

Finance 2

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Course Objectives

This course provides some of the tools necessary to approach the asset pricing literature, both theoretical and empirical, from a modern perspective. To different degrees, these tools are all related to the basic notion of no-arbitrage. We first defined the basic notation and definitions of a discrete-time stochastic security market, in the general case in which the support of prices and dividends is not restricted to be finite. We then formalize the intuitive notion of no-arbitrage from different perspectives, and we show how these formalizations lead to the characterization of no-arbitrage in terms of linear pricing rules, of stochastic discount factors, and of equivalent martingale measures. We then go on to relate the characterization of no arbitrage to the work horses of finance theory, i.e. the mean variance frontier and linear factor models. Finally, we revisit the standard dynamic optimal consumption-portfolio problem introduced already in the first module and show how it can be solved using the equivalent martingale measures technology. This course should also allow the students both to make a natural transition to the study of asset pricing in continuous-time, and as a foundation for advanced courses in empirical asset pricing and corporate finance.

Suggested Textbooks

- *Principles of Financial Economics*, by Stephen F. LeRoy and Jan Werner
Cambridge University Press, 2001
- *Stochastic Finance*, by Hans Follmer –and Alexander Schied
deGruyter, 2002

- *Asset Pricing*, by John H. Cochrane
Princeton University Press, 2005
- *Dynamic Asset Pricing Theory*, 3rd Edition, by Darrel Duffie
Princeton University Press, 2001

TENTATIVE OUTLINE OF THE COURSE

Discrete-time multi-period securities markets: notation and basic definitions

Information structures, the price-dividend process, dynamic trading strategies, the marketed subspace, the value process, the gain process. The notion of viable security markets and its relations to no-free-lunches and no-arbitrage.

References:

- LeRoy and Werner, Chapters 21, 23.
- Duffie, Chapter 2.
- Follmer and Schied, Chapters 1, 5.

Arbitrage, linear pricing functional, stochastic discount factors and equivalent martingale measures

Viability, no-arbitrage and existence of linear pricing functionals. Linear pricing functionals, state-price deflators and stochastic discount factors. Equivalent martingale measures: definition and existence.

References:

- LeRoy and Werner, Chapters 2, 3, 6, 22, 23, 25, 26.
- Cochrane, Chapters 3, 4.
- Follmer and Schied, Chapters 1, 5.

Stochastic discount factors, mean-variance theory and linear factor pricing

No-arbitrage, stochastic discount factors and the mean-variance frontier. Decomposing the mean-variance frontier in terms of stochastic discount factors. Linear factor models and stochastic discount factors. Conditional versus unconditional models.

References:

- LeRoy and Werner, Chapters 17,18,19,20.
- Cochrane, Chapters 5, 6, 8, 9.

(If time allows) Optimal dynamic consumption-investment decisions: the convex-duality approach

The general dynamic consumption-investment problem. Optimal consumption-investment decisions for an expected utility investor in complete markets: the Cox-Huang martingale approach. The case of incomplete markets: the convex-duality approach.

References:

- Follmer and Schied, Chapter 3
- Duffie, Chapters 2, 3.

Assessment Method

There will be six weekly homeworks. The grade for the course will be based on a final written exam.