

## PhD in Economics, Statistics and Data Science (ECOSTATDATA)

Academic Year 2024-2025

Cycle XL

### ECONOMETRICS I – THE LINEAR REGRESSION MODEL

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#### 1. Introduction

- Introduction to the econometrics courses at ECOSTATDATA
- Structure of the exam
- Notation

#### 2. Linear regression model

- The Ordinary Least Squares (OLS) estimator
- Gauss Markov assumptions and small sample properties of the OLS estimator
- Hypothesis testing
- Asymptotic properties of the OLS estimator
- The Generalized Least Squares (GLS) estimator
- Heteroskedasticity tests

#### 3. Endogeneity and instrumental variables

- Endogeneity, errors in variables
- The Instrumental Variables estimator (IV) and the Method of Moments (MM)
- The Generalised Instrumental Variables estimator (GIV/2SLS)

#### 4. Maximum Likelihood

- The Maximum Likelihood (ML) estimator
- Introduction to ML specification tests

#### Proposed references

- Greene, W.H. (2000), *Econometric Analysis*, Prentice-Hall.
- Hayashi, F. (2000), *Econometrics*, Princeton University Press.
- Verbeek, M. (2008), *A Guide to Modern Econometrics*, Wiley.