UNIVERSITY OF LONDON

Course information 2020-21
EC2020 Elements of econometrics

General information

MODULE LEVEL: 5

CREDIT: 30

NOTIONAL STUDY TIME: 300 hours

Summary

Econometrics is the application of statistical methods to the quantification and critical assessment of hypothetical economic relationships using data. This course gives students an opportunity to develop an understanding of econometrics to a standard that will equip them to understand and evaluate most applied analysis of cross-sectional data and to be able to undertake such analysis themselves.

Conditions

Prerequisite: If taken as part of a BSc degree, the following course(s) must be passed before this course may be attempted.

- EC1002 Introduction to economics **AND**
- ST104A Statistics 1 (half course) **AND**
- (MT105A Mathematics 1 (half course) **OR** MT1174 Calculus or MT1186 Mathematical methods)

Aims and objectives

The aims of this course are:

- To develop an understanding of the use of regression analysis and related techniques for quantifying economic relationships and testing economic theories.
- To equip students to read and evaluate empirical papers in professional journals.
- To provide students with practical experience of using mainstream regression programmes to fit economic models.

Learning outcomes

At the end of the course and having completed the essential reading and activities students should be able to:

- Describe and apply the classical regression model and its application to cross-section data.
- Describe and apply the:
  - Gauss-Markov conditions and other assumptions required in the application of the classical regression model

Please consult the current EMFSS Programme Regulations for further information on the availability of a course, where it can be placed on your programme's structure, and other important details.

  - reasons for expecting violations of these assumptions in certain circumstances
  - tests for violations
  - potential remedial measures, including, where appropriate, the use of instrumental variables.
- Recognise and apply the advantages of logit, probit and similar models over regression analysis when fitting binary choice models.
- Competently use regression, logit and probit analysis to quantify economic relationships using standard regression programmes (Stata and EViews) in simple applications.
- Describe and explain the principles underlying the use of maximum likelihood estimation.
- Apply regression analysis to fit time-series models using stationary time series, with awareness of some of the econometric problems specific to time series applications (for example, autocorrelation) and remedial measures.
- Recognise the difficulties that arise in the application of regression analysis to nonstationary time series, know how to test for unit roots, and know what is meant by co-integration.

Essential reading

For full details, please refer to the reading list.

Dougherty, C. *Introduction to Econometrics.* (Oxford: Oxford University Press, 2016) fifth edition [ISBN 9780199676828].

Assessment

This course is assessed by a three-hour unseen written examination.

Syllabus

Review: random variables and sampling theory: probability distribution of a random variable. Expected value of a random variable. Expected value of a function of a random variable. Population variance of a discrete random variable and alternative expression for it. Expected value rules. Independence of two random variables. Population covariance, covariance and variance rules, and correlation. Sampling and estimators. Unbiasedness. Efficiency. Loss functions and mean square error. Estimators of variance, covariance and correlation. The normal distribution. Hypothesis testing. Type I error and the significance of a test. Type II error and the power of a test. T tests. Confidence intervals. One-sided tests. Convergence in probability and plim rules. Consistency. Convergence in distribution (asymptotic limiting distributions) and the role of central limit theorems.

Simple regression analysis: simple regression model. Derivation of linear regression coefficients. Interpretation of a regression equation. Important results relating to OLS regressions. Goodness of fit.

Properties of the regression coefficients: types of data and regression model. Assumptions for Model A. Regression coefficients as random variables. Unbiasedness of the regression coefficients. Precision of the regression coefficients. Gauss–Markov theorem. *t* test of a hypothesis relating to a regression coefficient. Type I error and Type II error. Confidence intervals. One-sided tests. P-values of a test. *F* test of goodness of fit.