Financial Economics I (Asset Pricing)

Lecturer: Carsten Sprenger
Class teacher: Carsten Sprenger, Milan Martinovič

Course description

This course gives an introduction to the economics and mathematics of financial markets. Being the first course in finance within the ICEF Master Programme in Financial Economics, it introduces the students to the relevant modeling techniques for asset pricing. This will be useful for later courses in Corporate Finance, Fixed Income, Derivatives, Portfolio and Risk Management.

Three pricing principles are considered — non-arbitrage, individual optimality, and equilibrium. The first principle is especially useful for pricing derivative instruments (e.g. an option contract) whenever we know (or assume) what the price of the underlying asset (e.g. a stock) is and how it evolves. In order to price the whole universe of financial assets, however, we need to investigate how investors make their investment decisions (individual optimality) and how the coordination of these investors on the financial markets leads to the formation of prices (equilibrium analysis). Many of the models are treated at three different levels — as one-period, multi-period and continuous time models. This is necessary in order to understand the whole variety of models in financial economics. Furthermore, in many cases continuous time models are more tractable and have more elegant solutions than dynamic models in discrete time. Although the focus of the course is on theory, we shall comment on some empirical evidence and on how these theories are used in financial practice.

It is very useful to absorb the ideas and mathematics of financial models by doing small applications on the computer. MATLAB is a convenient programming language for this purpose. We will dedicate one practice session to give you an introduction to MATLAB, and you are required to solve a part of the homework exercises on the computer.

Prerequisites

Microeconomics I (concepts of utility functions and equilibrium), a good understanding of calculus, algebra, and basic probability theory. Beyond that, the course should be self-contained.

Teaching methods

The following methods and forms of study are used in the course:

- Lectures. Your active participation is required — presenting papers that were given for reading, answering questions, and asking questions.

- Practice sessions. They serve mainly to solve the homework assignments (see next point).
- Written homework assignments, containing paper-and-pencil exercises and applications in Matlab. Doing homework exercises is crucial for understanding and practicing the material.
- Self-study: read the corresponding sections in the lecture notes and in the chapters in the textbooks as indicated in the course outline below. In addition, journal papers may be given.

Grade determination

- Homework. Randomly chosen problem sets are marked and account for 15% of the final grade if you turn in ALL assignments minus one at the due date.
- Participation in class including the presentation of papers accounts for 10%.
- The midterm exam accounts for 20%.
- The rest of the grade (55%) comes from the final exam. Exam questions in the midterm and the final exam will be similar in style to the homework assignments.

Main reading

- Lecture notes at `mief.hse.ru`
- Cvitanić, Jakša and Fernando Zapatero, Introduction to the Economics and Mathematics of Financial Markets, MIT Press 2004 [short CZ].
- Pennacchi, George, The Theory of Asset Pricing, Pearson Addison Wesley, 2008 [short P].

Required readings of journal papers will be announced in class.

Additional reading

- LeRoy, Stephen and Jan Werner, Principles of Financial Economics, Cambridge University Press, 2001.
- Lengwiler, Yvan, Microfoundations of Financial Economics, Princeton University Press, 2004.

- Neftci, Salih N., An Introduction to the Mathematics of Financial Derivatives, 2nd edition, San Diego Academic Press, 2000 [short N]
- Munk, Claus, Financial Asset Pricing Theory, mimeo, [short M]
- `http://www.sam.sdu.dk/~cmu/cmu_pub3.htm`

Other classical texts such as Huang and Litzenberger (1988) Ingersoll (1987), and Cochrane (2001) can be consulted as well.

Course outline

This outline lists the topics to be covered in the course with the corresponding chapters in CZ, M, and N, and gives an approximate time schedule.

1. Asset Pricing Models and the No-Arbitrage Principle

1. Introduction: The terminology of financial markets; Bond prices and interest rates under certainty; An example of a simple asset pricing model. CZ 1,2, M 1, N 1,2.
2. Building Blocks of Asset Pricing Models: Review of probability theory and stochastic processes. Stochastic calculus. One-period, multi-period and continuous time models. No-arbitrage and market completeness. Stochastic discount factors and Arrow-Debreu securities. Risk-neutral probabilities. CZ 16, 3.1-3.3, 3.6, M 2-4, N 2, 9-12
3. The Basics of Option pricing: Binomial model and Black & Scholes formula. CZ 6-7, M 11-12, N 13

2. Individual optimality

1. Individual preferences, utility theory, and risk-aversion. CZ 4.1, M 5
2. Optimal consumption and portfolio choice. Dynamic programming. CZ 4.2-4.3, M 6
3. A Special Case — Mean-variance analysis. CZ 5.1, M 6.2.5.

3. Equilibrium models

1. Equilibrium fundamentals: Concept of equilibrium, representative agent, existence and Pareto-optimality. CZ 12, M 7
2. Consumption CAPM and CAPM. Asset Pricing Puzzles. Alternative Utility Specifications. CZ 13, M 8, 9.2
3. Multifactor models. CZ 14, M 9.

4. The term structure of interest rates. CZ 15.1, M 10.

5. Review; Presentation of course papers.

Distribution of hours

#	Topic	Total hours	Contact hours		Self study
			Lectures	Seminars	
Asset Pricing Models and the No-Arbitrage Principle					
1.	Introduction	10	3	1	6
2.	Building Blocks of Asset Pricing Models	28	9	3	16
3.	The Basics of Option pricing	20	6	2	12
Individual optimality					
1.	Individual preferences, utility theory, and risk-aversion	10	3	1	6
2.	Optimal consumption and portfolio choice	20	6	2	12
3.	A Special Case — Mean-variance analysis	10	3	1	6
Individual optimality					
1.	Equilibrium fundamentals	10	3	1	6
2.	Consumption CAPM and CAPM	20	6	2	12
3.	Multifactor models	10	3	1	6
4.	The term structure of interest rates	10	3	1	6
5.	Review	12	3	1	8
	Total:	160	48	16	96