

Finance 395-3
ASSET PRICING THEORY
SPRING 2010

Contact Information

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Course Overview

This course is an introduction to the theory of financial economics. We will start this class by examining the implications of no arbitrage, decisions under uncertainty, and various equilibrium models in a world with only one decision period. Then we will extend these simple concepts to multiple time periods, non-standard utility functions, endogenous production and asymmetric information.

Textbook

There is no required textbook for this class. If you would like to do any additional reading, here is a list of useful books:

- George Pennacchi, 2008, Theory of asset pricing, *Pearson*
- Costis Skiadas, 2009, Asset pricing theory, *Princeton University Press*
- Cochrane, John H., 2005, Asset pricing, *Princeton University Press*

- LeRoy, Stephen F., and Jan Werner, 2001, Principles of financial economics, *Cambridge University Press*
- Altug, Sumru, and Pamela Labadie, 2008, Asset pricing for dynamic economies, *Cambridge University Press*
- Duffie, Darrel, 2001, Dynamic asset pricing theory, *Princeton University Press*

Evaluation

There will be weekly homework assignments. The final grade consists of homework assignments (40%) and a final exam (60%).

Outline of Topics

1. No arbitrage pricing, single period, finitely many states of the world

- complete market \leftrightarrow incomplete market
- no arbitrage \Leftrightarrow there exist strictly positive Arrow prices
 - complete market: Arrow securities are traded
 - incomplete market: not all arrow securities are traded, state prices exist that are consistent with traded assets
(separating hyperplane theorem)
- strictly positive Arrow prices \Leftrightarrow risk neutral probabilities \Leftrightarrow pricing kernel
- no arbitrage \Rightarrow there exists a traded pricing kernel \Rightarrow Expected return - beta equation
- expectations kernel
- pricing kernel + expectations kernel = mean-variance efficient frontier
- two mean-variance efficient portfolios \rightarrow expected return - beta equation
- investors choose mean-variance efficient portfolios \Rightarrow CAPM
- APT (good approximation if maximum Sharpe ratio is bounded)

2. Expected utility

- von-Neumann Morgenstern
- risk aversions \Leftrightarrow concave utility function
- absolute & relative risk aversion
 - investment in risky asset as a function of wealth
- linear risk-tolerance utility functions: quadratic, CARA, power, log

3. Equilibrium

- no arbitrage \Leftrightarrow individual optimization problem has a solution
- complete market \Rightarrow equilibrium Pareto-optimal
- complete market \Rightarrow there exists a representative agent (RA)
- individuals have linear risk tolerance \rightarrow explicit construction of RA
- MRS of RA = pricing kernel \rightarrow CCAPM
- CCAPM \rightarrow CAPM for: quadratic utility, normal distribution
- RA \rightarrow equity premium puzzle

4. Multi-period model, discrete time, finitely many states of the world

- information: sequence of partitions \leftrightarrow filtration
- measurable random variables, adapted processes, generated filtration
- no single-period arbitrage \Leftrightarrow no multi-period arbitrage
- multi-period arrow prices = products of single-period Arrow prices
 - \rightarrow multi-period pricing kernel = product of single period pricing kernels
 - \rightarrow multi period risk-neutral probabilities = product of single-period risk neutral probabilities (martingale measure)
- multi-period optimization problem, 2 solution methods:
 - 1) take all FOCs at time 0 \Rightarrow stochastic Euler equations
 - 2) backward induction (dynamic programming):
 - * derived utility function of wealth, Bellman equation, envelope condition
 - * specific example: log utility (complete myopia)

5. Brief introduction to continuous time

6. Time Inseparable Utility

- internal habit: utility depends on consumption in excess of a habit level
- external habit: utility depends on individual consumption in excess of aggregate consumption
- recursive utility: current utility depends on future utility

7. Economies with production

- individuals can choose to consume or reinvest output (endogenous aggregate investment)

8. Asymmetric Information

- competitive rational expectations equilibrium (no price impact of trading): CARA utility, informed investors, uninformed investors, noise traders
Grossman, Sanford J. and Joseph E. Stiglitz, 1980, "On the impossibility of informationally efficient markets", *American Economic Review*, 70, 393-408
- equilibrium with price impact: risk-neutral agents, single informed investor, uninformed market maker, noise traders
Kyle, Albert S., 1985, "Continuous auctions and insider trading", *Econometrica*, 53, 1315-1336