

PRE-ESTABLISHED PROGRAMME ECONOMETRICS

Course contact hours: 45

Recommended credits: 6 ECTS – 3 US

Language: English

Prerequisites

It is highly recommended that the student has successfully completed courses in Mathematics 100 level or equivalent, as well as Statistics 100 level.

Having full command of the materials presented in these courses is essential to succeeding in Econometrics I.

Objectives and Contextualisation

Econometrics presents basic tools for the empirical analysis of relationships between economic variables. The course begins with the simple regression model, and continues with multiple regression, including both quantitative and qualitative regressors.

The goal of this course is for students to learn to extract information from economic data using basic regression analysis, being able to rigorously assess the advantages and limitations of this tool. Major emphasis shall be placed on understanding the intuition behind the general theoretical aspects of econometric analysis. Throughout the course numerous applications using real data and econometric software will be presented to help students learn to value the empirical applications of the tools introduced.

Competences

- Apply basic statistics for improving processes of analysis and systematisation of business information and learn rigorously and scientifically about the company chain of value.
- Capacity for adapting to changing environments.
- Capacity for independent learning in the future, gaining more profound knowledge of previous areas or learning new topics.
- Demonstrate initiative and work individually when the situation requires it.
- Identify and apply econometric methodology to respond to the problems that appear in the empirical study of some economic data.
- Organise the work in terms of good time management, organisation and planning.
- Select and generate the information necessary for each problem, analyse it and take decisions based on that information.
- Students must be capable of applying their knowledge to their work or vocation in a professional way and they should have building arguments and problem resolution skills.

- Students must be capable of collecting and interpreting relevant data (usually within their area of study) in order to make statements that reflect social, scientific or ethical relevant issues.
- Students must be capable of communicating information, ideas, problems and solutions to both specialised and non-specialised audiences.
- Take decisions in situations of uncertainty, demonstrating an entrepreneurial and innovative attitude. Use of the available information technology and adaptation to new technological environments.

Learning Outcomes

1. Ability to summarise and present the work conducted both orally and in writing.
2. Capacity to adapt to changing environments.
3. Capacity to continue future learning independently, acquiring further knowledge and exploring new areas of knowledge.
4. Demonstrate initiative and work independently when required.
5. Identify and apply the appropriate econometric methodology to respond to the problems appearing in the empirical study of some economic data.
6. Look for economic information from different sources: databases, Internet, etc.
7. Make decisions in situations of uncertainty and show an enterprising and innovative spirit.
8. Organise work, in terms of good time management and organisation and planning.
9. Prepare the data obtained from the sources for subsequent quantitative analysis.
10. Select and generate the information needed for each problem, analyse it and make decisions based on this information.
11. Students must be capable of communicating information, ideas, problems and solutions to both specialised and non-specialised audiences.
12. Use information technology programmes to perform a quantitative analysis of the data.

Content

Unit 1: Introduction to econometric analysis.

- What is econometrics?
- Objectives causation versus correlation.
- The nature of economic data: experimental data versus observational data.
- The structure of economic data.

Unit 2: The simple regression model: estimation.

- The simple regression model. The regression line.
- Least squares estimation. The fitted line. Goodness of fit.
- Interpretation of the coefficients. Special cases: dependent variable in logs. Qualitative regressor.
- Distribution of the estimator under classical assumptions. Statistical properties.
- Applications.

Unit 3: The simple regression model: inference.

- Inference in a regression model.
- Hypothesis testing with the t-statistic.
- Confidence intervals for a regression parameter.
- Applications.

Unit 4: The multiple regression model: estimation

- The multiple regression model. The population regression function.
- Least squares estimation. The sample regression function.
- Goodness of fit. Coefficient of determination. Adjusted coefficient.
- Distribution of the estimator under ideal conditions. Statistical properties.
- The components of the variance of the estimator.
- Applications.

Unit 5: Linear regression analysis: inference and extensions

- Hypothesis testing with the T statistic.
- Confidence intervals Hypothesis testing using the F statistic.
- Inference under the presence of collinearity.
- Regression models with variables in log. Polynomial forms. Interaction terms.
- Test of structural change.
- Applications.

Methodology

1. Lectures

During lectures, key concepts and methods will be presented using many examples to facilitate a clear understanding of the materials presented. An exercise list will be provided for each unit. Students will be asked to work on them, as an independent activity, in small groups or on their own. The instructor will select some exercises from the lists to be discussed in class and can use some of them as an evaluation activity.

2. Practical sessions

In order to better grasp the different econometric concepts and methods, some of the sessions will be practical in the classroom using personal computers. In these sessions econometric software (RStudio) will be used. The main goal of these sessions will be for the student to learn to rigorously apply to tools presented.

3. Tutoring

Students can use instructor's office hours to get help on specific questions. Office hours will be announced in either the intranet (Campus Virtual) or in the instructor's webpage.

4. Studying

It is expected that the activities described above, take about a fraction of the time that the student is supposed to dedicate to Econometric. The rest of the time should be filled with students' independent work (studying, reading the course textbook, problem solving,...). This activity is crucial to assimilate the theoretical aspects and the applications of the tools presented.

Note: The proposed teaching methodology may undergo some modifications according to the restrictions imposed by the school.

Activities

Directed:

Class sessions (practice)	17 hours
Class sessions (theory)	32.5 hours
Assessment	3.5 hours

Supervised:

Project	7 hours
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Assessment

To fully complete the course students must complete the following activities: lists of exercises, one midterm exam, one final exam and a final project. All assessment activities must be delivered individually in Canvas.

A list of exercises will be delivered electronically to students and must be submitted on time, and through the learning platform.

Midterm and final exams will consist of two parts, practical and theoretical. The final project is a paper based on the practical use of the tools used during this course.

Assessment Activities

Title	weighting	hours	learning outcomes
List of exercises	20%	15	6, 2, 1, 3, 4, 5, 8, 9, 10, 16, 17
Midterm	25%	2,5	1, 4, 5, 8, 7, 10, 17
Final	30%	1,25	1, 4, 5, 8, 7, 15, 14, 13, 11, 12, 10, 17
Final project	25%	15	6, 9, 10, 11-17

Bibliography

- Stock, J.H. & Watson, M.M., *Introduction to Econometrics*. Pearson Education.
- Wooldridge, J. M., *Introductory Econometrics: A Modern Approach*. South-Western Cengage learning.

Software

RStudio and Gretl