# Empirical Methods for Policy Evaluation

| Course title – Intitulé du cours | Empirical Methods for Policy Evaluation |
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| Level / Semester – Niveau /semestre | MRes/S1 |
| School – Composante | Ecole d'Economie de Toulouse |
| Teacher – Enseignant responsable | Matteo Bobba - Arnaud Maurel |
| Other teacher(s) – Autre(s) enseignant(s) | |
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| Other teacher(s) – Autre(s) enseignant(s) | |
| Lecture Hours – Volume Horaire CM | 30 |
| TA Hours – Volume horaire TD | |
| TP Hours – Volume horaire TP | |
| Course Language – Langue du cours | English |
| TA and/or TP Language – Langue des TD et/ou TP | English |

**Teaching staff contacts:**

- Matteo Bobba (MB): matteo.bobba@tse-fr.eu -  T362
- Arnaud Maurel (AM):   arnaud.maurel@tse-fr.eu -  T516
- office hours: TBD
- preferred means of interaction: after the classes, or during office hours with prior appointment

**Course Objectives: newly acquired knowledge once the course completed should be well identified**

This 10-week course is divided in two parts. In the first part, AM will focus on the interpretation and identification of various treatment effect parameters which are used in the context of ex-post policy evaluation. We will use the Marginal Treatment Effect as a building block for other types of treatment effect parameters. We will pay special attention to the underlying identifying assumptions, which will be analyzed from a statistical and behavioral viewpoint. We will also examine methods allowing to pin down the distribution of treatment effects, and discuss the use of factor models in this context.

In the second part, MB will examine the fruitful interactions between design-based and model-based approaches for policy evaluation. We will illustrate the use of these tools for a full characterization of a variety of public policies in developing countries.

**Prerequisites :**

Students should be familiar with the content of the compulsory M2 ETE courses. Familiarity with econometric packages such as R or Matlab is encouraged, although students will have the opportunity to enhance their programming skills with the take home exercises.

**Practical information about the sessions:**

Student should participate actively to each session. Laptops and tablets are tolerated if used for the sole purpose of following the course.

**Grading system :**

- Short research proposal, which may consist of an extension of one of the methods discussed in class, a new application to a particular economic question, or both. [45% of the grade].
- Problem sets and other take-home assignments such as referee reports [45% of the grade]
- Class participation [10% of the grade]

**Bibliography/references :**

See references in next section. Papers denoted with * are required readings and will be covered during the lectures. Students are strongly encouraged to take a look at them before the corresponding lecture.

**Session planning :**

# 1. Econometrics of Treatment Effects (AM)

## 1.1. Overview and Identification of Treatment Effects

Abadie, A., and Cattaneo, M. D. (2018), ``Econometric Methods for Program Evaluation'', *Annual Review of Economics*, Vol. 10, pp. 465-503.

Heckman, J.J. (2010), ``Building bridges between structural and program evaluation approaches to evaluating policy'', *Journal of Economic Literature*, Vol.48 (2), pp. 356-398.

Hotz, J., Mullin, C. and Sanders S. (1997), "Bounding causal effects using data from a contamined natural experiment: analyzing the effects of teenage childbearing", *Review of Economic Studies,* Vol. 64, No.4, pp. 575-603.

Kitagawa, T. (2021), "The identification region of the potential outcome distributions under instrument independence", *Journal of Econometrics,* Vol. 225, No. 2, pp. 231-253.

*Manski, C.F., and Pepper, J.V. (2000), "Monotone instrumental variables: with an application to the returns to schooling", *Econometrica,* Vol.68, No.4, pp. 997---1010.

Pepper, J. (2000), "The intergenerational transmission of welfare receipt: a nonparametric bound analysis", *Review of Economics and Statistics,* Vol. 82, No.3, pp. 472---488.

Pinto, R., and Heckman J.J. (2022), "The Econometric Model for Causal Policy Analysis", *Annual Review of Economics*, Vol. 14, pp. 893-923.

Rubin, D.B. (1974), "Estimating causal effects of treatments in randomized and nonrandomized studies", *Journal of educational Psychology,* Vol.66, No.5, pp.688---701.

## 1.2. Treatment Effect Heterogeneity and Marginal Treatment Effects

Björklund, A., and Moffitt, R. (1987), "The estimation of wage gains and welfare gains in self-selection models", *Review of Economics and Statistics*, Vol. 69, No.1, pp.42-49.

Brinch, C., Mogstad, M. and Wiswall, M.  (2017) "Beyond LATE with a discrete instrument: heterogenety in the quantity-quality interaction of children", *Journal of Political Economy,* Vol. 125, No. 4, pp. 985-1039.

Callaway, B. and Sant'Anna, P. (2021),  "Difference-in-Differences with multiple time periods", *Journal of Econometrics,* Vol. 225, No. 2, pp. 200-230.

*Carneiro, P., Heckman, J. and Vytlacil, E. (2010), "Evaluating marginal policy changes and the average effect of treatment for individuals at the margin" *Econometrica,* Vol. 78, No.1, pp. 377-394.

*Carneiro, P., Heckman, J. and Vytlacil, E. (2011), "Estimating marginal returns to education " *American Economic Review,* Vol. 101, No.6, pp. 2754-2781.

Carneiro, P. and Lee, S. (2009), "Estimating distribution of potential outcomes using local instrumental variables with an application to changes in college enrollment and wage inequality", *Journal of Econometrics,* Vol. 149, pp. 191-208.

De Chaisemartin, C. and D'Haultfoeuille, X. (2020), "Two-way fixed effects estimators with heterogeneous treatment effects", *American Economic Review,* Vol. 110, No. 9, pp. 2964-96.

Florens, J.P., Heckman, J.J., Meghir, C. and Vytlacil, E. (2008), "Identification of Treatment Effects using Control Functions in Models with Continuous, Endogenous Treatment and Heterogeneous Effects", *Econometrica,* Vol.76, No. 5, pp. 1191-206.

Hahn, J., Todd, P. and Van der Klaauw, W. (2001), "Identification and Estimation of Treatment Effects with a Regression-Discontinuity Design", *Econometrica,* Vol. 69, No. 1, pp. 201-209.

Heckman, J.J., and Pinto, R. (2018), "Unordered Monotonicity", *Econometrica,* Vol.86, No. 1, pp. 1-35.

*Heckman, J.J., and Vytlacil, E. (2005), "Structural equations, treatment effects, and econometric policy evaluation", *Econometrica,* Vol.73, No.3, pp.669-738.

Imbens G., and Angrist, J. (1994), "Identification and Estimation of Local Average Treatment Effects ", *Econometrica,* Vol. 62, No.2, pp.467-475.

Lee, S. and Salanie, B. (2018), "Identifying Effects of Multivalued Treatments", *Econometrica,* Vol. 86, No. 6, pp. 1939-63.

Mogstad, M., Santos, A. and Torgovitsky, A. (2018) "Using Instrumental Variables for Inference about Policy Relevant Treatment Parameters", *Econometrica,* Vol. 86, No. 5, pp. 1589-619.

Mogstad, M. and Torgovitsky, A. (2018) "Identification and Extrapolation of Causal Effects with Instrumental Variables", *Annual Review of Economics,* Vol. 10, pp. 577-613.

## 1.3. Treatment Effects and Generalized Roy Model

Bayer, P., Khan, S. and Timmins, C. (2011), "Nonparametric identification and estimation

in a Roy model with common nonpecuniary returns", *Journal of Business and Economic Statistics,* Vol. 29, No. 2, pp. 201-215.

Dahl, G.B. (2002), "Mobility and the return to education : testing a Roy model with multiple markets ", *Econometrica,* Vol. 70, No. 6, pp. 2367-2420.

*D'Haultfoeuille, X., and Maurel, A. (2013), "Inference on an Extended Roy model, with an application to schooling decisions in France", *Journal of Econometrics,* Vol. 174, No. 2, pp. 95-106.

*Eisenhauer, P., Heckman J.J. and Vytlacil, E. (2015), "The Generalized Roy Model and the Cost-Benefit Analysis of Social Programs", *Journal of Political Economy,* Vol. 123, No. 2, pp. 413-443.

Gardner, J. R. (2020), "Roy model bounds on the wage effects of the Great Migration", *Econometrics Journal,* Vol. 23, No. 1, pp. 68-87.

Heckman, J.J., and Honore, B. (1990), " The empirical content of the Roy model ", *Econometrica,* Vol. 58, No. 5, pp. 1121-1149.

Henry, M, Mourifie, I., and Meango. R. (2020), " Sharp bounds and testability of a Roy model of STEM major choices", *Journal of Political Economy,* Vol. 128, No. 8, pp. 3220 – 3283.

Walters, C.R. (2018), "The demand for effective charter schools ", *Journal of Political Economy,* Vol. 126, No. 6, pp. 2179 – 2660.

### 1.4. Unconfoundedness, Matching and Synthetic Control Methods

*Abadie, A., Diamond, A., and 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), pp. 493-505.

Abadie, A., and Imbens, G. (2016), "Matching on the estimated propensity score", *Econometrica*, Vol.84, No.2, pp. 781-807.

Abadie, A. and Imbens, G. (2008), "On the failure of the bootstrap for matching estimators", *Econometrica,* Vol. 76, No. 6, pp. 1537-57.

Abrevaya, J., Hsu, Y-C., and Lieli, R.P. (2015), "Estimating Conditional Average Treatment Effects", *Journal of Business and Economic Statistics,* Vol. 33, No. 4, pp. 484-505.

*Altonji, J., Elder, T., and Taber, C. (2005), "Selection on Observed and Unobserved Variables: Assessing the Effectiveness of Catholic Schools", *Journal of Political Economy,*

Vol. 113, No. 1, pp. 151-184.

Dehejia R.H., and Wahba, S. (2002), "Propensity Score-Matching Methods for Nonexperimental Causal Studies'', *Review of Economics and Statistics*, Vol.84, No.1, pp. 151-161.

Gobillon, L., and Magnac, T. (2016), "Regional Policy Evaluation: Interactive Fixed Effects and Synthetic Controls", *Review of Economics and Statistics*, Vol.98, No.3, pp. 535-51.

Heckman, J., Ichimura, H., Smith, J. and Todd, P. (1998), "Characterizing selection bias using experimental data", *Econometrica*, Vol.66, No.5, pp. 1017-1098.

Hirano, K., Imbens, G. and Ridder, G. (2003), "Efficient estimation of average treatment effects using the estimated propensity score", *Econometrica*, Vol.71, No.4, pp. 1161-1189.

Imbens, G. (2015), ``Matching Methods in Practice: Three Examples''', *Journal of Human Resources*, Vol. 50, No. 2, pp. 373-419.

Imbens, G. (2004), ``Nonparametric Estimation of Average Treatment Effects Under Exogeneity: A Review'', *Review of Economics and Statistics*, Vol. 86, No.1, pp. 4-29.

Rosenbaum, P. R., and Rubin, D.B. (1983), "The central role of the propensity score in observational studies for causal effects", *Biometrika,* Vol.70, No.1, pp.41-55.

## 1.5. Distributional Treatment Effects, Factor Models and Ex Ante Treatment Effects

Aakvik, A., Heckman, J. and Vytlacil, E. (2005), "Estimating treatment effects for discrete outcomes when responses to treatment vary: an application to Norwegian vocational rehabilitation programs", *Journal of Econometrics,* Vol. 125, pp. 15-51.

*Arcidiacono, P., and Hotz, V.J, and Maurel, A. and Romano, T (2020), "Ex ante returns and occupational choice", *Journal of Political Economy,* Vol. 128, No. 12, pp. 4475 – 4522.

Arellano, M. and Bonhomme, S. (2012), "Identifying Distributional Characteristics in Random Coefficients Panel Data Models", *Review of Economic Studies,* Vol. 79, No.3, pp. 987 - 1020.

Athey, S., and Imbens, G. (2006), "Identification and Inference in Nonlinear Difference-in-Differences Models", *Econometrica,* Vol. 125, pp. 15-51.

*Carneiro, P., Hansen, K., and Heckman, J.J. (2003), " Estimating distributions of treatment effects with an application to the returns to schooling and measurement of the effects of uncertainty on college choice ", *International Economic Review,* Vol. 44, No.2,

pp. 361 - 422.

Chernozhukov, V., and Hansen, C. (2005), "An IV Model of Quantile Treatment Effects", *Econometrica,* Vol.73, No.1, pp.245-261.

*Cunha, F., and Heckman, J.J. (2007), "Identifying and estimating the distributions of ex post and ex ante returns to schooling", *Labour Economics,* Vol. 14, No.6, pp.870-893.

Fan, Y. and Park, S.S. (2010), "Sharp Bounds on the Distribution of Treatment Effects and their Statistical Inference", *Econometric Theory,* Vol. 26, No. 3, pp. 931-51.

Frandsen, B.R. and Lefgren, L.J. (2021), "Partial identification of the distribution of treatment effects with an application to the Knowledge is Power Program (KIPP)", *Quantitative Economics,* Vol. 12, No.1 , pp. 143-71.

Heckman, J. J., Smith, J. and Clements, N. (1997), "Making the most out of program evaluations and social experiments: Accounting for heterogeneity in program impacts", *Review of Economic Studies,* Vol.64, No.4, pp.487-535.

## 2. Causal Inference Meets Structural Models (MB)

### 2.1 Ex-ante and Ex-post Policy Evaluation

Attanasio, Orazio, Meghir, Costas and Santiago, Ana, (2012), "Education Choices in Mexico: Using a Structural Model and a Randomized Experiment to Evaluate PROGRESA," The *Review of Economic Studies*, 79, issue 1, p. 37-66.

Nevo and Whinston (2010), "Taking the Dogma out of Econometrics: Structural Modeling and Credible Inference", *Journal of Economic Perspective*, vol 24, Number 2, p. 69-82.

Heckman (2010). "Building Bridges between Structural and Program Evaluation Approaches to Evaluating Policy," *Journal of Economic Literature,* vol. 48(2), pages 356-398, June.

Todd, Petra, E., and Kenneth I. Wolpin (2006). "Assessing the Impact of a School Subsidy Program in Mexico: Using a Social Experiment to Validate a Dynamic Behavioral Model of Child Schooling and Fertility." *American Economic Review*, 96 (5): 1384–1417**.**

Todd Petra E. and Kenneth I. Wolpin (2023). « The Best of Both Worlds: Combining RCTs with Structural Modeling," *Journal of Economic Literature*.

*Wolpin, Kenneth (2013). "The limits of inference without theory," MIT Press, Cambridge (Chapter 2).

**2.2 Field Experiments and Risk Sharing Models**

Athey and Imbens (2017). "The Econometrics of Randomized Experiments." *Handbook of Economic Field Experiments*, 1: 73-140.

Imbens and Rubin (2015). "Causal Inference for Statistics, Social, and Biomedical Sciences: An Introduction." Cambridge University Press.

*Meghir & Mobarack & Mommaerts & Morten (2022). "Migration and Informal Risk Sharing: Evidence form a Randomized Control Trial and a Structural Model". *Review of Economic Studies*, 89(1), 452-480.*


**2.3 Regression Discontinuity Designs and Discrete Choice Models**

*Bobba, Matteo, Tim Ederer, Gianmarco Leon, Chris Neilson, and Marco Nieddu (2024). "Teacher Compensation and Structural Inequality: Evidence from Centralized Teacher School Choice in Peru". *NBER working paper 29068*.

Cattaneo, Matias and Rocío Titiunik (2022). "Regression Discontinuity Designs." *Annual Review of Economics* 14: 821-851, August 2022.

Cattaneo, Matias D., Nicolas Idrobo, and Rocío Titiunik (2019). " A Practical Introduction to Regression Discontinuity Designs: Foundations» Cambridge University Press, 2019

Cattaneo, Matias D., Nicolas Idrobo, and Rocío Titiunik (2024). " A Practical Introduction to Regression Discontinuity Designs: Extensions » Cambridge University Press, 2024


**2.4 Difference-in-Differences and Job Search Models**

*Bobba, M., L. Flabbi, and S. Levy (2022). "Labor Market Search, Informality, and Schooling Investments." *International Economic Review*, 63: 211-259.

de Chaisemartin, Clément and d'Haultfoeuille, Xavier (2024). "Credible Answers to Hard Questions: Differences-in-Differences for Natural Experiments." Forthcoming, Princeton University Press.

Roth, Sant'Anna, Bilinski, and Poe (2023). "What's trending in difference-in-differences? A synthesis of the recent econometrics literature." *Journal of Econometrics*, Volume 235, Issue 2, 2218-2244.