UNIVERSITÀ
DEGLI STUDI DI MILANO-BICOCCA

COURSE SYLLABUS

Statistics for Financial Markets

2425-2-F1601M061-F1601M070M

Learning area

Statistical Methods in Finance

Learning objectives

The course aims to deepen the knowledge of the statistical tools learned during the basic courses of statistical inference and probability in order to improve the student's ability in analyzing financial time series. To this end, interval estimation and hypothesis testing techniques will be extended to the time series context and they will be applied in order to study the features of financial returns.

Copulas will be used to deepen the knowledge of the CreditMetrics and CreditRisk+ model by considering the possible dependence among the elements of the credit portfolio.

Several lessons will be held in the computer lab so that the theoretical insights can actually lead to an increase of the student's practical ability.

Contents

Statistical inference for time series and inference for risk and performance measures of financial assets. Introduction to Copulas and their use in CreditMetrics and CreditRisk+.

Detailed program

Preliminaries. Review on probability theory

The multivariate Normal distribution

The delta method and its applications

Normality tests and goodness of fit tests
Kernel Density Estimation

Definition of stochastic process in discrete time

Laws of large numbers and central limit theorems for dependent data and their applications in finance
Descriptive and Inferential analysis of the returns of financial assets: inference on the expected return, standard deviation, VaR, and Sharpe Ratio.
Copulas and their applications in the CreditMetrics and CreditRisk+model.

Prerequisites

Basic notions of mathematical analysis, probability theory, statistical inference, and informatics.

Teaching methods

The theoretical and methodological arguments will be treated during lessons. Several lessons will be held in the computer lab in order to increase the student's practical ability.

Assessment methods

Statistica dei mercati finanziari:

The exam is divided in two parts:

1. theoretical examination: the student is required to answer in writing to some open-ended questions.
2. practical examination: the student is required to apply the theoretical tools studied during the course in a practical test on a pc (using the R software).

The final evaluation will be given by the average of the evaluations in the theoretical and practical tests.

Textbooks and Reading Materials

Nelsen, R. B., An Introduction to Copulas, Springer, 2006.

Karlin S. and Taylor, H.M., A First Course in Stochastic Processes. Academic Press, 1975.

Classroom materials provided during the lessons

Sustainable Development Goals