ECONOMETRICS

Bachelor in Philosophy, Politics, Law and Economics PPLE
SEP-2023 E-PP.2.S.A

Area Economics

Number of sessions: 30

Academic year: 23-24

Degree course: SECOND

Number of credits: 6.0

Semester: 2º

Category: COMPULSORY

Language: English

Professor: **RODRIGO ALEGRIA HUERTA**

E-mail: ralegria@faculty.ie.edu

RODRIGO ALEGRIA HUERTA

Rodrigo Alegría got his Bachelor in Economics from Universidad de Navarra (2001). At a postgraduate level, he got a Master in Economics and Finance from Universidad de Navarra (UN) and a Master in Regional Economics from London School of Economics (LSE). He also holds a title in Big Data (UN). He has worked mainly as a researcher in different research centers such as UN in Pamplona, Geography Department (LSE), Centre for Economic Performance (LSE) and European Institute (LSE) all of them in London. As a professor he has lectured in Spain and United Kingdom and has visited different countries such as Greece, Netherlands, United States or France for conferences and seminars. He is currently an adjunct professor at IE University and at other institutions lecturing quantitative courses such as maths, statistics, data analysis and econometrics. He is also the co-director of the EconData Lab at IE University. His interests focus on urban, regional and international economics with a special interest in the spatial econometrics analysis of MNEs´ location choices.

Office Hours

Office hours will be on request. Please contact at:

ralegria@faculty.ie.edu

SUBJECT DESCRIPTION

Econometrics is the application of statistics tools and mathematical methods to describe, analyse and predict economic and business phenomenon. The main concern of Econometrics is related with the art of using economic theory and statistical techniques to analyse real world data sets.

This is an introductory Econometrics course. Students will learn the basic techniques to analyse, model and interpret business and economic data. On one hand, the course will provide a broad training in **basic econometric methods and tools**, mostly related to linear regression analysis. On the other hand, students will learn **practical applications** to real economic and business problems using those econometric approaches. Particular emphasis is given to the careful interpretation of numerical results and to understanding the implications of those results for economic policy and business decision making.

LEARNING OBJECTIVES

The course aims to provide students with a rigorous reasoning using the econometric approach when analysing problems and making decisions. Students will also learn practical applications mostly related within an economic and business context.

Objectives to be attained along the course:

- Apply econometric techniques for making decisions with quantitative and categorical data within an economic and business context.
- Understand the regression model (simple and multiple), its scope and limitations.
- Interpret and evaluate relationships between variables using econometrics.
- Understand and drive the properties of OLS.
- Interpret, evaluate and apply inferential methods to linear regression.
- Understand the use and implications of data scaling, functional form and dummy variables in regression modelling.
- Identify the presence of estimation problems.
- Acquire fluency in the use of R software in order to apply econometric techniques using real world data.

Skills to be acquired during the course:

- Fostering a logic and rigorous reasoning when facing quantitative analysis.
- The analysis and critical assesment of numerical results.
- The ability to formulate, express and solve a problem or question with a model.
- The ability to identify the relevant elements when facing a business decision.

TEACHING METHODOLOGY

IE University teaching method is defined by its collaborative, active, and applied nature. Students actively participate in the whole process to build their knowledge and sharpen their skills. Professor's main role is to lead and guide students to achieve the learning objectives of the course. This is done by engaging in a diverse range of teaching techniques and different types of learning activities such as the following:

Learning Activity	Weighting	Estimated time a student should dedicate to prepare for and participate in

Lectures	20.0 %	30.0 hours
Exercises in class, Asynchronous sessions, Field Work	20.0 %	30.0 hours
Group work	20.0 %	30.0 hours
Individual studying	40.0 %	60.0 hours
TOTAL	100.0 %	150.0 hours

PROGRAM

SESSION 1 (LIVE IN-PERSON)

Sustainability Topics:

- Economic Development

PRESENTATION

Lecture 1: Presentation of the programme, aims and guidelines of the course. Defininition of Econometrics and its applications.

SESSION 2 (LIVE IN-PERSON)

Sustainability Topics:

- Economic Development

REVIEW OF STATS. & BASIC CONCEPTS IN ECONOMETRICS

Lecture 2: Definition of population, sample, random variable, expected value, summary statistics, graphical analysis and correlation analysis.

SESSION 3 (LIVE IN-PERSON)

Sustainability Topics:

- Economic Development

ESTIMATOR & ITS PROPERTIES

Lecture 3: Definition of estimator and its properties: unbiasedness, efficiency, consistency and sufficiency.

SESSION 4 (LIVE IN-PERSON)

Sustainability Topics:

- Economic Development

PRACTICAL CLASS

Problem Set 1: Descriptive, graphical and correlation analysis.

SESSION 5 (ASYNCHRONOUS)

Sustainability Topics:

- Economic Development

COMPUTER CLASS (ASYNCHRONOUS)

R1: Introduction, descriptive, graphical and correlation analysis.

SESSION 6 (LIVE IN-PERSON)

Sustainability Topics:

- Economic Development

INTRODUCTION TO LINEAR REGRESSION ANALYSIS

Lecture 4: The simple linear regression model and its assumptions.

SESSION 7 (LIVE IN-PERSON)

Sustainability Topics:

- Economic Development

OLS ESTIMATION AND PROPERTIES OF THE REGRESSION COEFFICIENTS

Lecture 5: Ordinary Least Squares estimation method. Model derivation and interpretation of the estimated coefficients. Determination coefficient. Unbiasedness and precision of the regression coefficients. Gauss-Markov theorem.

SESSION 8 (LIVE IN-PERSON)

Sustainability Topics:

- Economic Development

OLS ESTIMATION AND PROPERTIES OF THE REGRESSION COEFFICIENTS

Lecture 6: Ordinary Least Squares estimation method. Model derivation and interpretation of the estimated coefficients. Determination coefficient. Unbiasedness and precision of the regression coefficients. Gauss-Markov theorem.

SESSION 9 (LIVE IN-PERSON)

Sustainability Topics:

- Economic Development

TRANSFORMATION OF VARIABLES

Lecture 7: Transformations in a new variable. Logarithmic transformation. Semilogarithmic transformation. Quadratic transformation.

SESSION 10 (LIVE IN-PERSON)

Sustainability Topics:

- Economic Development

MULTIPLE LINEAR REGRESSION MODEL

Lecture 8: Model derivation and interpretation of the estimated coefficients.

SESSION 11 (LIVE IN-PERSON)

Sustainability Topics:

- Economic Development

PRACTICAL CLASS

Problem Set 2: Linear regression analysis.

SESSION 12 (ASYNCHRONOUS)

COMPUTER CLASS (ASYNCHRONOUS)

R2: Linear regression analysis.

SESSION 13 (LIVE IN-PERSON)

Sustainability Topics:

     - Economic Development

REVIEW SESSION

Review 1: Midterm review (Discussion and Q&A)

SESSION 14 (LIVE IN-PERSON)

Sustainability Topics:

     - Economic Development

HYPOTHESIS TESTING I

Lecture 9: One-tailed test and two-tailed test (normal and Student tests).

SESSION 15 (LIVE IN-PERSON)

Sustainability Topics:

     - Economic Development

MIDTERM EXAM

Exam 1: Mid-term exam covering Unit 1 and Unit 2 of the course.

SESSION 16 (LIVE IN-PERSON)

Sustainability Topics:

     - Economic Development

HYPOTHESIS TESTING II

Lecture 10: F test (Fisher) for the overall significance.

SESSION 17 (LIVE IN-PERSON)

Sustainability Topics:

     - Economic Development

DISCUSSION CLASS

Practical applications and discussion of mid-term results.

SESSION 18 (LIVE IN-PERSON)

Sustainability Topics:

     - Economic Development

PRACTICAL CLASS
Problem Set 3: Hypothesis testing.

SESSION 19 (ASYNCHRONOUS)

Sustainability Topics:

- Economic Development

COMPUTER CLASS

R3: Hypothesis testing.

SESSION 20 (LIVE IN-PERSON)

Sustainability Topics:

- Economic Development

DUMMY VARIABLES I

Lecture 11: Definition, application, types (additive and interaction dummies) and interpretation. Hypothesis Testing with DV. Chow test.

SESSION 21 (LIVE IN-PERSON)

Sustainability Topics:

- Economic Development

DUMMY VARIABLES II

Lecture 12: Definition, application, types (additive and interaction dummies) and interpretation. Hypothesis Testing with DV. Chow test.

SESSION 22 (LIVE IN-PERSON)

Sustainability Topics:

- Economic Development

PRACTICAL CLASS

Problem Set 4: Dummy variables.

SESSION 23 (ASYNCHRONOUS)

Sustainability Topics:

- Economic Development

COMPUTER CLASS (ASYNCHRONOUS)

R4: Dummy variables.

SESSION 24 (LIVE IN-PERSON)

Sustainability Topics:

- Economic Development

ESTIMATION PROBLEMS I

Lecture 13: Omission of relevant variables. Inclusion of irrelevant variables. Step-wise regression. Measurement errors. Definition and detection of the multicollinarity problem. Outliers.

SESSION 25 (LIVE IN-PERSON)

Sustainability Topics:

- Economic Development

ESTIMATION PROBLEMS II

Lecture 14: Definition, causes and how to detect heteroscedasticity. White Test.

SESSION 26 (LIVE IN-PERSON)

Sustainability Topics:

- Economic Development

PRACTICAL CLASS

Problem Set 5: Estimation problems.

SESSION 27 (ASYNCHRONOUS)

Sustainability Topics:

- Economic Development

COMPUTER CLASS (ASYNCHRONOUS)

R5: Estimation problems.

SESSION 28 (LIVE IN-PERSON)

Sustainability Topics:

- Economic Development

REVIEW SESSION

Review 2: Final review of the course. Review for the computer and final exams.

SESSION 29 (LIVE IN-PERSON)

Sustainability Topics:

- Economic Development

COMPUTER EXAM

Exam 2: Computer exam using R

SESSION 30 (LIVE IN-PERSON)

Sustainability Topics:

- Economic Development

FINAL EXAM

Exam 3: Final exam covering all the content of the course.

EVALUATION CRITERIA

ORDINARY EVALUATION

Your final grade in the course will be based on a combination of different items that are described in the following table:

criteria	percentage	Learning Objectives	Comments
Class Participation	10 %		Participation
Intermediate Tests	25 %		Mid Term Exam
Computer Exam	25 %		Computer Exam
Final Exam	40 %		Final Exam

RE-SIT / RE-TAKE POLICY
CLASS PARTICIPATION (10%)

Participation in class will be evaluated positively if students: (1) attain a threshold quantity of contributions that is sufficient for making a reliable assessment of comment quality. Additionally, (2) participation will be evaluated in quality terms. A high quality comment reveals depth of insight, rigorous use of case evidence, consistency of argument, and realism. A high quality presentation of ideas must consider the relevance and timing of comments, and the flow and content of the ensuing class discussion. It demands comments that are concise and clear, and that are conveyed with a spirit of involvement in the discussion at hand.

MID-TERM EXAM (25%)

The mid-term exam will cover Units 1 and 2 of the content of the course. More details about this exam will be provided in advance in class.

COMPUTER EXAM (25%)

This exam mainly consists in solving and discussing some questions about a case study in econometrics with real data using the statistical software. This exam is in groups (no more than 3 students per group). More details about this exam will be provided in advance in class.

FINAL EXAM (40%)

The final exam will take place in session 30 and will cover all the content of the course. More details about this exam will be provided in advance in class.

IMPORTANT: In order to pass the course, you need a minimum grade of 3.5 in the final exam. If your grade in the final exam do not reach the threshold value of 3.5, you will fail the course, even in the case in which your weighted average of the course exceeds 5.

Given that the dates of exams are provided in advance, no excepcions will be made. If you do not attend the exams (for whatever reason), this will automatically imply a 0 in this part of the course. Please take this into consideration when planning your semester.

RE-SIT / RE-TAKE POLICY

Each student has four (4) chances to pass any given course distributed over two (2) consecutive academic years. Each academic year consists of two calls: one (1) ordinary call (during the semester when the course is taking place); and one (1) extraordinary call (or "re-sit") in June/July.

Students who do not comply with the 80% attendance requirement in each subject during the semester will automatically fail both calls (ordinary and extraordinary) for that Academic Year and have to re-take the course (i.e., re-enroll) during the next Academic Year.

Regarding to the newly implemented ´liquid learning´ model, all students must still abide by the same IEU attendance policy, including those students who are connecting remotely to class sessions and not physically in the classroom because they are unable to be physically in Spain, on campus. During the sessions, students connecting remotely are required to fully connect their camera and microphone at all times, and must actively participate during the sessions (using all necessary audiovisual equipment), just as their fellow peers who are physically present in the classroom on campus.

The Extraordinary Call Evaluation criteria will be subject to the following rules:

- Students failing the course in the ordinary call (during the semester) will have to re-sit evaluation for the course in June / July (except those students who do not comply with the attendance rule, and therefore will not have that opportunity, since they will fail both calls and must directly re-enroll in the course during the next Academic Year).
- It is not permitted to change the format nor the date of the extraordinary call exams or deadlines under any circumstance. All extraordinary call evaluation dates will be announced in advance and must be taken into consideration before planning the summer (e.g. internships, trips, holidays, etc.)
- The June/July re-sit will consist of a comprehensive evaluation of the course. Your final grade for the course will depend on the performance in this exam or evaluation only. I.e., continuous evaluation over the semester (e.g. participation, quizzes, projects and/or other grade components over the semester) will not be taken into consideration on the extraordinary call. Students will have to achieve the minimum passing grade of 5 and the maximum grade will be capped at 8.0 (out of 10.0) – i.e., "notable" in the extraordinary call.
- Re-takers: Students who failed the subject on a previous Academic Year and are now re-enrolled as re-takers in a course will need to check the syllabus of the assigned professor, as well as contact the professor individually, regarding the specific evaluation criteria for them as re-takers in the course during that semester (ordinary call of that Academic Year). The maximum grade that may be obtained as a retaker during the ordinary call (i.e., the 3rd call) is 10.0 (out of 10.0).

After exams and other assessments are graded by the professor (on either the ordinary or extraordinary call), students will have a possibility to attend a review session (whether it be a final exam, a final project, or the final overall grade in a given course). Please be available to attend the session in order to clarify any concerns you might have regarding your grade. Your professor will inform you about the time and place of the review session.

- Students failing more than 18 ECTS credits after the June/July re-sits will be asked to leave the Program. Please, make sure to prepare yourself well for the exams in order to pass your failed subjects.
- In case you decide to skip the opportunity to re-sit for an exam or evaluation during the June/July extraordinary call, you will need to enroll in that course again for the next Academic Year as a re-taker, and pay the corresponding tuition fees. As you know, students have a total of four (4) allowed calls to pass a given subject or course, in order to remain in the program.

BIBLIOGRAPHY
Recommended

- Wooldridge, J.M. *Introduction to Econometrics: A modern Approach..* Any edition. Thomson Learning. ISBN 9788131524657 (Digital)

BEHAVIOR RULES

Please, check the University's Code of Conduct here. The Program Director may provide further indications.

ATTENDANCE POLICY

Please, check the University's Attendance Policy here. The Program Director may provide further indications.

ETHICAL POLICY

Please, check the University's Ethics Code here. The Program Director may provide further indications.