Statistical methods for social sciences: prevision techniques

Academic Year: (2021 / 2022) **Review date: 24-06-2021**

Department assigned to the subject: Statistics Department

Coordinating teacher: MOLINA PERALTA, ISABEL

Type: Compulsory ECTS Credits : 6.0

Year : 3 Semester : 2

REQUIREMENTS (SUBJECTS THAT ARE ASSUMED TO BE KNOWN)

Previuos courses on Statistics and Econometrics.

OBJECTIVES

Nowadays, due to the development of the IT and massive access to data sources, quantitative analysis has become a basic tool in the sociological and economic research. Traditional qualitative analysis has been significantly enriched by the application of statistical methods that allow the processing of these data and facilitates the formulation and validation of hypotheses in the field of social sciences.

However, these statistical methods have to be applied in such a way that they allow, not only to describe the social events that have already taken place, but also to anticipate what will be the future evolution of the analyzed data and how this evolution can be affected by the implementation of a particular policy. In addition, forecasting, as in any decision-making process, plays a crucial role in the implementation and evaluation of any socio-economic policy. It is therefore important that these predictions are not only based on a qualitative analysis. Instead they should be also supported by quantitative methods based on techniques of forecasting and econometric.

Therefore, it is crucial in this context not only for the social researcher but also the legislator to become familiar with quantitative methods that are based on the forecasting techniques in order to be able to know in greater depth the evolution of the various socio-economic aspects and also to be able to quantify and assess what are the consequences of the policies that are implemented.

This course is intended to address the problem of socio-economic forecasting, the study of the main methodologies for prediction and the analysis of the correct use of the predictions in decision-making.

DESCRIPTION OF CONTENTS: PROGRAMME

Chapter 1. TIME SERIES ECONOMETRICS. PROPERTIES AND STATISTICAL CONTEXT

1.1 Quantitative methods and socioeconomic analysis.
1.2 Random samples and time series characteristics. Evolution of the level and stationary oscillations.
1.3 Time series decomposition
  1.3.1 Classical decomposition: trend, seasonality and short term disturbances.
  1.3.2. Time series decomposition and econometric modelling
1.4 Trend and seasonality in time series. Transformations of stationarity.
  1.4.1 The model of linear trend and deterministic seasonality
  1.4.2 Trend segmentation.
  1.4.3 Stochastic seasonality and trends

Chapter 2. UNIVARIATE LINEAR MODELS

2.1 Stationary stochastic processes. Univariate models: autocorrelation function and correlogram
2.2 White noise process
2.3 First-order Autoregressive model AR (1)
2.4 Generalization to the AR (p)
2.5 Integrated models: ARI (1, p)
2.6 ARMA and ARIMA models

Chapter 3 SPECIFICATION, ESTIMATION AND VALIDATION OF ARIMA MODELS

3.1 The Box-Jenkins Methodology

3.2 Initial Specification
3.2.1 Unit root test
3.2.2 Information criteria for temporal dependence
3.2.3 Seasonal unit root test
3.3 Estimation
3.4 Validation of ARIMA models
3.4.1 Residual Analysis
3.4.2 Alternative models

Chapter 4 STATIONARY MULTIVARIATE MODELS

4.1. Stationary VAR(p) Model. Specificacion. Temporal Dependence.
4.2. Granger Causality. Contemporaneous Dependence
4.3. VAR model estimation
4.4. VAR model with exogenous variables. Recursive VAR models
4.5. Uniequational Dynamic Models. Autoregressive Distributed Lag models (ADL).
4.6. Impact and long run multipliers

LEARNING ACTIVITIES AND METHODOLOGY

The course is composed by theoretical lectures where both blackboard and audiovisual media is used to present abstract concepts. In addition, there will be practical sessions in computer classrooms where students will learn the use of the software necessary to implement the models based on real data

ASSESSMENT SYSTEM

60% of the final grade will be obtained through a final exam. It will be necessary to get a grade of at least 5 points out of 10 to pass the course.
40% remaining from the final grade corresponds to the continuous evaluation of the knowledge and skills acquired by the student at the theoretical level and in the resolution of practical problems and data analysis. This continuous evaluation will consist of two mid-term exams, each corresponds to 20% of the final grade.

% end-of-term-examination:	60
% of continuous assessment (assigments, laboratory, practicals…):	40

BASIC BIBLIOGRAPHY

- Dielbold Elements of Forecasting, South-Western College Publishing, Cincinnati, 2004

- Espasa, A. and Cancelo, J.R. Métodos Cuantitativos para el Análisis de la Coyuntura Económica , Alianza Editorial, 1993

- Gonzalez, C.W.J Forecasting in Business and Economics, Pearson, 2013

- Granger, C.W.J Forecasting in Business and Economics, Academic Press, San Diego, 1984

- Peña, D. Análisis de Series Temporales, Alianza Editorial, 2005