Econometrics: Panel Data Models

Level: *Master 2*
Program: *Master Economics, Data and Decision Science*
Semester : 1
Class hours: 21h
Instructor: Victor STEPHANE
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Course Outline:

Chapter 1: Introduction to Panel Data

- Some definitions
- Examples of panel datasets in economics
- Advantages and challenges of panel data

Chapter 2: Static Panel Data Models

- Pooled OLS
- First difference model
- Fixed effects model
- Random effects model
- Tests

Chapter 3: Recent Advances in Panel Data Methods

- Difference-in-Differences
- Two-way fixed effects and the Goodman-Bacon decomposition
- Problems with heterogeneous treatment effects and staggered adoption
- Modern DiD estimators

Chapter 4: Dynamic Panel Data Models

- Motivation: economic applications of dynamics
- Bias in static estimators
- Anderson–Hsiao estimator
- Arellano–Bond estimator
- Blundell–Bond estimator

Learning Outcomes:

By the end of the course, students will be able to:

- Distinguish between cross-sectional, time-series, and panel datasets.
- Understand the benefits and challenges of using panel data in empirical research.
- Apply pooled OLS, fixed effects, random effects, and first-difference models to panel data.
- Conduct hypothesis testing and interpret coefficients and marginal effects in static models.
- Understand the limitations of two-way fixed effects with heterogeneous treatment effects.
- Implement modern Difference-in-Differences estimators.
- Estimate and interpret dynamic panel data models using GMM techniques.
- Use econometric software (RStudio) to apply these methods to real-world datasets.

Assessment: Final exam, one presentation and one homework assignment.

Prerequisites: Econometrics of linear models.

References:

- Hsiao, C. (2014). *Analysis of Panel Data*. Cambridge University Press.
- Wooldridge, J. M. (2010). *Econometric Analysis of Cross Section and Panel Data*. MIT Press.
- Cunningham, S. (2021). *Causal Inference: The Mixtape*. Yale University Press.
- Adams, C. (2020). *Learning Microeconometrics with R*. Routledge.