

**Minicourse: Econometric Evaluation of Social Programs**  
**June 8-13**  
**CIDE Summer School**

**Instructor: Edward Vytlacil, Yale University**

This mini-course will consider the econometric evaluation of policy counterfactuals. Our starting point will be to consider treatment effect parameters when (1) the effect of the treatment varies across individuals; and (2) selection into treatment is possibly related to the idiosyncratic treatment effect. We then move beyond the conventional treatment effect parameters to consider the evaluation of alternative policies that would change the selection of individuals into the treatment. Our prototypical examples will be (1) college education, with policy counterfactuals that would encourage college attendance such as a tuition subsidy, and (2) job training programs, with policy counterfactuals that would change the assignment of workers into the programs. We will consider alternative criteria for evaluating policies. Our focus will be on the evaluation of such programs using selection models, though we will also consider other approaches.

**Course Outline:**

**R** denotes required readings, **NR** denotes readings that are not required.

1. Heterogeneity in Program Impacts, Modeling Self-Selection, and Parameters of Interest.

We first briefly review structural models and counterfactual notation. We then discuss possible ways to summarize the effect of an intervention when the effect varies across people, including both mean and distributional treatment parameters. We then consider alternative policy changes, and what information is required to evaluate proposed policy changes according to alternative criteria.

Readings:

NR James J. Heckman/Jeffrey Smith/Nancy Clements Making the Most Out Of Programme Evaluations and Social Experiments: Accounting for Heterogeneity in Programme Impacts. *Review of Economic Studies*, 64 October 1997, Nr. 221

R James J. Heckman/Jeffrey A. Smith Evaluating the Welfare State. In S. Strom, editor *Econometrics and Economic Theory in the Twentieth Century: The Ragnar Frisch Centennial Symposium*. New York: Cambridge University Press, 1998

## 2. Overview of some possible approaches

We consider some alternative approaches to evaluate policy counterfactuals, including the use of randomized experiments, before-after and differences-in-differences approaches, matching approaches, regression discontinuity approaches, instrumental variable approaches, and selection model approaches. Emphasis will be given to analyzing these approaches when treatment effects vary across individuals.

Readings:

- NR James J. Heckman/Jeffrey A. Smith Assessing the Case for Social Experiments. *Journal of Economic Perspectives*, 9 Spring 1995, Nr. 2
- NR Gary Burtless The Case for Randomized Field Trials in Economic and Policy Research. *Journal of Economic Perspectives*, 9 Spring 1995, Nr. 2
- R James J. Heckman/Hidehiko Ichimura/Petra E. Todd Matching as an Econometric Evaluation Estimator. *Review of Economic Studies*, 65 April 1998, Nr. 223
- R Jinyong Hahn/Petra E. Todd/Wilbert Van der Klaauw Identification and Estimation of Treatment Effects with a Regression-Discontinuity Design. *Econometrica*, 69 January 2001, Nr. 1
- R Guido W. Imbens/Joshua D. Angrist Identification and Estimation of Local Average Treatment Effects. *Econometrica*, 62 March 1994, Nr. 2

3. Further Analysis of Instrumental Variables and Selection Models to Evaluate Treatment Effects.

We consider the structure of parametric, semiparametric, and nonparametric selection models, and relate them to the independence and monotonicity assumptions imposed in the LATE framework. We analyze the identification and estimation of treatment effects while controlling for self-selection. We focus on the Marginal Treatment Effect parameter (MTE), and consider how the shape of the MTE function can provide guidance on whether a program currently in place is targeting those individuals who would most benefit from the program.

Readings:

- R Anders Björklund/Robert Moffitt The Estimation of Wage Gains and Welfare Gains in Self-Selection. *Review of Economics and Statistics*, 69 February 1987, Nr. 1
- R Guido W. Imbens/Joshua D. Angrist Identification and Estimation of Local Average Treatment Effects. *Econometrica*, 62 March 1994, Nr. 2
- NR Edward Vytlacil Independence, Monotonicity, and Latent Index Models: An Equivalence Result. *Econometrica*, 70 January 2002, Nr. 1
- R James J. Heckman/Edward Vytlacil Local Instrumental Variables. In Cheng Hsiao/Kimio Morimue/James L. Powell, editors *Nonlinear Statistical Modeling: Proceedings of the Thirteenth International Symposium in Economic Theory and Econometrics: Essays in Honor of Takeshi Amemiya*. New York: Cambridge University Press, 2001
- R James J. Heckman/Sergio Urzua/Edward Vytlacil Understanding Instrumental Variables in Models with Essential Heterogeneity. *Review of Economics and Statistics*, 88 2006, Nr. 2
- NR Arild Aakvik/James J. Heckman/Edward Vytlacil Estimating Treatment Effects for Discrete Outcomes When Responses to Treatment Vary: An Application to Norwegian Vocational Rehabilitation Programs. *Journal of Econometrics*, 125 2005, Nr. 1-2

#### 4. Selection Model to Evaluate Policy Changes

We consider the evaluation of policies that change incentives for entering the program or otherwise change selection into the program. Our prototypical examples will be (1) tuition subsidies on self-selection into college attendance, and (2) alternative rules for case-workers to select individuals into job training. Most of the discussion will be in the context of selection models.

Readings:

- NR James J. Heckman/Edward Vytlacil Policy-Relevant Treatment Effects. *American Economic Review*, 91 May 2001, Nr. 2
- NR James J. Heckman/Edward Vytlacil Structural Equations, Treatment Effects and Econometric Policy Evaluation. *Econometrica*, 73 May 2005, Nr. 3
- R James J. Heckman/Sergio Urzua/Edward Vytlacil Understanding Instrumental Variables in Models with Essential Heterogeneity. *Review of Economics and Statistics*, 88 2006, Nr. 2
- R Anders Björklund/Robert Moffitt The Estimation of Wage Gains and Welfare Gains in Self-Selection. *Review of Economics and Statistics*, 69 February 1987, Nr. 1,
- R James J. Heckman/Edward Vytlacil Marginal Policy Changes and Treatment Effects for Individuals at the Margin. Unpublished manuscript, University of Chicago, Department of Economics, 2007
- NR James J. Heckman/Edward Vytlacil Generalized Roy Model, Subjective Cost, and Program Evaluation. Unpublished manuscript, University of Chicago, Department of Economics, 2007

## 5. Adding Additional Structure to Selection Models

We continue to investigate the use of selection models to evaluate treatment effects, but now consider alternative restrictions on the outcome equation in addition to the selection model for selection into treatment.

Readings:

- R E. Vytlačil/N. Yildiz Dummy Endogenous Variables in Weakly Separable Models. *Econometrica*, 75 May 2007, Nr. 3
- R Jay Bhattacharya/Azeem M. Shaikh/Edward J. Vytlačil Treatment Effect Bounds under Monotonicity Assumptions: An Application to Swan-Ganz Catheterization. *American Economic Review Papers and Proceedings*, 98 2008, Nr. 2
- R Jay Bhattacharya/Azeem M. Shaikh/Edward J. Vytlačil Treatment Effects Bounds: An Application to Swan-Ganz Catheterization. Unpublished manuscript, Yale University, Department of Economics, 2007
- NR Cecilia Machado/Azeem M. Shaikh/Edward J. Vytlačil Instrumental Variables and the Sign of the Average Treatment Effect. Unpublished manuscript, Yale University, Department of Economics, 2009

## 6. Statistical Decision Rules and Decision Making under Ambiguity

We now consider two important complications, sampling variability in the estimation and that objects of interest may not be identified.

Readings:

- R Charles Manski Identification Problems and Decisions Under Ambiguity: Empirical Analysis of Treatment Response and Normative Analysis of Treatment Choice. *Journal of Econometrics*, 95 April 2000, Nr. 2,
- R Charles Manski Statistical Treatment Rules for Heterogeneous Populations. *Econometrica*, 72 July 2004, Nr. 4 Charles Manski Fractional Treatment Rules for Social Diversification of Indivisible Private Risks. NBER, 2005 (11675). – Technical report,
- NR Charles Manski Search Profiling with Partial Knowledge of Deterrence. NBER, 2005 (11848). – Technical report