UNIVERSITÀ
DEGLI STUDI DI MILANO-BICOCCA

COURSE SYLLABUS

Econometrics

2223-1-F1601M050

Learning area

Learning objectives

The course aims to offer an introduction to the econometrics techniques in the area of financial econometrics.
At the end of the course, the students will be able to choice, estimate and interpret linear models for financial applications.
In details, the student will be able to:
• Know the specification and the estimation of the classical linear model;
• Apply, estimate and evaluate the estimated models;
• Identify violations of classical assumptions, apply diagnostic tests and adopt suitable estimation criteria;
• Know the characteristics and analysis data in time series;
• Estimate and evaluate estimates of dynamic models for time series.

Contents

The course deals with econometrics methodology concerning cross-sectional, and time-series data. The first block of the course covers an overview of the classical linear regression model and generalizes it in a multiple linear setting. Empirical applications on the linear factor models and principal components analysis are carried out. The second block covers univariate and multivariate time series analysis. The applications concern estimation and forecasting exercises based on empirical economics and financial literature.

Detailed program

1. Introduction:

- What is *Econometrics*?
- What is *Financial Econometrics*?

2. Classical linear regression model (CLRM):

- Regression model
- Simple linear regression
- The assumptions of the model
- Properties of the OLS estimator

3. Multiple linear regression model

- Ordinary Least Squared (OLS)
- Properties of estimators
- Goodness of fit statistics
- Diagnostic tests
- Restricted OLS estimator
- Dummy variables

4. Violations of the Assumptions of the CLRM

- Consequences
- Assumptions and Diagnostic Tests
- "Remedies"

5. Time series modelling and forecasting

- Moving average processes
- Autoregressive processes
- ARMA processes

6. Multivariate models

- Structural and Reduced forms
- Stochastic regressors
- VAR

7. Non-stationary processes

- Cointegration: an introduction

8. Volatility models

- ARCH and GARCH models

Prerequisites

In order to understand the topics covered, it is necessary to have the competence of the topics covered in Statistics and to be aware of the basic notions of Matrix Algebra.

Teaching methods

Face-to-face lectures using notes provided by the lecturer. The notes will be available at the beginning of the lesson.
Classroom exercises on theoretical and empirical problems. The empirical applications consist on the developing and discussion of empirical problem sets using Matlab.
Classes will be held in English.

Assessment methods

The written examination is conducted in two different modalities:

1. A “compound exam” - the student will have to carry out an assignment that will consist of theoretical exercises and empirical applications, which will count for 40% of the exam mark. The remaining part, 60%, will be assessed on knowledge of the subject through a written exam consisting of multiple choice questions and open questions.
2. "Open-book exam" - the student will have to carry out a written exam consisting of two problems, one theoretical and one of empirical interpretation, with the help of his own notes.

Textbooks and Reading Materials

Lecture notes/slides.

Brooks, C. (2019). Introductory Econometrics for Finance, Cambridge University Press.

Greene, W. (2008). Econometric Analysis, 7th ed. Prentice Hall. New York, 7.

Additional references:

Hayashi, F. (2000), Econometrics. Princeton University Press.

Enders W. (2014). Applied Econometric Time Series, 4th edition, John Wiley.

Sustainable Development Goals