

Asset Pricing Theory — PhD course
The Einaudi Institute for Economics and Finance

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1 Syllabus - Asset Pricing Theory

1.1 Course Description

This course introduces students to doctoral level developments of financial theory. The main purpose is to give rigorous introductions to the analytical issues specific to financial economics.

Topics covered include: one period and multi-period portfolio choice, one period and multi-period asset pricing models, discrete time versus continuous time approach, PDE approach versus probabilistic approach.

1.2 Prerequisites

The prerequisites for this course are MSc level Microeconomics and Ph.D. level Microeconomics; MSc level course in Theory of Finance is a plus.

1.3 Evaluation

Coursework includes assignments (30 percent) and a 3 hour written final exam (70 percent). Both parts of the evaluation need to be passed in order to get a grade in the course.

1.4 Textbook

The required reading for this course are journal articles.

I encourage you to do additional reading from Asset Pricing (J. H. Cochrane) or another Ph.D. textbook. It complements my series of lectures. As most Ph.D. textbooks, Cochrane provides a —high altitude— view of asset pricing. Many times it is lacking in details making it difficult to learn from. However, this book nicely links the theory to empirical work. You should read and re-read it through your Ph.D. education.

1.5 Course Outline

1. Review: Absence of Arbitrage (AoA), Primitive Securities, Contingent Claims, Martingales, Change of Numeraire, Optimal Allocations, Equilibrium, and State Price Deflators in a Simple (Normal) One Period Economy.

2. One Period Portfolio Theory

Framework and Notations

Efficient Portfolio in Absence of a Risk-free Asset

Efficient Portfolio with a Risk-free Asset

HARA Preferences and Cass-Stiglitz 2 Fund Separation

CAPM

APT and Factor Models

3. Dynamic Consumption and Portfolio Choices (The Merton Model)

Framework - Dynamic Programming

Cake Eating Problem in Discrete Time and in Continuous Time

The Solution(s) with Static and Time-Varying Opportunity Set

4. Intertemporal CAPM (Merton)

Framework

The Solution

5. The Equivalent Static Problem (Cox-Huang, Karatzas-Lehoczky-Shreve Approach)

Framework

The Solution

6. The Consumption Based CAPM in Continuous Time

Framework

The Solution

7. The Consumption Based CAPM in Continuous Time with Heterogeneous Beliefs

Framework

The Solution

1.6 Literature Overview

1. Books: Prerequisites

Copeland, Weston and Shastri, *Financial Theory and Corporate Policy*, 4e, Addison-Wesley (2005).

Danthine and Donaldson, *Intermediate Financial Theory*, 2e, Elsevier (2005).

2. Books: Asset Pricing

Cochrane, *Asset Pricing*, 2e, Princeton University Press (2005).

Duffie, *Dynamic Asset Pricing Theory*, 3e, Princeton University Press (2001).

Huang and Litzenberger, *Foundations for Financial Economics*, North-Holland (1988).

Merton, *Continuous-Time Finance*, 2e, Oxford (1992).

3. Books: Stochastic Calculus

Øksendal, *Stochastic Differential Equations*, 5e, Springer (2000).

4. Main Articles

Basak, S., 2000, A Model of Dynamic Equilibrium Asset Pricing with Heterogeneous Beliefs and Extraneous Risk, *Journal of Economic Dynamics and Control* 24, 63-95.

Breeden, D., 1979, An Intertemporal Asset Pricing Model with Stochastic Consumption and Investment Opportunities, *Journal of Financial Economics* 7, 265-96.

Cox, J. C. and C. Huang, 1989, Optimal Consumption and Portfolio Policies when Asset Prices Follow a Diffusion Process, *Journal of Econometric Theory* 49, 33-83.

Cox, J. C. and C. Huang, 1991, A Variational Problem Arising in Financial Economics, *Journal of Mathematical Economics* 20, 465-487.

Detemple, J. B. and F. Zapatero, 1991, Asset Pricing in an Exchange Economy with Habit Formation, *Econometrica* 59, 1633-1657.

Detemple, J. B., and S. Murthy, 1994, Intertemporal Asset Pricing with Heterogeneous Beliefs, *Journal of Economic Theory* 62, 294-320.

Duffie, J. D. and W. R. Zame, 1989, The Consumption-Based Capital Asset Pricing Model, *Econometrica* 57, 1279-1298.

Dybvig, P. H. and Chi-fu Huang, 1988. Nonnegative Wealth, Absence of Arbitrage, and Feasible Consumption Plans, *Review of Financial Studies* 4, 377-401.

Harrison, M. and D. Kreps, 1979, Martingales and Arbitrage in Multiperiod Security Markets, *Journal of Economic Theory* 20, 381-408.

Karatzas, I., Lehoczky, J. P. and S. E. Shreve, 1987, Optimal Consumption and Portfolio Decisions for a 'Small Investor' on a Finite Horizon, *SIAM Journal of Control and Optimization* 25, 1557-1586.

Lintner, J., 1965, The Valuation of Risky Assets and the Selection of Risky Investments in Stock Portfolios and Capital Budgets, *Review of Economics and Statistics* 47, 13-37.

Markowitz, H., 1952, Portfolio Selection, *Journal of Finance* 7, 77-91.

Merton, R. C., 1969, Lifetime Portfolio Selection under Uncertainty: The Continuous-Time Case, *Review of Economics and Statistics* 51, 247-257.

Merton, R. C., 1971, Optimal Consumption and Portfolio Rules in a Continuous-Time Model, *Journal of Econometric Theory* 3, 373-413.

Merton, R. C., 1972, An Analytic Derivation of the Efficient Portfolio Frontier, *Journal of Financial and Quantitative Analysis* 7, 1851-1872.

Merton, R. C., 1973, An Intertemporal Capital Asset Pricing Model, *Econometrica* 41, 867-887.

Mossin, J., 1966, Equilibrium in a Capital Asset Market, *Econometrica* 34, 768-783.

Ross, S., 1976, The Arbitrage Theory of Capital Asset Pricing, *Journal of Economic Theory* 13, 341-360.

Sharpe, W. F., 1964, Capital Asset Prices: A Theory of Market Equilibrium under Conditions of Risk, *Journal of Finance* 19, 425-442.

5. Other Articles

Brennan, M. J., Schwartz, E. S., and R. Lagnado, 1997, Strategic Asset Allocation, *Journal of Economic Dynamics & Control* 21, 1377-1403.

Brennan, M. J., 1998, The Role of Learning in Dynamic Portfolio Decisions, *European Finance Review* 1, 295-306.

Cox, J.C., Ingersoll, J.E. and S.A. Ross, 1985a, An Intertemporal Asset Pricing Model with Rational Expectations, *Econometrica* 53, 363-384.

Cox, J.C., Ingersoll, J.E. and S.A. Ross, 1985b, A Theory of the Term Structure of Interest Rates, *Econometrica* 53, 389-403.

Detemple, J. B., R. Garcia, and M. Rindisbacher, 2003, A Monte Carlo Method for Optimal Portfolios, *Journal of Finance*, 58, 401-446.

Long, J. B., 1990, The Numeraire Portfolio, *Journal of Financial Economics* 26, 29-69.