

15S001

6 ECTS

Quantitative and Statistics Methods I

Overview and Objectives

The objective of this course is to familiarize students with the basic most widely used and up-to-date methodologies of applied econometric data analysis, aimed at giving an understanding of the different techniques and enabling students to conduct empirical research projects.

The course covers basic tools needed for empirical economic research. The first part of the course focuses on the use of the linear regression model, including estimation and inference under basic assumptions. The second part of the course introduces other estimation methods (MLE, GMM) that allow for departures from these basic assumptions. Topics such as limited dependent variables, GARCH and DSGE models will be covered. Economic applications are discussed throughout the course.

Course Outline

Part I. Introduction to Regression Analysis

Objectives. Descriptive versus causal econometrics. Experimental versus observational data. Regressions, correlations and causal inference.

Part II. Linear Regression Model

Least squares estimation

Least squares estimator. Goodness of fit. Numerical properties. Classical assumptions. Finite sample properties.

Inference under classical assumptions

Inference with exact tests. Testing parameter stability. Confidence intervals and confidence regions. Inference under collinearity.

Least squares asymptotics

Asymptotic distribution of the least squares estimator. Asymptotic properties. Inference with large sample tests. Robust least squares.

Part III. Advanced Estimation Methods

Extremum estimation

Theory. Numeric optimization methods.

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Maximum likelihood

Theory. Limited dependent variables. ARCH/GARCH models. Estimation of linear DSGE models using Kalman filtering.

Generalized method of moments

Theory. Instrumental variables estimation. Hausman-type tests. Estimation of portfolio and real business cycle models.

Introduction to Bayesian methods

Theory. MCMC and sequential Monte Carlo. Examples.

Required Activities

The course will be structured into 6 hours of lectures a week. In addition, the students will have to hand in assignments.

Evaluation

Exam (80%) and problem sets / assignments (20%).

Materials

Introductory textbooks:

Stock and Watson (2011). Introduction to econometrics. Pearson. 3rd edition.

Wooldridge (2013). Introductory econometrics. 5th edition.

Advanced textbooks:

Cameron & Trivedi (2005),
Microeconometrics: methods and applications.
Cambridge University Press.

Creel (2012), Econometrics
(<http://pareto.uab.es/mcreel/Econometrics>).

Davidson & MacKinnon (2003), Econometric Theory and Methods. Oxford University Press.

Green (2008), Econometric Analysis. Prentice Hall. 6th edition.

Hayashi (2000), Econometrics. Princeton University Press.

Companion textbooks:

Angrist & Pischke (2008), Mostly Harmless Econometrics: An Empiricist's

Companion. Princeton University Press.

Kennedy (2008) A Guide to Econometrics. Wiley-Blackwell. 6th edition.