Credit Risk

Module 1, 2017-2018

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TAs: TBA

Course description

This 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.

The course is designed to strike a balance between a practical approach to the most popular credit risk models and their theoretical underpinnings. It will include at least one case study where you need to put together various parts of knowledge that you obtained. Homework exercises will help you to acquire the material.

The course also gives you a good preparation 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.

Course requirements, grading, and attendance policies

Requisites:

Attendance: Not mandatory, but highly recommended. Even though I provide you with lecture slides, there are many examples and in depth-explanations that I will only give in class.

Grading: You final grade will be composed of the following parts:

- Homework assignments (10%)
- Case study (10%)
- Final exam (80%)

Course contents

(The indicated chapter numbers refer to the readings given in the next section.)

1. 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
2. Credit exposure [H 20]
   - Pre-settlement and settlement risk
   - Measures of exposure, exposure profiles
   - Wrong-way and right-way risk
3. Models of Single Counterparty Default Risk [H 19.1, 19.6-19.8, 21.1, 21.4, SA 2, 4-9, 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

4. Modelling Default and Recovery: Portfolio Models [H 21.2-21.4, 11.4, 11.5, SA 11, 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
5. Economic capital and regulatory capital [H 15, 16, 26, SA 3, 13, 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
6. Credit risk management [H 19.4-19.5, 6.2, SA 15, 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
   - Harvard case no. 9-203-033 (First American Bank: Credit Default Swaps by Chacko and Strick, 2002)

Course materials

Required textbooks and materials

- Lecture slides will be provided to students in electronic form.
- Hull, John C. (2015), Risk Management and Financial Institutions (4th edition), Pearson (short: H).

Additional materials

- Saunders, Anthony and Linda Allen (2nd edition 2002): Credit Risk Measurement, Wiley (short: SA).
- Duffe, Darrell and Kenneth J. Singleton (2003): Credit Risk, Princeton UP (short: DS).
- Jorion, Philippe (2011): Financial Risk Manager Handbook, Wiley.
- Witzany, Jiri (2017), Credit Risk Management – Pricing, Measurement, and Modeling, Springer.

Academic integrity policy

Cheating, plagiarism, and any other violations of academic ethics at NES are not tolerated.