

Doctoral Program in Economics



Academic year 2020/21

ECONOMETRICS III

Period:

Fourth term: September / November 2021

Course hours:

28

Teachers:

Francesca Bettio, course coordinator (10 hours), Silvia Ferrini (8 hours), Tiziano Razzolini (10 hours)

Prerequisites:

A basic understanding of statistical inference, ordinary least square estimation (classical OLS estimations and violation of assumptions thereof), IV regression, maximum likelihood theory and qualitative, binary and limited dependent models is required. Students are recommended to revise using: Greene Econometric Analysis, 7th edition. Prentice Hall, Edition.

MODULE I

Teacher:

Francesca Bettio, 10 hours

Exam methods:

written exam questions, including questions involving actual estimation using the STATA software

Program

This module combines theory about key labour market issues with selected microeconomic applications to these issues. Although labour theory is used to illustrate the chosen applications, the latter are widely used in other areas of economics as well as in social sciences in general.

The module is structured around two main topics, job search theory and human capital theory. For each topic a brief review of theory will be followed by a review of the methodology for the chosen microeconomic applications and by lab practice. Laboratory class in STATA will be held in order for the students to practice. Handouts will be distributed for each lecture and class.

Educational objectives

Introducing students to more advanced econometric methods, with a special focus on (i) the way econometric specification is 'derived' from economic theory and depends on it; (ii) how econometric

estimation is actually performed using STATA, perhaps the most common econometric software among economists.

Bibliographical references

Topic 1. Job search theory: sample selection bias

Review Articles:

- Mortensen D. T.(1986) “Job search and Labor Market Analysis” in Ashenfelter, O. and R. Layard (eds.): Handbook of Labor Economics, vol. 2: North Holland
- Rogerson R. and R. Shimer (2010) “Search in Macroeconomic Models of the Labor Market”, NBER Working Paper Series, no. 15901

Econometric methodology and applications: sample selection bias

- Heckman J. (1979) “Sample Selection Bias as a Specification Error”, *Econometrica*, 47, 153-161
- Puhani P. (2000) “The Heckman Correction for Sample Selection and Its Critique”, *Journal of Economic Surveys*, 14(1), 53–68

2. Human Capital theory and policy evaluation: propensity score matching

Review Articles:

- Card, D. (1999): “The Causal Effect of Education on Earnings”, in Ashenfelter, O. and Card, D. (eds.): Handbook of Labor Economics, vol. 3A. Amsterdam: Elsevier

Econometric methodology and applications: propensity score matching

- Dehejia R. H. and S. Wahba (2002) “Propensity Score Matching Method for Non-Experimental Causal Studies”, *Review of Economics and Statistics*, 84(1), 151-161
- Rosenbaum P.R. and D.B. Rubin (1983) “The Central Role of Propensity Score in Observational Studies for Causal Effects”, *Biometrika*, 70 (1), 41-55
- Caliendo M. and S. Kopeining (2008) Some Practical Guidance for the Implementation of Propensity Score Matching, *Journal of Economic Surveys*, 22 (1), 31-72

Background textbooks:

- Wooldridge J. M. (2002): *Econometric Analysis of Cross Section and Panel Data*. Cambridge, Mass.: MIT Press
- Cameron A. C. and P.K. Trivedi (2005) *Microeconometrics: Methods and Applications*, Cambridge, UK: Cambridge University Press
- Angrist and Pitschke (2008) *Mostly Harmless Econometrics*, Princeton and Oxford: Princeton University Press

MODULE II

Teacher:

Tiziano Razzolini, 10 hours

Exam methods:

Individual written exam

Program

This module explores the problem of identifying causal effects by introducing the notation based on potential outcomes. The topics will show some of the estimation techniques that can eliminate the selection bias in the estimation of the Average Treatment Effect (ATT) and the estimation of the Average Treatment Effects on the Treated (ATET). The topics covered are:

1. Treatment effect approach and Rubin causal model,
2. OLS regression,
3. Conditional Independence Assumption,
4. DAG, Matching and Subclassification,
5. Instrumental variable and Local Average Treatment Effect (LATE), Difference-in-Difference,
6. Regression discontinuity (Sharp and Fuzzy)

Educational objectives

The aim of the module is to teach to the students i) how to construct a clear research design, ii) how to identify the population of interest in an empirical analysis iii) and how to use the appropriate estimation techniques.

Bibliographical references

- Scott Cunningham. Causal Inference: The Mixtape, available at:
<https://www.scunning.com/mixtape.html>
- Angrist, Joshua D.; Pischke, Jörn-Steffen. Mostly harmless econometrics: An empiricist's companion. Princeton university press, 2008
- Angrist, J. D., Pischke, J. S. (2014). Mastering'metrics: The path from cause to effect. Princeton University Press.
- Rubin, Donald B. "Estimating causal effects of treatments in randomized and nonrandomized studies." *Journal of educational Psychology* 66.5 (1974): 688
- Krueger, Alan B. Experimental estimates of education production functions, *The quarterly journal of economics* 114.2 (1999): 497-532.
- Heckman, James J., Robert J. LaLonde, and Jeffrey A. Smith. "The economics and econometrics of active labor market programs." *Handbook of labor economics*. Vol. 3. Elsevier, 1999. 1865-2097
- Angrist, Joshua D., and Alan B. Krueger. "Empirical strategies in labor economics." *Handbook of labor economics*. Vol. 3. Elsevier, 1999. 1277-1366.
- LaLonde, R. J. (1986). Evaluating the econometric evaluations of training programs with experimental data. *The American economic review*, 604-620.

MODULE III

Teachers:

Ferrini Silvia, 8 hours

Exam methods:

Individual written exam and/or group essay with empirical analysis

Program**Discrete choice models.**

The module presents methods for individual discrete choice data in theory and practice. A very brief review of linear probability model and binary choice models will be provided. The core part of the course is dedicated to model and test binary choice data and multinomial/conditional logit model within the random utility theory. Examples and a laboratory class will be held during the module.

Educational objectives

The students will familiarize with the random utility theory and discrete choice methods to analyse individual/group choices. The module focuses primarily on the empirical application of discrete choice models.

Bibliographical references

Main book:

- Train Kenneth E., 2003, *Discrete choice methods with simulation*, Cambridge University Press [<http://elsa.berkeley.edu/books/choice2.html>].

Suggested supporting readings:

- Hensher D., Rose J., Greene, D., (2005) *Applied Choice Analysis* Cambridge University Press, 2005
- Greene W.H. (2008), *Econometric Analysis*, 7th edition. Prentice Hall, Edition.
- Agresti, Alan. 2002, *Categorical Data Analysis*. New York: Wiley
- Cramer, J. S., 2003, *Logit Models from Economics and Other Fields*, Cambridge University Press
- Long, J. Scott and Freese, Jeremy. 2003. *Regression Models for Categorical Dependent Variables Using Stata*, Revised Edition. Stata Press: College Stata, TX.