

SF2942 - PORTFOLIO THEORY AND RISK MANAGEMENT

SUMMARY

The parts of [1] that have been covered:

- Chapter 1: Entire chapter.
- Chapter 2: Entire chapter.
- Chapter 3: Sections 3.1, 3.3, 3.6.
- Chapter 4: Sections 4.1 (briefly), 4.2 (excluding 4.2.4), 4.3, 4.5 (briefly).
- Chapter 5: Sections 5.1, 5.2 (in a problem session), 5.3 (up to Section 5.3.1).
- Chapter 6: Introductory discussion. Properties of risk measures. Value-at-Risk and Expected Shortfall.

Note that topics that have not been (explicitly) covered but that are close enough to what has been discussed to be considered special cases, or slight tweaks, of certain examples may appear on the final exam. However, this does not mean that you have to look at topics / sections of [1] that have not been covered in class.

LECTURES

The following is an overview of the main topics discussed during class. Not everything discussed in class is explicitly mentioned in this summary, e.g., not every example from Ch. 1 is mentioned, but rather included under the label “Section 1.2”.

- Week 1
 - Tue 8/30 (I): Introductory meeting. Ch. 1: Basic concepts such as interest rates, deterministic cash flows; up to and including statement of Thm 1.1.
 - Tue 8/30 (II): Ch. 1: Thm 1.1, remaining parts of Section 1.1.2 (complete markets, forward prices, bootstrapping zero rates).
 - Thu 9/1: Parts of Section 1.2, up to Black-Scholes formula for call options. European derivatives, arbitrage opportunities in markets with derivatives, Thm 1.2, log-normal model.
 - Fri 9/2: Section 1.2.2 (implied forward probabilities). Ex. 1.9.
- Week 2
 - Tue 9/6: Problem session. Problems 1.1, 1.2 and 1.3.
 - Thu 9/8 (I): Ex. 1.4, then Ch 2. Up to and including Prop. 2.1.
 - Thu 9/8 (II): Remaining parts of Ch. 2.. Intro to Ch. 3: Statement of the minimization problem of interest and some basic facts about conditional expectations.
 - Fri 9/9: Section 3.1, excluding proofs (Section 3.1.2).
- Week 3

- Tue 9/13: Section 3.3, up to and including Ex. 3.6.
- Thu 9/15 (I): Problem session. Problems 1.5, 3.1 and parts of 3.2.
- Thu 9/15 (II): Section 3.3 cont'd. Ex. 3.7, 3.8. Calculations regarding conditional distributions involving binomial and Poisson distributions.
- Fri 9/16: Section 3.6. General setup for immunization, duration, effect on the sensitivity to changes in the zero-rate curve from entering a interest-rate swap (fixed leg).
- Week 4
 - Tue 9/20: Section 3.6 cont'd. Principal component analysis, first half of Ex. 3.16. [R markdown document available]
 - Thu 9/22: Problem session. Problem 3.4 and some aspects of the content in Ch. 1 (pricing measure and discount factors) in the context of Problem 1.5.
 - Fri 9/23: Section 3.6 cont'd. Immunization using PCA. Remaining part of Ex. 3.16. Ch. 4: General setup, three optimization problems (“trade-off”, “max-of-expectation” and ”min-variance”) when no risk-free asset.
- Week 5
 - Tue 9/27: Section 4.2. Trade-off problem (with risk-free asset) and its optimal solution. Sharpe ratio. Examples of optimal portfolios in some specific settings (Ex. 4.6, 4.7) and efficient frontier (Ex. 4.8).
 - Thu 9/29: Problem session. Problems 4.1 (parts a and b) and 4.2.
 - Fri 9/30: Section 4.2.3.
- Week 6
 - Tue 10/4: Section 4.3.
 - Thu 10/6: Problem session.
 - Fri 10/7: Section 4.5 (briefly!). Most of Section 5.1. Up to and including Ex. 5.4, but excluding (for now) Ex. 5.2 and 5.3.
- Week 7
 - Tue 10/11: Detailed discussion of Ex. 5.3. Parts of Section 5.3. **Note:** Section 5.2. is included in the course and will be presented (to some extent) on 10/13.
 - Thu 10/13: Problem session.
 - Fri 10/14: Introductory part of Ch. 6. Value-at-Risk, Expected Shortfall.
- Week 8: **No classes.**
 - Office hours: Tues 10-11:30 and by appointment.
- Week 9
 - Office hours: Mon 9:00-11:00.
 - Thu 10/27: **Final exam, 08:00-13:00.**

REFERENCES

- [1] HULT, H., LINDKSOG, F., HAMMARLING, O. AND REHN, C. J. (2012). *Risk and Portfolio Analysis: Principles and Methods*. Springer-Verlag, New York.