

# SIDE

## Panel data econometrics: theory and applications - Module 3, (September 3-9, 2017), Bertinoro (FC)

### Lecturers

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### Course outline

The following topics will be discussed throughout the lectures:

- Dealing with panel datasets, intended both as time-series cross-sectional data and as hierarchical data with observations at higher and lower-levels.
- Discovering how to model and estimate the issue of interest, according to the problems at hand: static versus dynamic approaches, heterogeneity and clustering, exogeneity versus endogeneity of covariates, instrumental variables and generalized method of moments (GMM), unit roots and long/short run relationships.

### Basic Requirements

Basic knowledge of econometrics to a level comparable with Modules 1 and 2 of the SIDE PhD courses. Examples of reference are represented by:  
- the first six chapters of Verbeek M., *A guide to Modern Econometrics*, 4<sup>th</sup> ed, Wiley;  
- Wooldridge J. M., *Introductory Econometrics, a Modern Approach*, 5<sup>th</sup> ed., chs. 1-6, 8, and 15.

### Reference textbook for the course:

Wooldridge J. M., *Econometric Analysis of Cross-Section and panel Data*, 2<sup>nd</sup> ed, Cambridge Mass.: MIT Press.

Handouts, readings and further material will be provided before the beginning of the course and during the lectures.

## **SCHEDULE of the course**

- (0) Crash course: OLS, GLS, IV, heteroscedasticity, the introduction of dynamics and the role of unit roots.
- (1) Static panels. Understanding the clustered data structure. Dealing with endogeneity (simultaneity, measurement errors). Methods: handling unobserved heterogeneity; variance decomposition at two or more levels; correlated random effects and correlated random slopes; instrumental variables (IV) in panel data models; unbalanced panels and selection bias. *Application*: intangible capital and productivity of firms.
- (2) Dynamic panels. Nickell's bias, and the problem of overfitting and weak instruments. Methods: alternative data transformations; first-differences and IV, GMM-DIF, -LEV, -SYS estimators, the principal components analysis applied to the set of instruments. *Applications*: corporate capital structure models; investment and uncertainty relationship (the Euler and the reduced-form approach); FDI, democracy and natural resources.
- (3) Heterogeneous panels. ARDL specification and Pesaran's poolability. Methods: Mean-Group (MG) and Pooled-MG estimators; demeaning and cross-correlated effects. *Applications*: modeling expectations and inattentiveness; R&D and productivity growth.
- (4) Non-stationary panels. Integration and cointegration. Methods: first- and second-generation unit roots tests; Pedroni and Westerlund cointegration tests; PANIC and PANICCA. *Applications*: companies' leverage and mean reversion; fiscal policy reaction functions.

## **Hands-on Sessions**

Theoretical lectures are associated with working sessions; during them you will receive the suggestions needed to use an econometric software and to run your own empirical analysis. The statistical analysis will be done using Stata, and help for new Stata users will be given during the lectures (it is worth to be stressed that the course is not about Stata, but it is on Panel Data Econometrics, and Stata is just a tool, like any other econometric package able to manage panel data). The data-sets and the programming files to make applied econometrics will be provided during the lectures in Bertinoro. But in Bertinoro we do not have and we cannot provide Stata software installation files or the Stata licence. So, if you would interactively use Stata

during the lectures, you must have Stata pre-installed on your laptop before coming to Bertinoro. Any Stata version from 12 to 14 is ok!

### **Venue and timetables**

The Module will last one week and will be held in the **University Residential Centre**, Via Frangipane 6, 47032 Bertinoro (FC). Participants will be hosted in the Centre guest quarters, (as an exception, in case of reduced availability of rooms in the Centre, they will be accommodated in local hotels). Lectures and tutorials will be in English, with the following schedule (provisional):

**Monday to Friday:** *lectures:* 9.00-11.00, 11.00-13.00, 15.00-17.00; *individual hands-on sessions:* 17.00-19.00. **Saturday:** *lectures:* 9.00-11.00, 11.00-13.00.

See you in Bertinoro for great work on Panel Data Econometrics (and nice food, drink, and landscapes)!