

FEEM Autumn School

Spatial Analysis and Policy Evaluation 2° Edition

October 2021

Thursday 7th – Friday 8th

Thursday 14th – Friday 15th

Friday 22th

Course Description

Spatial statistics and econometrics include techniques and methods to model spatial data (or geo-referenced data) taking into account spatial spillover effects and spatial heterogeneity. It is an active and fast-growing area of research, spurred by the increasing availability of spatial data. These techniques, many of which are still in their early development, use different analytic approaches and are applied in fields as different as economics, sociology, epidemiology and geology.

Spatial data are often used in policy evaluation or treatment effect analyses, based on quasi-experimental evaluation designs such as Difference-in-Difference, and Regression Discontinuity Design. However, the role of spatial effects (spatial dependence and spatial heterogeneity) is often neglected in this context, potentially violating one of the main assumptions of treatment analysis, the stable unit treatment value assumption (SUTVA).

The aim of the course is twofold. On the one side, it aims at getting acquaintance with the techniques of spatial statistics and econometrics. On the other side, it provides an overview of the recent attempts to account for spatial effects in policy evaluation analysis. The course includes a guest seminar on Difference-in-Difference designs with multiple time periods and multiple groups.

The course will be held online.

Learning Outcomes

Students participating in the course will gain an up-to-date and accessible overview of the relevant theory as well as exposure to empirical applications of spatial econometric and policy evaluation models. All lectures will include applied component, showing empirical examples and providing statistical software (R and STATA) to analyze real-world cases.

Application

The ideal candidates for the Training School are PhD students interested in the analysis of spatial data with particular reference to policy evaluation.

The course is open to a maximum of 30 participants.

Applications should include a CV and a short motivational letter that specifies the ways participating in the school will be useful for their current and perspective research (max 300 words).

Candidates should apply by sending an email with the required documents to Massimiliano Rizzati (massimiliano.rizzati@feem.it) by **Tuesday 31 August, 2020**. Upon acceptance, applicants will receive a notification by the end of September.

Lecturers

Roberto Basile

Department of Industrial and Information Engineering and Economics
University of L'Aquila, L'Aquila, Italy

Marco Ventura

Department of Economics and Law
Sapienza University of Rome, Rome, Italy

Guest Seminar

Brantly Callaway - Economics Department, University of Georgia, Athens, USA

For organizational issues and questions

Massimiliano Rizzati - Research Fellow, Fondazione Eni Enrico Mattei
massimiliano.rizzati@feem.it

Program

a) Main issues in modelling spatial data

7-8 october: 09:30-14:30 - Instructor: Prof. Roberto Basile

1. Notions of spatial dependence and spatial heterogeneity
2. Parametric Spatial Autoregressive Models
 - i. Spatial autoregressive models for cross-sectional data
 - ii. Static and dynamic spatial panel data models
 - iii. Spatial autoregressive models for large panel data
3. Semiparametric spatial autoregressive models
 - i. P-Spline spatial autoregressive models
4. Notions of spatial statistics
5. Lab-class with R

b) Policy evaluation and treatment effects with spatial data

14-15 october: 09:30-14:30 - Instructor: Prof. Marco Ventura

1. The idea of counterfactual: treatment and control groups
2. Challenges of counterfactual evaluations: selection bias and common trend
3. Designs for counterfactual impact evaluation: randomized and

Quasi-experimental data

4. Quasi-experimental evaluation designs
 - i. Instrumental variables
 - ii. Difference-in-differences (DiD) for panel data
 - iii. RDD for cross-sectional data
 - iv. Synthetic Control Method (SCM)
5. SUTVA violations
 - i. Spatial effects and DiD
 - ii. Spatial effects and RDD
 - iii. Spatial effects and SCM
6. Lab-class with STATA

c) Guest seminar

22 october: 14:00-18:00 - Instructor: Prof. Brantly Callaway

DiD with multiple time periods and staggered adoption, based on *Difference-in-Difference with multiple time periods*” (Brantly Callaway with Pedro H.C. Sant’Anna, Forthcoming at Journal of Econometrics)

Software used & Recommendations

Software used: R (<http://www.r-project.org/>). STATA (<https://www.stata.com/>). Knowledge required: statistics, econometrics, notions of regional economics

Venue: The School will be held online

Fees: No fees

Certificate: Participants will receive a certificate of attendance

Main references

- Abadie A., 2020. Using synthetic controls: Feasibility, data requirements, and methodological aspects. *Journal of Economic Literature*, forthcoming.
- Abadie, A., Diamond, A., 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), 493–505.
- Abadie, A., Diamond, A., Hainmueller, J. 2015. Comparative politics and the synthetic control method. *American Journal of Political Science* 59(2), 495–510.
- Angrist, J.D., Pischke, J.S., 2009. *Mostly Harmless Econometrics: An Empiricist's Companion*. Princeton University Press, Princeton.
- Basile R., Mìnguez, J.M. (2017), "Advances in spatial econometrics: parametric vs. semiparametric spatial autoregressive models", in Commendatore Pasquale, and Kubin Ingrid (Eds.), Springer.
- Callaway, B., & Sant'Anna, P. H. (2020). Difference-in-differences with multiple time periods. *Journal of Econometrics*.
- Calonico S., Cattaneo M.D., Farrell M.H., Titiunik R., 2017. rdrobust: Software for regression-discontinuity designs. *The Stata Journal*, 17(2), 372–404.
- Delgado, M. S., and R. J. G. M. Florax. (2015) "Difference-in-differences Techniques for Spatial Data: Local Autocorrelation and Spatial Interaction." *Economics Letters* 137: 123–26.
- Di Stefano, R., & Mellace, G. (2020). The inclusive synthetic control method. University of Southern Denmark, Department of Business and Economic papers, 21/2020.
- Elhorst, P. (2014), *Spatial Econometrics: From Cross-sectional Data to Spatial Panels*, Springer, London.
- Keele, L. J., and R. Titiunik. (2015) "Geographic Boundaries as Regression Discontinuities." *Political Analysis* 23:127–55.
- Kolak M. and Anselin L. (2020) A Spatial Perspective on the Econometrics of Program Evaluation *International Regional Science Review*, Vol. 43(1-2) 128-153.
- LeSage J. and Pace R.K. (2009), *Introduction to Spatial Econometrics*, Taylor & Francis Group, LLC.

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