SF2974 Portfolio Theory and Risk Management 6.0 credits

Portföljteori och riskvärdering

This is a translation of the Swedish, legally binding, course syllabus.

If the course is discontinued, students may request to be examined during the following two academic years

Establishment

Course syllabus for SF2974 valid from Autumn 2007

Grading scale

A, B, C, D, E, FX, F

Education cycle

Second cycle

Main field of study

Industrial Management,Mathematics

Specific prerequisites

Optimization corresponding to SF1811/5B1712 and Mathematical statistics corresponding to SF1901 (5B1501).

Language of instruction

The language of instruction is specified in the course offering information in the course catalogue.

Intended learning outcomes

After completed course the student should

- be able to account for basic principles for investment analysis such as arbitrage, linear pricing, discounting, hedging, and balancing of risk and expected return,
- use different concepts of compounded interest
- understand, calculate and in practice use the notions price, return, and duration for fixed-income securities,
- calculate immunized portfolios of fixed-income securities,
- account for different concepts of risk (market risk, credit risk etc),
- know something about credit rating,
- account to the term structure of interest rates, and use the spot rate curve to calculate price, duration and immunizations,
- account for different hypothesis for the term structure,
- account for and formulate the Markovitz model,
- understand how and that one can solve large instances of different variants of the Markovitz model,
- formulate and prove the one- and two-fund theorems,
- account for the transition from the Markovitz model to the CAPM model with an equilibrium argument,
- formulate and prove the central CAPM result,
- account for how CAPM can be used for pricing of non-market priced instruments and for evaluation of funds,
- understand why it is difficult to estimate the parameters for the CAPM and Markovitz models,
- set up a factor model,
- formulate and prove a simple form of APT,
- use APT for pricing in practice,
- account for the need of utility functions,
- know how the existence of utility function is proven,
- know how to do investment evaluations with the help of utility functions and to formulate relevant optimization problems with these,
- account for the principles for financial derivatives, such as forwards, futures, options and swaps,
- calculate the price and duration of a future contract,
- calculate a minimum variance hedge by means of a future,
- know the concepts of optimal growth and log-optimal pricing,

- know how to perform a computer simulation of the development of a portfolio of assets,
- account for the need of and the principles of coherent risk measures,
- account for the concept Value-at-Risk and its weaknesses.

Course contents

Deterministic cash flows: Basic theory of interest, bonds, interests' term structure

Random cash flows: Mean-variance portfolio theory, the Markovitz model, One- and Two-fund theorems, CAPM, factor-models, APT, utility theory, linear pricing.

Overview of financial derivaties, such as futures, swaps and options.

General cash flows: Optimal growth.

Risk evaluation: Simulation of portfolios, Coherent risk measures, Value at Risk.

Course literature

Literature D.G. Luenberger, Investment Science (Oxford University

Press), and complementary material from the department.

Examination

- TEN1 - Examination, 6.0 credits, grading scale: A, B, C, D, E, FX, F

Based on recommendation from KTH's coordinator for disabilities, the examiner will decide how to adapt an examination for students with documented disability.

The examiner may apply another examination format when re-examining individual students.

Other requirements for final grade

One written exam (6 university credits). Voluntary homework sets.

Ethical approach

- All members of a group are responsible for the group's work.
- In any assessment, every student shall honestly disclose any help received and sources used.
- In an oral assessment, every student shall be able to present and answer questions about the entire assignment and solution.