Quantitative methods for management

Academic Year: (2020 / 2021) **Review date: 07-07-2020**

Department assigned to the subject: Statistics Department

Coordinating teacher: LOPES MOREIRA DA VEIGA, MARIA HELENA

Type: Compulsory ECTS Credits : 6.0

Year : 3 Semester : 1

REQUIREMENTS (SUBJECTS THAT ARE ASSUMED TO BE KNOWN)

All the previous courses in Statistics

OBJECTIVES

SPECIFIC COMPETENCES: After successfully finishing the course, the student will be able to evaluate the relations between economic variables by applying regression models. For example, the student would be able to run a regression between the returns and the volatility in a determined market. However, since real-life data rarely satisfies the underlying assumptions of the regression model, the student will also learn how to modify the model or the estimation methods in order to be able to confront the usual problems of the data analysis. To be more concrete, the course will cover the following topics: qualitative explanatory variables, heteroskedasticity, the correlation among explanatory varibles, and endogeneous variables. The student will also learn how to test economic or financial theories using real-life data.

ADDITIONAL COMPETENCES:

1. Capacity to analyze and syntesize.
2. The use of computer software for the econometric analysis.
3. Solving problems.
4. Team work.
5. Critical thinking.
6. Oral and written communication.

DESCRIPTION OF CONTENTS: PROGRAMME

In this course, the fundamental concepts for being able to apply the regession to measure the relation between economic variables is taught. In particular, the following topics will be covered throughout the course.

1. Testing linear relationship between the variables contained in the model. These tests are of special interest to study whether the relation postulated by the economic theory is present in the actual data.
2. The use of dummy variables in order to introduce into the model the effect of quantitative explanatory variables or other effects that are difficult to measure.
3. Multicollinearity between the explanatory variable is a common problem in the econometric analysis. The standard techniques how to deal with this problems are covered.
4. The regression model in the presence of heteroskedasticity. It is common that the uncertainty about economic variables is not constant over time, which will be reflected in the empirical data. In these circumstances, the properties of the estimators change and it could be necessary to consider alternative estimation techniques to this problem into account.
5. Finally, the problem of endogeneity of variables is considered. In this case, the use of instrumental variables to obtain estimators with ¿nice¿ properties will be explained.

PROGRAMME

1. Inference in the multiple regression model
1.1 Basic concepts
1.2 Sampling distributions of the OLS estimators
1.3 Testing hypotheses about a single population parameter
1.4 Confidence intervals
1.5 Testing hypotheses about a single linear combination of parameters
1.6 Testing multiple linear restrictions: the F-test
2. Multiple regression with dummy variables
2.1 Describing qualitative information
2.2 A single dummy independent variable

2.3 Using dummy variables for multiple categories
2.4 Interactions involving dummy variables
2.5 A binary dependent variable: The linear probability model
3. Multicolinearity
3.1 Perfect colinearity
3.2 The effects of multicolinearity
3.3 Indicators of multicolinearity
4. Heteroskedasticity
4.1 Consequences of heteroskedasticity for the OLS estimator
4.2 Robust estimation of heteroskedasticity
4.3 Tests for heteroskedasticity
4.4 Generalized least squares estimation
5. Endogenous Regressors
5.1 Causes of endogeneity
5.2 Tests for endogeneity
5.3 Instrumental variables

LEARNING ACTIVITIES AND METHODOLOGY

The theoretical classes (3ECTS) will be held in a classroom using the whiteboard and audiovisual content. All overhead slides used during the classes will be made available on the webpage of the course. The collected problem sets that will have to be solved on a weekly basis (2ECTS) can be found online as well. Finally, the computer rooms of the university will be used for problem solving sessions.

ASSESSMENT SYSTEM

60% of the final mark will be obtained by means of a final exams that tests the required knowledge. The remaining 40% will result from a continuous evaluation of the student's capacity to solve problems. Minimum grade required in the exam to pass the course is 4.

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

BASIC BIBLIOGRAPHY

- Wooldridge, J.M. Introductory Econometrics: A Modern Approach , Thomson, 2019

ADDITIONAL BIBLIOGRAPHY

- AZNAR GRASA.; GARCIA FERRER; A. Y MARTIN ARROYO, A. Ejercicios de Econometría, Volumen I y II (1994).

- GOLDBERGER, A.S. Introductory Econometrics, Harvard University Press (1999).