

27545 - Statistical Analysis for Finance

Información del Plan Docente

Academic Year	2016/17
Academic center	109 - Facultad de Economía y Empresa
Degree	449 - Degree in Finance and Accounting
ECTS	6.0
Course	4
Period	Second semester
Subject Type	Optional
Module	---

1. Basic info

1.1. Recommendations to take this course

1.2. Activities and key dates for the course

2. Initiation

2.1. Learning outcomes that define the subject

2.2. Introduction

3. Context and competences

3.1. Goals

3.2. Context and meaning of the subject in the degree

3.3. Competences

3.4. Importance of learning outcomes

4. Evaluation

5. Activities and resources

5.1. General methodological presentation

There will be theoretical and computer practical sessions. In theoretical sessions the concepts and mathematical foundations of the statistical techniques will be exposed by means of slides and theoretical notes. Practical sessions will be taught with the computer in the computer classroom. In these sessions simulated and real financial time series will be analyzed by applying the statistical tools explained in the theoretical sessions. To that aim we will use the statistical programme R which contains very specialized libraries to apply the Box-Jenkins methodology of analysis of time series and to model its volatility using GARCH models and their extensions.

In these classes some illustrative simulated and real time series will be set-up by the teacher and will be solved by the

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different teams during half hour with a posterior half an hour to discuss among all the groups, the obtained results.

Platform *Moodle 2.0* will be used to publish all the theoretical and practical materials and all the information about the development of the subject along time.

5.2.Learning activities

There are programmed several types of learning activities in order to achieve the objectives of the subject.

- Theoretical sessions:

These sessions will be taught by means of participative master classes where a set of slides will be used in order to explain the theoretical part of the subject. The aim of these sessions will be to establish the theoretical foundations of each theme, illustrating the studied concepts and ideas by means of illustrative practical examples. The teacher will use his computer to illustrate in these examples, the application of the explained statistical techniques. It is recommended to attend to these sessions because, in our experience, the theoretical part of the subject is the more difficult part to understand and study.

- Computer Practical sessions:

These sessions will be carried out in the computer rooms with the students working by teams. In these classes some simulated and real series will be set-up by the teacher and will be solved by the different teams during half hour with a posterior half an hour to discuss among all the groups, the obtained results. The R statistical package will be used to solve these practical problems.

5.3.Program

Lesson 0: Introduction

Course objectives. Evaluation. Teaching program. Bibliography

Lesson 1: Empirical characteristics of the financial time series

Assets returns. Empirical characteristics of the returns: mean, median, skewness, kurtosis, normality, autocorrelation. Introduction to R: installation, basic commands, libraries.

Lesson 2: Dynamic linear models: ARIMA

Stationary series. Autocorrelation. White noise. AR, MA and ARMA models: identification, estimation, goodness of fit and prediction. Non-stationary series: unit roots tests, ARIMA models.

Lesson 3: Statistical analysis of volatility (I)

Introduction. ARCH, GARCH and ARMA-GARCH models: properties, identification, estimation, goodness of fit and prediction. Applications: dynamic estimation of correlations and beta coefficients: minimum variance portfolios.

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Lesson 4: Statistical analysis of volatility (II)

IGARCH models. Asimmetric effect: GJRGARCH, EGARCH and APARCH models. Components GARCH. GARCH in mean. Insampling and outsampling validation of models.

Lesson 5: Value at Risk

Measuring risk. Coherence. Value at Risk. Conditional Value at Risk. Risk Metrics. Backtesting techniques.

5.4.Planning and scheduling

Date	Contents	Session
First week	Presentation. Lesson 0	Theoretical
	Lesson 1: Asset returns	Theoretical
Second week	Introduction to R	Practical computer
	Lesson 1: Descriptive and graphical analysis of time series	Theoretical
Third week	Lesson 1: Normality	Theoretical
	Computer session Lesson 1	Practical computer
Fourth week	Lesson 1: Autocorrelation	Theoretical
	Computer session Lesson 1	Practical computer
Fifth week	Supervised Job 1	Practical computer
	Lesson 2: Stationarity. AR and MA models	Theoretical

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Sixth week	Lesson 2: ARMA Models. Identification and estimation	Theoretical
	Computer session Lesson 2	Practical computer
	Lesson 2: ARMA Models. Goodness of fit.	Theoretical
Seventh week	Computer session Lesson 2	Practical computer
	Lesson 2: ARMA Models: Prediction	Theoretical
Eighth week	Computer session lesson 2	Practical computer
	Lesson 2: Non-stationary time series. Unit test roots. ARIMA	Theoretical
Ninth week	Computer session lesson 2	Practical computer
	Supervised Job 2	Practical computer
Tenth week	Lesson 3: ARCH and GARCH models	Theoretical
	Lesson 3: ARMA-GARCH models: identification, estimation and goodness of fit	Theoretical
Eleventh week	Computer session lesson 3	Practical computer
	Lesson 3: ARMA-GARCH models: prediction	Theoretical
Twelfth week	Computer session lesson 3	Practical computer
	Lesson 4: Extension of GARCH models	Theoretical

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Thirteenth week	Lesson 4: Extension of GARCH models	Theoretical
	Computer session lesson 4	Practical computer
Fourteenth week	Supervised job 3	Practical computer
	Lesson 5: Value at Risk	Theoretical
	Computer session lesson 5	Practical computer
Fifteenth week	Supervised job 3	Practical computer
	Supervised job 3	Practical computer

5.5. Bibliography and recommended resources

Updated bibliography is available through the website of the library: <http://psfunizar7.unizar.es/br13/eBuscar.php?tipo=a>