

Risk Management Course Syllabus

Fall semester 2016

Instructors: Dr. Vincent Fardeau
and Dr. Carsten Sprenger

Course Objective

This course deals with the ways in which risks are quantified and managed by financial institutions. It consists of two parts, one on market risk and one on credit risk. The course prepares for the credit risk parts of the Financial Risk Manager® and Professional Risk Manager™ Examinations provided by the professional risk manager associations GARP and PRMIA, respectively. Both certificates are valuable assets on your CV if you aim at a career in the banking sector.

The first part of the course studies how to model the risk of portfolios emanating from fluctuations in market prices, or market risk. A parametric structure on the distribution of returns may be imposed, or the realised distribution of returns can be used to generate a non-parametric distribution of returns. With the parametric or non-parametric distribution of returns in hand, the risk of particular portfolios can be studied and optimised with reference to the likelihood of losses (Value-at-Risk or Expected Short-fall). Finally applications and short-comings of market risk management tools in banking and financial stability regulation will be studied, and in particular the evolution of the Basel regulation.

The second part of the course gives an introduction to commonly used models of credit risk. Credit risk is the risk of loss due to a debtor's non-payment of a bond or a loan. Models of default risk of a single counterparty are studied, and then extended to the case of portfolios of bond or loans. The major complication with portfolios is the correlation of defaults. A widely used tool to deal with it, Copula distributions, is introduced. Regulation of credit risk in the Basel II Accord and its transition to Basel III is presented briefly. Finally, devices to mitigate credit risk, in particular credit derivatives are discussed. This part of the course is designed to strike a balance between a practical approach to the most popular credit risk models and their theoretical underpinnings.

Prerequisites

Financial Economics I (Asset Pricing)

Teaching Methods

- Lectures
- Homework assignments

Grade Determination

Each of the two sections accounts for 50% of the final grade. In both sections, the grade will be fully determined by the final exam.

Required readings

Lecture slides will be provided to students at icef-info.hse.ru. They contain a complete description of the course unless stated in the lectures. In addition, the following books are required:

- Christoffersen, P.F. (2003), Elements of Financial Risk Management, Academic Press, London (short: **C**)
- Hull, John C. (2015), Risk Management and Financial Institutions (4th edition), Pearson (short: **H**).

Supplementary readings

- Saunders, Anthony and Linda Allen (2nd edition 2002): Credit Risk Measurement, Wiley (short: **SA**), or 1st edition, 1999.
- Duffie, Darrell and Kenneth J. Singleton (2003): Credit Risk, Princeton UP (short: **DS**).
- Jorion, Philippe (2011): Financial Risk Manager Handbook, Wiley.

Course Outline

References to the required readings and corresponding chapter numbers are given in [].

1. The case for Risk Management [C 1, H 1, 2, 3]
 - Why hedge?
 - Some well-known risk-management failures
 - Stylized facts about asset returns
 - Hedging assets vs hedging portfolios
2. Risk measures [C 2, H 8]
 - Value-at-Risk (VaR) and Expected Shortfall (ES)

- Coherent risk measures
 - Some analytical expressions for VaR
 - The choice of parameters
 - Historical simulation for VaR and ES
3. Volatility modeling [C 4, 5, H 5]
- Moving average and weighted moving average
 - GARCH type models
 - Implied and realized volatility
4. The model-building approach [H 10]
- The linear model
 - Cash-flow mapping
 - Second-order extensions
5. Backtesting and stress testing [C 13, H 8]
- Violation ratios, Bernoulli tests
 - Testing independence of violations and window length
 - Stress-tests
6. Value-at-Risk and regulation [H 7]
- The Basel framework
 - VaR and procyclical leverage
 - Beyond VaR
7. The elements of Credit Risk [H 19.2, 19.3, DS 1, 2.4-2.5]
- Introduction, outline and literature
 - Definition, market vs. credit Risk
 - The elements of credit risk: Default, exposure, and loss given default (or recovery)
 - Expected, unexpected loss, and VaR
8. Credit exposure [H 20]
- Pre-settlement and settlement risk
 - Measures of exposure, exposure profiles
 - Wrong-way and right-way risk
9. Models of Single Counterparty Default Risk [H 19.1, 19.6-19.8, 21.1, 21.4, SA 2, 4-9 or SA, 1st ed. 2-8, DS 3-4]

- Scoring, logit and probit
 - Ratings
 - Rating-based models: CreditMetrics, CreditPortfolioView
 - Default rates implied from bond prices
 - Default rates implied from equity prices: Asset-based (structural) models (Merton and KMV models)
 - Intensity-based (reduced-form) models
10. Modelling Default and Recovery: Portfolio Models [H 21.2-21.4, 11.4, 11.5, SA 11 or SA 1st ed. 10, DS 10]
- Actuarial Approach: Mortality tables, CreditRisk+
 - Asset return models, correlated Defaults and CreditMetrics for portfolios
 - Introduction to Copula distributions
 - Vasicek model of correlated defaults
11. Economic capital and regulatory capital [H 15, 16, 26, SA 3 (2nd ed. only), 13 or SA 1st ed. 12, DS 2.5]
- Economic capital
 - Short history and current provisions of the Basel Accord
 - Calculation of capital charges and main regulations of Basel II and Basel III
12. Credit risk management [H 19.4-19.5, 6.2, SA 15 or SA, 1st ed. 14, DS 8]
- Exposure mitigation: Netting, collateral, limits, guarantees
 - Credit derivatives
 - Credit default swap (CDS): standard, binary, basket CDS, mechanics and pricing of the contracts
 - Total return swaps
 - Collateralized debt obligations