

Doctoral Program in Economics



Academic year 2020/21

PANEL DATA ECONOMETRICS

Period:

Second term: February-March 2021

Course hours:

20

Teachers:

Silvia Tiezzi (10 hours, course coordinator), Federico Crudu (10 hours)

Exam methods:

written test: students will have to answer 2 questions (one on Module 1 and one on Module 2) out of a basket of 4 questions.

Prerequisites:

principles of statistics and econometrics; basic calculus and linear algebra

Module 1 - Introduction to Linear Panel Data Models (10 hours) – Prof. Tiezzi

Educational objectives

This part of Panel Data Econometrics will offer an *introduction to linear Panel Data models estimation techniques in a static environment.*

Class 1

Background and motivation for using panel data methods.

Fixed effects panel data models: the Pooled Ordinary Least Squares (OLS) estimator; the Within-Groups (WG) estimator; the Least Squares Dummy Variable (LSDV) estimator.

Class 2

Random Effects models (REM): Generalised Least Squares (GLS) estimator; Breusch-Pagan Lagrange Multiplier misspecification test; Hausman specification Test for comparing the random effects estimator with the fixed effects estimator; Heteroskedasticity and robust covariance estimation; Autocorrelation.

Class 3

We will look at the random effects model where some of the RHS regressors might be correlated with the individual effects and study the Hausman-Taylor (HT) IV estimator.

Class 4

Lab Session. We will estimate models with Fixed Effects, Random Effects and the HT estimator using STATA.

Class 5

Instrumental variables (IV)/generalized method of moments (GMM) estimation for Linear Panel Data Models with endogenous variables.

Bibliographical references

1. Greene, W. (2017) (8th Edition) *Econometric Analysis*, Prentice Hall International. Chapter 11 (Sections 11.2.1, 11.2.2, 11.2.4, 11.2.5, 11.3, 11.3.5, 11.4, 11.4.1, 11.4.2, 11.4.3, 11.5 (from 11.5.1 to 11.5.5), 11.6, 11.7, 11.8 (only sections 11.8.1 and 11.8.2))

or

2. Wooldridge, J. M. (2010) (Second Edition) *Econometric Analysis of Cross Sections and Panel Data*, MIT Press. Chapter 10.

Module 2 - Generalised Method of Moments with Applications to Dynamic Panels (10 hours) – Prof. Crudu

Educational objectives

This module introduces the generalised method of moment (GMM) as a comprehensive approach to estimation and inference with specific focus on dynamic panel data models.

Class 1

In this lecture will revise some important preliminary ideas associated to the concept of conditional and unconditional expectations.

Class 2

During this lecture we will introduce some fundamental results in asymptotic theory that will be useful during the development of the course.

Class 3

Here we will define the concept and fundamental properties of M-estimation and its relationship with GMM and other well known estimation frameworks (i.e. maximum likelihood)

Class 4

During this lecture we will introduce the GMM method for estimation and inference.

Class 5

This lecture will explore how to use GMM in the context of dynamic panel data models.

Bibliographical references

1. Amemiya, T. (1985) *Advanced Econometrics*, Blackwell. Chapters 3 and 4.

2. Wooldridge, J. M. (2010) (Second Edition) *Econometric Analysis of Cross Sections and Panel Data*, MIT Press. Chapters 2, 3, 12, 14.

3. Hansen, B. E. (2020) *Econometrics*, <https://www.ssc.wisc.edu/~bhansen/econometrics/>. Chapters 2, 6, 13, 17, 22.

4. Poskitt, D. (2006) *Lecture Notes on GMM*, University of York.