

Introduction to Econometrics

Master in Economics:
Empirical Applications and Policies
2016-2017

Class Teachers:

Petr Mariel (Room 1C17): September 12 – October 14 (16 hours)

Office hours:	Petr Mariel
Monday	12:00-15:00
Tuesday	12:00-15:00
Wednesday	
Thursday	
Friday	

Lecture notes, related documents and files of this course will be made available to students through Moodle platform: <https://egela.ehu.es/>

Objectives:

This course offers an introduction to linear regression model both from a theoretical and applied point of view.

Requirements:

Knowledge of linear algebra and calculus is required as is some basic statistical theory. The course will involve the use of computer, but no previous experience is required, apart from the *Introduction to Stata*.

Grading & Organization:

Each week there will be two or three lectures. For each of the chapters a homework assignment will be handed in, to be returned in the following week. The assignments will be marked and returned to students. The marks obtained in them would account for 10% of the final mark.

Computer Skills:

Students are introduced to the statistical package *Stata*. Different types of empirical data sets are introduced, and students are shown how to apply various estimation techniques and testing procedures in practice.

Course Outline:

1. Summary of Matrix Algebra

2. Fundamentals of Probability

- 2.1. Random variables and their probability distributions
 - 2.1.1. Discrete random variable (univariate)
 - 2.1.2. Continuous random variable (univariate)
 - 2.1.3. Joint distributions and conditional distributions
 - 2.1.4. A measure of central tendency: The expected value
 - 2.1.5. A measure of variability: Variance and Standard Deviation
 - 2.1.6. Features of joint and conditional distributions
 - 2.1.7. Conditional Expectation
- 2.2. The normal and related distribution
 - 2.2.1. The Normal Distribution
 - 2.2.2. The Chi-Square Distribution
 - 2.2.3. The t Distribution
 - 2.2.4. The F Distribution
- 2.3. Population versus sample
- 2.4. General approaches to parameter estimation
 - 2.4.1. Method of Moments (MM)
 - 2.4.2. Maximum likelihood (ML)
 - 2.4.3. Least Squares (LS)
- 2.5. Interval estimation and confidence interval
- 2.6. Hypothesis testing
 - 2.6.1. Testing Hypotheses about the Mean in a Normal Population

3. The Simple and Multiple Regression Model

- 3.1. The meaning of regression
- 3.2. The classical linear regression model
- 3.3. Basic assumptions
- 3.4. Ordinary least squares (OLS) estimator
 - 3.4.1. Algebraic properties of OLS statistics and Goodness of fit
 - 3.4.2. Why ordinary least squares? The properties of OLS estimators
 - 3.4.3. Estimator of σ
 - 3.4.4. Exact sampling distribution of the estimator of β
 - 3.4.5. Exact sampling distribution of the estimator of σ
- 3.5. Alternative estimators: methods of moments and maximum likelihood
 - 3.5.1. Method of moments (MME)
 - 3.5.2. Maximum likelihood (ML)
- 3.6. Inference
 - 3.6.1. Testing hypotheses about a single population parameter: The t test
 - 3.6.2. Testing hypotheses about a single and multiple linear combination of the parameters
 - 3.6.3. Testing exclusion restrictions
- 3.7. Prediction

4. Multiple Regression Analysis: Further Issues

- 4.1. Functional forms of regression models
 - 4.1.1. The log-linear model
 - 4.1.2. More on using logarithmic functional forms
 - 4.1.3. Reciprocal models
 - 4.1.4. Polynomial regression models
- 4.2. Regression on dummy explanatory variables
 - 4.2.1. Different intercepts
 - 4.2.2. Different slope coefficients

Reading:

Gujarati, D. (2006), *Essential of Econometrics*, Third Edition, McGraw-Hill, New-York.

Gujarati, D. (2003), *Basic Econometrics*, Fourth Edition, McGraw-Hill, New-York
Maddala, G.S. (2002), "Introduction to Econometrics", Third Edition, Wiley. (M).

Wooldridge, J.M. (2006), *Introductory Econometrics. A Modern Approach*, Third Edition, Thomson South-Western.

Wooldridge, J.M. (2002), *Econometric Analysis of Cross Section and Panel Data*. The MIT Press