



UNIVERSITÀ
CATTOLICA
del Sacro Cuore

Economic statistics

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Course aims and intended learning outcomes

Course goals: to give students the knowledge of the most important concepts and tools of economic statistics, particularly focusing on the construction of price index numbers and on the analysis and the forecasting of economic time-series.

Expected achievements: students are expected to acquire a sound understanding of the main tools of economic statistics and to be able to apply them in real situations.

Course content

Introduction

Goals and typical topics of Economic Statistics. Complexity of socio-economic phenomena: new conceptual and methodological challenges.

Economic data sources

Main indicator systems; the products of Istat and Eurostat.

PART I - Price Index Numbers

The structure of national accounts and the main macro-economic aggregates.

The problem of temporal and spatial price comparisons.

Simple index numbers: the axiomatic approach and the Jevons index.

Compound index numbers: the axiomatic approach and main index formulas.

Transitivity and multi-temporal indexes.

Examples of index numbers for economic and financial analysis.

Purchasing power parity and spatial price comparisons.

Multi-spatial comparisons.

PART II - Economic time-series analysis

Definition of time-series; Stationary and non-stationary time-series; White noise; Level, Trend, Seasonality and erratic component; Forecasting and decomposition of a time-series.

Uni- and multivariate linear regression models. Point and interval estimation of model parameters.

Linear models for time-series analysis: specification estimation and forecasting.

ETS models: specification and maximum likelihood estimation.

Time-series decomposition, point and interval forecasting.

Implementing ETS models in the R language.

PART III - Machine learning and non-linear methods for the analysis of economic data

Fundamentals of machine learning. Basic notions on regression and classification trees, Random Forests (RFs) and Deep Learning algorithms. Applications to time-series analysis.

Reading list

C.M BISHOP, Neural networks for Pattern Recognition, Oxford University Press, 1995.

R.J. HYNDMAN-A.B. KOEHLER-J.ORD-KEITH-R.D SNYDER, Forecasting with exponential smoothing, Springer, 2008.

M. KUHN-K. JOHNSON, Applied Predictive Modeling, Springer, 2013.

Notes and documents provided by the teacher.



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Teaching method

Frontal lessons and exercises developed by the teacher.

Assessment method and criteria

The final assessment will be performed through a written exam on the whole program. The exam will be designed so as to assess the knowledge width (programme coverage), the technical skills (technical ability), the content comprehension (depth) and the precision in the exposition (accuracy). Such four dimensions define the “preparation profiles” of the students, out of which final scores are computed.

Notes and prerequisites

There are no mandatory prerequisites; some background in probability calculus and statistical estimation is of help.