Econometrics of Program Evaluation

Level: Master – first year - M1 / second semester
Cursus: Economics
Teaching hours: 12h in class (lectures - CM) and 12h of practice (TD)

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Course's objectives:

This course covers the basic theoretical knowledge and technical skills required for implementing microeconometric methods of estimation of causal or treatment effects.

The course introduces students to the fundamental problem of causal inference and to the most common methodologies that can be implemented to overcome this problem. It covers controlled experiments (randomized controlled trials), natural experiments (instrumental variables, differences in differences and regression discontinuity design) and observation methods (controls in regressions and matching).

At the end of the class, students are expected to:

- understand the basic language to encode causality,
- know the fundamental problems of causality and the biases of intuitive estimators,
- understand how econometric methods recover treatment effects,
- be able to compute these estimators along with an estimate of their precision using the statistical software R.

The students are not expected to know how to reproduce the mathematical derivations of the various results seen in class.

Practical information about the sessions:

The course is organized in 2 hours of lectures (6 sessions) followed by 2 hours of practice (6 sessions) relating to the previous lecture session. Practice sessions involve replicating the results of a published paper.

Lecture Session	Practice sessions
1. The fundamental problem of causal inference	1. End of lecture 1 (if necessary) + the basics of R
2. Controlled experiments	2. Replication of Banerjee *et al.* (2015)
3. Instrumental variables	3. Replication of Angrist and Krueger (1991)
4. Difference in differences	4. Replication of Papke (1994)
5. Matching	5. Replication of Dehejia and Wahba (1999)
6. Regression discontinuity design	6. Replication of Lee (2008)

Students are expected to show up in class and read the replicated papers before the practice sessions. All slides, papers and data will be posted in advance. I expect a lot of participation from students, especially during the practice sessions.

Skills developed:
At the end of the course, students will be able to:

- identifiy causality / endogeneity issues in a study / expertise
- discuss the validity of a program evaluation study
- build a coherent program evaluation design using quantitative methods
- undertake the basic approaches to program evaluation (using R)

Prerequisites:

Students are expected to master the basic notions of statistical inference (population, sample, OLS, IV, unbiasedness, consistency, estimation of standard errors, testing, binary discrete choice models (probit and logit)), as detailed in the Econometrics courses at the bachelor level (Licence, third year) and during the first semester. Students are not expected to master R but having a basic knowledge of the software and its GUI (e.g. RStudio) is a plus. Knowledge of nonparametric estimation techniques (e.g. kernel estimation) is also a plus.

Grading system:

Evaluation will be an individual test (2h) covering all the topics covered in class.

Bibliography/references:

There will be no textbook assigned for this class. However, most of the content of the class can be found in the following textbooks:

Angrist, J. D., & Pischke, J. S. (2008). *Mostly harmless econometrics: An empiricist's companion*. Princeton University Press.

Angrist, J. D., & Pischke, J. S. (2014). *Mastering 'Metrics: The path from cause to effect*. Princeton University Press.

Imbens, G. W., & Rubin, D. B. (2015). *Causal inference in statistics, social, and biomedical sciences*. Cambridge University Press.

and in several chapter of several econometrics textbooks:

Cameron, A. C., & Trivedi, P. K. (2005). *Microeconometrics: methods and applications*. Cambridge university press.

Wooldridge, J. M. (2010). *Econometric analysis of cross section and panel data*. MIT press.

<u>Papers used in replication sessions:</u>

Angrist, J. D., & Krueger, A. B. (1991). Does compulsory school attendance affect schooling and earnings?. *The Quarterly Journal of Economics*, 106(4), 979-1014.

Banerjee, A., Duflo, E., Glennerster, R., & Kinnan, C. (2015). The miracle of microfinance? Evidence from a randomized evaluation. *American Economic Journal: Applied Economics*, 7(1), 22-53.

Dehejia, R. H., & Wahba, S. (1999). Causal effects in nonexperimental studies: Reevaluating the evaluation of training programs. *Journal of the American Statistical Association*, 94(448), 1053-1062.

Lee, D. S. (2008). Randomized experiments from non-random selection in US House elections. *Journal of Econometrics*, 142(2), 675-697.

Papke, L. E. (1994). Tax policy and urban development: evidence from the Indiana enterprise zone program. *Journal of Public Economics*, 54(1), 37-49.

Software:

R can be freely downloaded at: https://cran.r-project.org/

RStudio can be freely downloaded at: https://www.rstudio.com/

The Microsoft R Open distribution of R can be downloaded at: https://mran.microsoft.com/

Microsoft R Open is optimized for Microsoft computers (it uses Microsoft's multi-threaded math libraries).