UNIVERSITÀ
DEGLI STUDI DI MILANO-BICOCCA

COURSE SYLLABUS

Econometrics

2627-1-F1602M005

Learning area

Quantitative metheds (for Economics and Finance)

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:
• **Knowledge and understanding**: Know the specification and the estimation of the classical linear model; Know the characteristics and analysis data in time series;
• **Applying knowledge and understanding**: Apply, estimate and evaluate the estimated models;
• **Learning skills**: autonomous evaluation and interpretation of empirical results;
• **Making judgements** Estimate and evaluate estimates of dynamic models for time series and cross-sectional analysis; Identify violations of classical assumptions, apply diagnostic tests and adopt suitable estimation criteria.

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 examination is conducted in two different ways:

1. The compound exam: classroom and homework exercises + written exam.
This option is available to students who complete several exercises throughout the course.
The assignments consist of both classroom and homework exercises.
The written exam consists of both closed and open questions.

2. The written open-book exam:
The exam consists of two parts: one theoretical question and one empirical exercise. It is an open-book exam. You can use printed class notes (slides, exercises, and statistical tables), summaries, and textbooks.

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

QUALITY EDUCATION