# Risk Management

## Prof. Mario Anolli

***COURSE AIMS AND INTENDED LEARNING OUTCOMES***

The course aims to supply an in-depth view of the main techniques used by financial intermediaries in their managing risk. The course will also look at the regulatory framework with respect to risks. The course aims to help the student develop the professional skills needed for tackling risk management at banks and other financial intermediaries, and therefore, the main models developed by theory and used in practice will also be examined.

Course prerequisites

The students enrolling for the course should be capable of:

– calculating present values and principal and interest on the basis of discrete and continuous capitalisation;

– knowing the significance of the main income-statement and balance-sheet accounts of a bank, as well as the structure of the notes to the financial statements;

– calculating price, return, duration and convexity of a bond and calculating spot and forward interest rates;

– understanding the concept of alpha and beta for an equity security;

– calculating the expected value and standard deviation of a random variable;

– solving linear equations with use of matrix algebra;

– calculating a matrix of variances and covariances and a correlation matrix, and understanding their significance;

– understanding the main symmetric and asymmetric derivatives and the related methods of basic valuation;

– understanding the institutions involved in regulating banks.

***COURSE CONTENT***

*Interest-rate risk*

After having completed the study of the material, the student should:

– be familiar with the reasons for the manifestation of interest-rate risk in banking operations;

– be able to identify bank assets and liabilities sensitive to changes in interest rates;

– be able to calculate the gap in its various definitions (marginal and cumulative) and apply it for estimating the impact of interest-rate changes on the bank's interest margin;

– be familiar with the premiums and limits of the repricing gap model;

– be able to calculate and apply the duration gap, evidencing its advantages and limits;

– be able to map cash flow for financial instruments along the main segments of the yield curve;

– be familiar with the significance and use of internal transfer rates.

*Liquidity risk*

After having completed the study of the material, the student should:

– be familiar with the reasons for the manifestation of liquidity risk in banking operations;

– be familiar with the main techniques for measuring liquidity risk;

– be able to calculate the liquidity-gap and liquidity-at-risk indicators;

– be familiar with the principal strategies for managing liquidity risk, including for assets and liabilities not having explicit maturity dates.

*Market risks*

After having completed the study of the material, the student should:

– be familiar with the concept of Value at Risk (VaR);

– be able to calculate the VaR of a position and of a portfolio of positions according to the variance-covariance (parametric) approach, historical simulation method and Monte Carlo method;

– understand the logic and applications for stress test and/or backtesting of VaR models;

– be familiar with the concept of expected shortfall and the fundamentals of extreme value theory;

– be able to use the concept of VaR for determination of the limits of risk assumption, for constructing risk-adjusted performance measures and for capital allocation.

*Credit risk*

After having completed the study of the material, the student should:

– be familiar with the causes and the manifestation of credit risk;

– understand the method for calculating linear discriminant analysis, know how to set up the calculation and apply the method;

– understand the method for calculating regression models, know how to set up the calculation and apply the method;

– be able to estimate the probability of marginal and cumulative insolvency on the basis of the spreads reported on the bond market;

– understand the methodology behind the Merton and KMV models;

– be familiar with the factors that determine the recovery rate in the event of insolvency and the method for its estimation;

– be familiar with the significance of the rating and the methodology for its assignment, identifying the main factors that influence it;

– be familiar with the concept of VaR of a portfolio of receivables;

– understand CreditMetrics™ and CreditRisk approaches;

– understand the merits in relation to the different approaches used for estimate credit risk of a portfolio;

– be able to calculate the estimated probability of default for the pricing of receivables and for the estimation of risk-adjusted profitability.

*Operational risk*

After having completed the study of the material, the student should:

– be familiar with the causes and the manifestation of operational risk, evidencing their components and types;

– be familiar with the peculiarities of operational risk compared with financial risks;

– be familiar with the methodology for identifying risk factors and the main approaches for measuring expected and unexpected losses.

*Capital adequacy*

After having completed the study of the material, the student should:

– be familiar with objectives and general framework of regulatory oversight;

– be able to understand the concept of computing regulatory capital and capital adequacy;

– understand the solutions that can be adopted for the first pillar (standard approach, internal-ratings-based approach);

– understand the role of the second and third pillars (role of regulators and market discipline).

– know the concept of Risk Appetite Framework (RAF), Supervisory Review and Evaluation Process (SREP), Internal Capital Adequacy-and-Assessment-Process (ICAAP), Internal liquidity Adequacy-and-Assessment-Process (ILAAP).

*Capital management and creation of value*

After having completed the study of the material, the student should:

– be familiar with objectives and strategies underlying capital management;

– be familiar with the determinants of the degree of capitalisation of banks;

– understand the process of capital allocation;

– be able to calculate harmonised risk measures and risk-adjusted measures (Raroc, Rorac, etc.);

– be familiar with the organisational and operational repercussions of capital management;

– be able to estimate the cost of capital and creation-of-value ratios.

***READING LIST***

Slides shown in class and other instructional material (in particular, articles and working papers) will be made available through the Blackboard platform.

A. Resti-A. Sironi, *Rischio e valore nelle banche. Misura,* *regolamentazione e gestione,* Egea, Milan, 2008 (ISBN: 9788823831254).

***TEACHING METHOD***

The course will be taught through lectures, assignments and seminars conducted by experts in the field.

***ASSESSMENT METHOD AND CRITERIA***

Assessment is based on a final written test consisting of both multiple choice and open-ended questions and covering the entire course content. Students’ interventions during lectures may also be assessed. Both students and the lecturer will have the right to request an oral interview to supplement the written test.

***NOTES AND PREREQUISITES***

Prerequisites for attending the course: basic knowledge of the economics of banking, financial mathematics, financial instruments, including derivatives.

Further information can be found on the lecturer's webpage at http://docenti.unicatt.it/web/searchByName.do?language=ENG, or on the Faculty notice board.