

INTERNATIONAL GROUP

DEGREE IN ECONOMICS (ECO)

SYLLABUS

INTRODUCTORY ECONOMETRICS (12156)

ACADEMIC YEAR 2008-2009

1. GENERAL IDENTIFICATION

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|--------------------|--|
| Subject: | Introductory Econometrics. |
| Type: | Compulsory - 1 st semester. |
| Degree: | Economics. |
| Stage: | First. Third year. |
| Department: | Economic Analysis. |
| Lecturer: | Francisco J. Goerlich |
| Teacher: | Jorge Belaire |

2. INTRODUCTION

Welcome to the *Introductory Econometrics* class in the international group of the *Economics* degree at the **University of Valencia**.

The course is designed as an **introduction to econometrics from first principles**. It puts emphasis on intuition and interpretation of empirical examples, more than on theoretical developments, notwithstanding that some theory is essential to the understanding of the subject. No special prerequisites, beyond college algebra and introductory probability and statistics are necessary to follow the course, in particular we shall not use matrix algebra at all in our introduction to econometrics, but moving beyond an introductory course makes matrix algebra completely essential in studying econometrics. Please check the contents of appendixes A, B and C of the Wooldridge's *Introductory Econometrics* textbook (see below) for the necessary background to follow the course. We shall not devote any time to lecture on these matters, so fill in your gaps, if necessary, as soon as possible.

The course is mainly a course on multiple regression under the assumption of random sampling. This general setting should be familiar to you from your introductory statistics course, so this provides a simple and intuitive generalization of the questions of estimating population parameters and testing hypothesis about them, and allow us to distinguish between assumptions made about the underlying population regression model, assumptions that can be given economic or behavioural content, and eventually assumptions about how the data are sampled. In this context all variables are treated as outcomes of random variables, as it should be in non-experimental settings like economics.

What should you expect from us?

You should expect a precise guide of the topics covered in the course (see below), as well as an explanation of the main concepts to be covered in the course. You should not expect all the derivations to be given in lectures and classes. Our role as instructors is to guide you in the process of learning, to show you the path, but walking along that path is your responsibility.

What should we expect from you?

Accordingly, we expect from you a responsible attitude towards the study of the subject, which means a regular reading of the main textbook (see below), an effort in reasoning more than in memorising, the attempt of doing additional problems and computer exercises beyond those solved in classes and an active participation in lectures and classes. In addition some practice exercises would be given to you for hand them in, they will be marked for your own benefit or solved in classes.

We estimate a minimum of four hours of weekly personal study, shared between theoretical works and solving problems, as a standard burden of the subject.¹

3. BRIEF CONTENTS

Introductory Econometrics is mainly a course on regression analysis, this is, a course about modelling the conditional expectation of a random variable by means of a linear function. Multiple regression analysis is the core of more advanced econometrics techniques; hence it is the natural starting point for an introductory course.

- **Part I: Introduction**

Topic 1. The nature of econometrics and economic data.

- **Part II: Regression Analysis with Cross-Sectional Data**

Topic 2. The simple regression model.

Topic 3. Multiple regression analysis: Estimation.

Topic 4. Multiple regression analysis: Inference.

Topic 5. Multiple regression analysis: OLS asymptotics.

Topic 6. Multiple regression analysis: Further issues.

Topic 7. Multiple regression analysis with qualitative information: Binary (or dummy) variables.

Topic 8. Heteroskedasticity.

¹ Bear in mind that this is a 6 credit course, and 6 ECTS represent an estimated burden of 150 hours of total work along a semester.

4. REFERENCE TEXTBOOK

The course follows quite closely the relevant parts of the textbook:

Jeffrey M. Wooldridge (2003) *Introductory Econometrics. A Modern Approach*. Second edition. Thomson. United States.

It is extremely important that you consult the textbook often, every week, since our topics are in fact the first eight chapters of this book and the problems and computer exercises you will do in classes come from this textbook. You should be able to get a copy of the book from the library, but please let me know if you are in trouble getting one.

Ideally, you should read the relevant sections of the book in advance to the corresponding lecture, so **you concentrate in understanding and not in taking notes**.

Associated to the book there is a *Student Study Guide With Solutions*, that contains suggestions on how to read each chapter as well as answers to selected problems and computer exercises. This can also be additional useful material to follow the course. Please let me know if you are interested in getting a copy.

In addition, the textbook has a web site,

<http://www.swlearning.com:80/economics/wooldridge/wooldridge2e/wooldridge2e.html>,

where data sets for all the computer exercises in the text and other useful information can be found.²

Despite the course being designed with the Wooldridge book in mind, I list below some other textbooks about the same level of the course, the Stock and Watson text being the closest in spirit to the Wooldridge text.

- **Amemiya, T. (1994) *Introduction to Statistics and Econometrics***. Harvard University Press. Cambridge, Massachusetts. (More statistical oriented than the syllabus of the course).
- **Bernt, E. R. (1991) *The Practice of Econometrics: Classic and Contemporary***. Addison-Wesley Publishing Company. New York. (Econometrics by examples).
- **Dougherty, C. (2006) *Introduction to Econometrics***. Third Edition. Oxford University Press. Oxford. (Simpler than the level of the course, but useful additional material can be found in the *web* site of the author at the London School of Economics, <http://econ.lse.ac.uk/courses/ec220/>, and specially the Power Point Slide Shows, <http://econ.lse.ac.uk/courses/ec220/G/ieppt/series2/>)

² Please note that a new edition (the 4th) has just been released, but the textbook for the course is the second edition. In addition the 2nd has been translated into Spanish, even you are encouraged to use the English version for study, since the exam will have to be answered in English.

- **Franses, P. H. (2002)** *A Concise Introduction to Econometrics. An Intuitive Guide*. Cambridge University Press. Cambridge. (A helicopter tour on what econometrics is and is used for).
- **Hill, R. C.; Griffiths, W. E. & Judge, G. G. (2008)** *Principles of Econometrics*. Third Edition. John Wiley & Sons, Inc. New York. (A standard introductory textbook about the same level of the course).
- **Stock, J. & Watson, (2003)** *Introduction to Econometrics*. Addison Wesley. International Edition. New York. (Closest in spirit to the Wooldridge's textbook).
- **Hendry, D. F: & Nielsen, B. (2007)** *Econometric Modeling. A Likelihood Approach*. Princeton University Press. Princeton. (A maximum likelihood approach to econometrics).
- **Barreto, H. & Howland, F. M. (2006)** *Introductory Econometrics. Using Monte Carlo Simulation with Microsoft Excel[®]*. Cambridge University Press. Cambridge. (A simulation approach using a spreadsheet).

5. SYLLABUS

| Topic | Content | Weeks |
|-------|--|-----------------------|
| 1 | <p>THE NATURE OF ECONOMETRICS AND ECONOMIC DATA.</p> <p>1.1 What is econometrics? 1.2 Steps in empirical economic analysis. 1.3 The structure of economic data. 1.4 Causality and the notion of ceteris paribus in econometric analysis.</p> <p>References: Wooldridge: Chapter 1, p.-1-19.</p> | 1 23-Sep |
| 2 | <p>THE SIMPLE REGRESSION MODEL.</p> <p>2.1 Definition of the simple regression model. 2.2 Deriving the Ordinary Least Squares (OLS) estimates. 2.3 Mechanics of OLS. 2.4 Units of measurement and functional form. 2.5 Expected values and variances of the OLS estimators. 2.6 Regression through the origin.</p> <p>References: Wooldridge: Chapter 2, p.-21-67.</p> | 2 30-Sep 7-Oct |
| 3 | <p>MULTIPLE REGRESSION ANALYSIS: ESTIMATION.</p> <p>3.1 Motivation for multiple regression. 3.2 Mechanics and interpretation of Ordinary Least Squares (OLS). 3.3 The expected value of the OLS estimators. 3.4 The variance of the OLS estimators. 3.5 Efficiency of OLS: The Gauss-Markov Theorem.</p> <p>References: Wooldridge: Chapter 3, p.-68-115.</p> | 2 14-Oct 21-Oct |
| 4 | <p>MULTIPLE REGRESSION ANALYSIS: INFERENCE.</p> <p>4.1 Sampling distributions of the OLS estimators. 4.2 Testing hypothesis about a single population parameter: The t test. 4.3 Confidence intervals. 4.4 Testing hypothesis about a single linear combination of the parameters. 4.5 Testing multiple linear restrictions: The F test. 4.6 Reporting regression results</p> <p>References: Wooldridge: Chapter 4, p.-116-165.</p> | 2 28-Oct 14-Nov |
| 5 | <p>MULTIPLE REGRESSION ANALYSIS: OLS ASYMPTOTICS.</p> <p>5.1 Consistency. 5.2 Asymptotic normality and large sample inference. 5.3 Asymptotic efficiency of OLS.</p> <p>References: Wooldridge: Chapter 5, p.-166-181.</p> | 1 11-Nov |
| 6 | <p>MULTIPLE REGRESSION ANALYSIS: FURTHER ISSUES.</p> <p>6.1 Effects of data scaling on OLS statistics. 6.2 More on functional form. 6.3 More on goodness-of-fit and selection of regressors. 6.4 Prediction and residual analysis.</p> <p>References: Wooldridge: Chapter 6, p.-182-217.</p> | 2 18-Nov 25-Nov |

| Topic | Content | Weeks |
|-------|---|-----------------------|
| 7 | <p>MULTIPLE REGRESSION ANALYSIS WITH QUALITATIVE INFORMATION: BINARY (OR DUMMY) VARIABLES.</p> <p>7.1 Describing qualitative information. 7.2 A single dummy independent variable. 7.3 Using dummy variables for multiple categories. 7.4 Interactions involving dummy variables. 7.5 A binary dependent variable: The linear probability model. 7.6 More on policy analysis and program evaluation.</p> <p>References: Wooldridge: Chapter 7, p.-218-256.</p> | 2 2-Dec 9-Dec |
| 8 | <p>HETEROSKEDASTICITY.</p> <p>8.1 Consequences of heteroskedasticity for OLS. 8.2 Heteroskedasticity-robust inference after OLS estimation. 8.3 Testing for heteroskedasticity. 8.4 Weighted least squares estimation (WLS). 8.5 The linear probability model revisited.</p> <p>References: Wooldridge: Chapter 8, p.-257-288.</p> | 2 16-Dic 13-Jan |

WEEKLY TIMETABLE (THEORY)

- 23-September: Topic 1
- 30-September: Topic 2: 2.1, 2.2 & 2.3
- 7-October: Topic 2: 2.4, 2.5 & 2.6
- 14-October: Topic 3: 3.1 & 3.2
- 21-October: Topic 3: 3.3, 3.4 & 3.5
- 28-October: Topic 4: 4.1, 4.2 & 4.3
- 4-November: Topic 4: 4.4, 4.5 & 4.6
- 11-November: Topic 5
- 18-November: Topic 6: 6.1 & 6.2
- 25-November: Topic 6: 6.3 & 6.4
- 2-December: Topic 7: 7.1, 7.2, 7.3 & 7.4
- 9-December: Topic 7: 7.5 & 7.6
- 16-December: Topic 8: 8.1 & 8.2
- 13-January: Topic 8: 8.3, 8.4 & 8.5

Small changes over this timetable will be done if necessary.

6. LECTURES AND CLASSES

Lectures will be delivered each Tuesday between 8:30 and 19:30 at room S111 in the south building.³ They will last for about 1h. 40min., and will present most (but not all) of the theoretical material covering the syllabus. Many theoretical derivations will be given in the lectures, but emphasis will be placed mainly on intuition and interpreting the empirical examples. Please, pay attention to the in-text questions along the Wooldridge's textbook; since they provide an immediate feedback on what you are learning, moreover the answers are supplied in Appendix F of the textbook. Power Point slides will be used in lectures and they will be available to you at "*Aula Virtual*".

Classes will be delivered each Monday between 10:30 and 12:30 at the computing room S508. They will last for about 1h. 40min., and will develop problems and computer exercises from the Wooldridge's textbook, they are heavily oriented toward empirical work, rather than complicated derivations, notwithstanding the fact that some elementary theory is necessary for an understanding of the subject. For the computer exercises you will use the EViews software (version 5.0 or 6.0), a standard econometric software that runs under a University campus license, you don't need any previous knowledge of this program and will not be examined on how the program works, but only on interpretation of results. Please, pay attention to the in-text examples since many problems and computer exercises often expand on these examples.

Neither lectures nor classes are compulsory, but you are strongly advised to follow them on a regular basis. Please, don't hesitate to ask any doubt about the course or its material to the teachers, either at the office hours or by appointment.

7. GRADING

The course will be marked on the basis of a written exam only. This will take place at the end of the term and the exact date will be determined by the Faculty staff. However, given the small size of the group, **it will be easy to monitor your progress by the active participation in lectures and classes and this can eventually alter the final grade you get in the exam in the adequate direction.** In addition you will have to hand in some exercises along the term to monitor your progress in a bidirectional way; this is, from us as well as from your own point of view.

You should expect questions, problems and computer exercises very similar to the ones developed in lectures and classes; moreover you will have some degrees of freedom, so not every question will have to be answered to get full marks.

³ If the group is small enough we can arrange a more friendly room close to the Department.