and Guido Imbens (2006): "Large Sample Properties of Matching Estimators for Average Treatment Effects," *Econometrica*, 74, 1, 235-267.
- Andrews, Donald and Schafgans, (1998): "Semiparametric Estimation of the Intercept of a Sample Selection Model," *Review of Economic Studies*, 65, 497-518.
- Angrist, J. and Imbens, G. "Identification and Estimation of Local Average Treatment Effects" in *Econometrica*, March, 1994, v62, n2, p467(9).
- Ashenfelter, Orley (1978): Estimating the Effect of Training Programs on Earnings in *Review of Economics and Statistics*, 60, 47-57.
- Ashenfelter, Orley and David Card (1985): Using the Longitudinal Structure of Earnings to Estimate the Effect of Training Programs," in *Review of Economics and Statistics*, 67, 648-660.
- Behrman, Jere, Jorge Garcia-Gallardo, Susan Parker, Petra Todd, and Viviana Velez-Grajales (2005): "How Conditional Cash Transfers Impact School and Working Behavior of Children and Youth in Urban Mexico," in *Education Economics*.
- Carniero, P., Heckman, J. J. and Vyltasil, E (2001): "Understanding What Instrumental Variables Estimate: Estimating Marginal and Average Returns to Education," manuscript, University of Chicago.

- Dehejia, Rajeev and Sadek Wahba (1998): "Propensity Score Matching Methods for Nonexperimental Causal Studies," NBER Working Paper # 6829.
- Dehejia, Rajeev and Sadek Wahba (1999): "Causal Effects in Noexperimental Studies: Reevaluating the Evaluation of Training Programs," in *Journal of the American Statistical Association*, 94(448), 1053-1062.
- Duflo, Esther (2000): "Child Health and Household Resources in South Africa: Evidence from Old Age Pension," *AEA Papers and Proceedings*, 90(2), 393-398.
- Galiani, Sebastian, Gertler, Paul, and Ernesto Schargrotsky "Water for Life: The Impact of the Privatization of Water Services on Child Mortality in Argentina," *Journal of Political Economy*, Vol. 113, No. 1 (February 2005), pp. 83-120.
- Glewwe, Paul, Kremer, Michael, Moulin, Sylvie, and Eric Zitzewitz (2004): "Retrospective vs. prospective analyses of school inputs: the case of flip charts in Kenya," *Journal of Development Economics*, 74, 251-268.
- Hahn, J., Todd, P. and W. Van der Klauuw (2001): "Identification of Treatment Effects by Regression-Discontinuity Design," in *Econometrica*, February, 2001.
- Heckman, James (1997): "Randomization as an Instrumental Variables Estimator: A Study of Implicit Behavioral Assumptions in One Widely-used Estimator," *Journal of Human Resources*, 32, 442-462.
- Heckman, J., H. Ichimura, J. Smith and P. Todd (1998): "Characterizing Selection Bias using Experimental Data" *Econometrica*, Vol. 66, September.
- Heckman, J., H. Ichimura and P. Todd (1997): "Matching as an Econometric Evaluation Estimator: Evidence from Evaluating a Job Training Program with J. Heckman and H. Ichimura," *Review of Economic Studies*, Vol. 64(4), October.
- Heckman, James and Salvador Navarro (2004): "Using Matching, Instrumental Variables, and Control Functions to Estimate Economic Choice Models," *Review of Economics and Statistics*, February 2004, Vol. 86, No. 1, Pages 30-57.
- Heckman, J. and E. Vytlačil (2005): "Structural Equations, Treatment Effects and Econometric Policy Evaluation," *Econometrica*, 2005.
- Imbens, Guido W. (2009): "Better LATE than nothing: some comments on Deaton (2009) and Heckman and Urzua (2009)," NBER working paper #14896.
- LaLonde, Robert (1986): "Evaluating the Econometric Evaluations of Training Programs with Experimental Data in *American Economic Review*, 76, 604-620.
- Rosenbaum, P. and D. Rubin (1983): "The Central Role of the Propensity Score in Observational Studies for Causal Effects," *Biometrika*, 70,41-55.
- Rubin, D. B. (1980): "Bias Reduction Using Mahalanobis' Metric Matching," *Biometrics*, 36,2, pp. 295-298.

- Smith, J. and P. Todd Reconciling Conflicting Evidence on the Performance of Propensity Score Matching Estimators in *American Economic Review*, Papers and Proceedings, May 2001.
- Thistlethwaite, D., and D. Campbell (1960) :Regression-discontinuity Analysis: An alternative to the ex post facto experiment, *Journal of Educational Psychology*, 51, 309-317.
- Trochim, W. (1984): *Research Design for Program Evaluation: the RegressionDiscontinuity Approach*. Beverly Hills: Sage Publications.
- Van der Klaauw, W. (1996): Estimating the Effect of Financial Aid Offers on College Enrollment, in *International Economic Review*, Vol. 43, Issue 4, pp. 1249-1287.
- Wolpin, Kenneth I. and Mark R. Rosenzweig (1988a): "Evaluating the Effects of Optimally Distributed Programs: Child Health and Family Planning Programs," in *American Economic Review*, 76(3), 470-482.
- (2) *Ex Ante Evaluation Methods*
- Heckman, James J. (2000): "Causal Parameters and Policy Analysis in Economics: A Twentieth Century Retrospective," in *Quarterly Journal of Economics*, Vol. 115(1), p.45-97.
- Hurwicz, Leonid (1962): "On the Structural Form of Interdependent Systems." In *Logic, Methodology and Philosophy of Science*, edited by Ernest Nagel, Patrick Suppes and Alfred Tarski. Stanford, Calif.: Stanford University Press.
- Ichimura, Hidehiko and Christopher Taber (2002): "Semiparametric Reduced-Form Estimation of Tuition Subsidies" in *American Economic Review*. Vol. 92 (2). p 286-92.
- Lise, Jeremy, Seitz, Shannon, and Jeffrey Smith (2003): "Equilibrium Policy Experiments and the Evaluation of Social Programs," working paper.
- Lumsdaine, Robin L., James H. Stock and David A.Wise (1992): "Pension Plan Provisions and Retirement: Men and Women, Medicare, and Models," in D. A. Wise (ed.) *Studies in the Economics of Aging*, Chicago: University of Chicago Press.
- Marschak, Jacob (1953): "Economic Measurements for Policy and Prediction," in William Hood and Tjalling Koopmans, eds., *Studies in Econometric Method* (New York: John Wiley, 1953), pp. 1-26.
- McFadden, Daniel and A. P. Talvitie and Associates (1977): "Validation of Disaggregate Travel Demand Models: Some Tests" in *Urban Demand Forecasting Project, Final Report, Volume V*, Institute of Transportation Studies, University of California, Berkeley.
- Todd, Petra E. and Kenneth I. Wolpin (2005): *Ex Ante Evaluation of Social Programs*, *Annales Statistique*, 2008, downloadable from <http://athena.sas.upenn.edu/petra/papers/exante.pdf>
- Todd, Petra E. and Kenneth I. Wolpin (2006): *Assessing the Impact of a School Subsidy Program in Mexico: Using Experimental Data to Validate a Behavioral Model of Child Schooling and Fertility*, *American Economic Review*, 2006, 96(5): 1384-1417. downloadable from <http://athena.sas.upenn.edu/petra/papers/aerfinal.pdf>

Todd, Petra E. and Kenneth I. Wolpin (2006): Handout on Ex Ante Evaluation in a Three Period Schooling Choice Model, downloadable from <http://athena.sas.upenn.edu/petra/iza/exanteexample.pdf>

Todd, Petra E. and Kenneth I. Wolpin (2010): Structural Estimation and Policy Evaluation in Developing Countries, published in Annual Review of Economics, downloadable from <http://athena.sas.upenn.edu/petra/papers/arregstyle1.pdf>

Wise, David A. (1985): "A Behavioral Model Verses Experimentation: The Effects of Housing Subsidies on Rent" in Methods of Operations Research, 50, Verlag Anton Hain.

Some references on nonparametric methods

Fan, J. "Design Adaptive Nonparametric Regression," in JASA, 87, 998-1004.

Fan, J. "Local Linear Regression Smoothers and their Minimax Efficiencies," The Annals of Statistics, 21, 196-216.

Hardle, W. Applied Nonparametric Regression, Cambridge University Press.

Hardle, W. and Linton, O. "Applied Nonparametric Methods" in Handbook of Econometrics, (R. Engle and D. McFadden, eds.), Vol. IV, 1994, p.2295.

Ichimura, Hidehiko and Todd, Petra (2000) "Implementing Nonparametric and Semiparametric Estimators," manuscript under preparation for Handbook of Econometrics, Volume 5. (downloadable from <http://athena.sas.upenn.edu/petra/papers/curver9.pdf>)

Jones, M. C., Marron, J. S. and Sheather, S. J. (1996): "A Brief Survey of Bandwidth Selection for Density Estimation" in Journal of the American Statistical Association, Vol. 91, No. 433, 401-407.

Silverman, B.W. (1986) Density Estimation for Statistics and Data Analysis (London: Chapman and Hall).