Remarque
For sem. MA1

Summary
The course covers basic econometric models and methods that are routinely applied to obtain inference results in economic and financial applications.

Content
- Linear regression models
- Ordinary least squares estimation
- Hypothesis testing and confidence intervals in linear regression models
- Nonlinear regression models
- Generalised least squares
- Instrumental variables estimation
- Generalized method of moments
- Maximum likelihood estimation
- Introduction to time series models

Keywords
Econometrics; linear regression; ordinary least squares; instrumental variables; generalized method of moments; maximum likelihood inference.

Learning Prerequisites

Important concepts to start the course
- Matrix algebra;
- Probability and distribution theory (incl. conditional expectation and variance, normal, Chi-squared, Student, and F distributions);
- Statistical estimation and inference (incl. point estimation, interval estimation, hypothesis testing);
- Large-sample distribution theory (incl. convergence in probability, convergence in distribution, central limit theorem, Delta method);
• Familiarity with R, Matlab or Python is recommended for practicals (e.g., empirical analysis, simulations).

Learning Outcomes
By the end of the course, the student must be able to:
• Describe the basic assumptions of the linear regression model.
• Test whether the basic assumptions of the linear regression model are met in the data using formal statistical procedures.
• Derive statistical estimators like least squares and instrumental variables estimators.
• Recall basic goodness-of-fit measures like R-squared.
• Construct linear regression models from actual data using statistical variable-selection techniques like t-statistics and F-tests.
• Describe the main advantages and disadvantages of likelihood-based and instrumental variable-based inference procedures.
• Carry out linear and nonlinear hypothesis testing procedures.
• Discuss asymptotic properties of linear and nonlinear estimators such as consistency and efficiency.
• Conduct team-work and write an econometric report about linear and nonlinear regression models.

Transversal skills
• Use a work methodology appropriate to the task.
• Continue to work through difficulties or initial failure to find optimal solutions.
• Write a scientific or technical report.
• Use both general and domain specific IT resources and tools

Teaching methods
Lectures and exercise sessions.

Expected student activities
• Attend and participate to lectures;
• Attend and participate to exercise sessions;
• Review lecture material and complete exercises,
• Write a midterm exam;
• Write a final exam.

Assessment methods
• Midterm written exam (weight: 35%);
• Final written exam (weight: 65%).

Supervision
Office hours No
Assistants Yes
Forum No

Resources
Virtual desktop infrastructure (VDI)
No

Bibliography

Ressources en bibliothèque
• Introduction to Econometrics / Stock
• Econometrics / Hayashi
• Econometric analysis / Greene
• Introduction to the Mathematical and Statistical Foundations of Econometrics/ Herman J. Bierens

Prerequisite for
• Advanced topics in financial econometrics
• Credit risk
• Derivatives
• Financial econometrics
• Fixed income analysis
• Investments