University of Pennsylvania
The Wharton School

FNCE 911:
Foundations for Financial Economics

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Fall 2007
Classes: Tu/Th 1:30-3:00
Office Hours: Mon 3:00-4:30

Course Description

The objective of this course is to undertake a rigorous study of the theoretical foundations of modern financial economics. The course will cover the central themes of modern finance including individual investment decisions under uncertainty, stochastic dominance, mean-variance theory, capital market equilibrium and asset valuation, arbitrage pricing theory, option pricing and the potential application of these themes. Upon completion of this course, students should acquire a clear understanding of the major theoretical results concerning individuals' consumption and portfolio decisions under uncertainty and their implications for the valuations of securities.

Prerequisites

The prerequisites for this course are graduate level microeconomics (Economics 681 or Economics 701), matrix algebra, and calculus. The microeconomics courses may be taken concurrently.

Course Material

The required textbook for this course is:

- HL: C.F. Huang and R. Litzenberger, 1988, *Foundations for Financial Economics*, Prentice Hall.

This book is no longer in print. A photocopy of the relevant chapters will be available from Wharton Reprographics

Listed papers will be available as a course pack from Wharton Reprographics

Other excellent texts that cover related material are:

- J. Campbell, A. Lo, A. MacKinlay, 1996, *The Econometrics of Financial Markets*, Princeton University Press. (See especially chapters 5-11)
- J. Cochrane, 2005, *Asset Pricing* Revised Edition, Princeton University Press. (See especially chapters 1-9, 17-21)
- D. Duffie, 2001, *Dynamic Asset Pricing Theory* 3rd edition, Princeton University Press. (See especially chapters 1-4)
- J. Ingersoll, 1987, *Theory of Financial Decision Making*, Rowman and Littlefield.

For background reading, the following textbooks may be useful:

- A. Mas-Colell, M. Whinston, and J. Green, 1995, *Microeconomics Theory*, Oxford University Press, New York.
- W. Rudin, 1976, *Principles of Mathematical Analysis*, McGraw Hill, New York.

Course Work and Grading

Homework assignments will be handed out on Thursdays starting the second week of classes and will be due in class the following Thursday. While you may work on the homework in groups, you must hand in your own answers. Homework assignments will be graded on a three point scale.

There will be a closed-book final during the final exam period. Students are expected to come to class and to actively participate in class discussion. Final grades will be determined by 20% homework and 80% final exam. Class participation will count for students on the margin between grades.

Course Outline and Readings

Note: Dates are approximate

1. **Decision Making under Uncertainty** (Sept. 6, 11, 18)

   - Outline
     - Expected utility representations
     - Risk aversion
     - Insurance premium; certainty equivalent wealth
     - Portfolio choice
     - Important utility functions
     - Global risk aversion
   - Readings:
     (a) HL Chapter 1
     (b) Cass, D., and J. Stiglitz, 1970, The structure of investor preferences and asset returns, and separability in portfolio allocation: a contribution to the pure theory of mutual funds, *Journal of Economic Theory* 2, 122-160.
     (c) Pratt, J., 1964, Risk aversion in the small and in the large, *Econometrica* 32, 122-136.
     (d) Ross, S., 1981, Some stronger measures of risk aversion in the small and large with applications, *Econometrica* 49, 621-638.

2. **Stochastic Dominance** (Sept. 20)

   - Outline
     - Motivation
     - First order stochastic dominance
     - Second order stochastic dominance
     - A definition of risk; mean-preserving spreads
   - Readings
     (a) HL Chapters 2.1–2.10
     (b) Rothschild, M., and J. Stiglitz, 1970, Increasing risk I: a definition, *Journal of Economic Theory* 2, 225-243.

3. **Mean-Variance Portfolio Analysis** (Sept. 25, 27, Oct. 2)

   - Outline
     - Notation and definitions
     - Characterization of minimum variance portfolios
     - Properties of minimum variance portfolios
     - The case with a riskless asset
   - Readings
     (a) HL Chapter 3
     (b) Roll, R., 1977, A critique of the asset pricing theory's tests, *Journal of Financial Economics* 4, 129-176. (Pay special attention to the Appendix)

4. **Portfolio Separation and the Capital Asset Pricing Model (CAPM)** (Oct. 4, 9)

   - Outline
     - Statement of the CAPM
     - First derivation of the CAPM
     - One and two-fund separation
     - Second derivation of the CAPM
   - Readings
     (a) HL Chapters 4.1–4.17
     (b) Black, F., 1972, Capital market equilibrium with restricted borrowing, *Journal of Business* 45, 444-454.
     (c) Brennan, M., 1971, Capital market equilibrium with diverged borrowing and lending rates, *Journal of Financial and Quantitative Analysis* 1971, 1197-1205.
     (d) Ross, S., 1978, Mutual fund separation in financial theory: the separation distributions, *Journal of Economic Theory* 17, 254-286.
     (e) Sharpe, W., 1964, Capital asset prices: a theory of capital market equilibrium under conditions of risk, *The Journal of Finance* 19, 425-442.

5. **Arbitrage Pricing Theory** (Oct. 11)

   - Outline
     - The linear factor model
     - The case of no residual risk
     - The case with residual risk
   - Readings
     (a) HL Chapters 4.18–4.22
     (b) Huberman, G., 1983, A simplified approach to arbitrage pricing theory, *Journal of Economic Theory* 28, 1983-1991.
     (c) Ross, S., 1976, Arbitrage Theory of Capital Asset Pricing, *Journal of Economic Theory* 13, 341-360.

6. **State-Contingent Claims** (Oct. 18, 23, 25)

   - Outline
     - Pareto-optimal allocations
     - Complete markets economy and competitive equilibrium
     - Security markets economy
     - Using options to complete markets
     - Representative agent
     - Aggregation
   - Readings
     (a) HL Chapter 5
     (b) Arrow, K., 1964, The role of securities in the optimal allocation of risk-bearing, *Review of Economic Studies* 31, 91-96.
     (c) Hansen, L., and S. Richard, 1987, The role of conditioning information in deducing testable restrictions implied by asset pricing models, *Econometrica* 55, 587-614.
     (d) Rubinstein, M., 1974, An aggregation theorem for securities markets, *Journal of Financial Economics* 1, 225-244.

7. **State Prices and Arbitrage** (Oct. 30, Nov. 1)

   - Outline
     - Definitions
     - Fundamental theorem of asset pricing
     - Complete markets
     - Application to options
   - Readings
     (a) HL Chapters 6.1–6.9
     (b) Dybvig, P., S. Ross, 2003, Arbitrage, state prices, and portfolio theory, in *Handbook of the Economics of Finance*, G. Constantinides, M. Harris, and R. Stulz (eds.), North-Holland, Amsterdam, The Netherlands.

8. **Multi-Period Security Markets** (Nov. 6, 8)

   - Outline
     - Description of the economy
     - Pareto optimal allocations
     - Complete markets competitive equilibrium
     - Dynamic completeness
     - Security market equilibrium
   - Readings
     (a) HL Chapters 7.1–7.8, 7.11-7.15
     (b) Kreps, D., 1982, Multiperiod securities and the efficient allocation of risk: A comment on the Black-Scholes option pricing model, in *The Economics of Uncertainty and Information*, J. McCall, University of Chicago Press, Chicago, Illinois.

9. **Characterizing Optimal Consumption and Investment Policies: Dynamic Programming** (Nov. 13, 20, 27)

- Outline
  - Dynamic programming
  - Characterization of optimal consumption and investment policies
  - Representative agent revisited
  - Consumption CAPM
  - Extensions to non-expected utility
- Readings
  (a) HL Chapters 7.9, 7.10, 7.16, 7.19, 7.20, 7.22
  (b) Campbell, J., 2003, Consumption-based asset pricing, in *Handbook of the Economics of Finance*, G. Constantinides, M. Harris, and R. Stulz (eds.), North-Holland, Amsterdam, The Netherlands.
  (c) Constantinides, G., 1987, Theory of valuation: overview and recent developments, in *Frontiers of Financial Theory*, G. Constantinides and S. Bhattacharya (eds.), Rowman and Littlefield, Totowa, New Jersey.
  (d) Epstein, L., S. Zin, 1991, Substitution, risk aversion, and the temporal behavior of consumption and asset returns: An empirical analysis, *Journal of Political Economy* 99, 263-286.
  (e) Grossman, S. and R. Shiller, 1982, Consumption correlatedness and risk measurement in economies with non-traded assets and heterogeneous information, *Journal of Financial Economics* 10, 195-210.
  (f) Levhari, D., Srinivasan, T. N., 1969, Optimal savings under uncertainty, *The Review of Economic Studies* 36, 153-163.
  (g) Lucas, R., 1978, Asset prices in an exchange economy, *Econometrica* 46, 1426-1446.
  (h) Mehra, R., and E. Prescott, 1985, The equity premium puzzle, *Journal of Monetary Economics* 15, 145-161.
  (i) Samuelson, P., 1969, Lifetime portfolio selection by dynamic stochastic programming, *Review of Economics and Statistics* 51, 239-246.
  (j) Sargent, T., 1987, *Dynamic Macroeconomic Theory*, Harvard University Press, Cambridge, MA, Chapter 1.

10. **Optimal Consumption/Investment Policies and Asset Pricing: The Martingale Representation Approach** (Nov. 29, Dec. 4, 6)

- Outline
  - Notation and definitions
  - Martingale property of prices and no-arbitrage
  - Market completeness
  - Individual optimization
  - Binomial model
  - Dynamic term structure models
- Readings

(a) HL Chapter 8

(b) Backus D., S. Foresi, and C. Telmer, 1998, Discrete-time models of bond pricing, Working Paper, New York University.

(c) Cox, J., and S. Ross, 1976, The valuation of options for alternative stochastic processes, *Journal of Financial Economics* 3, 145-166.

(d) Cox, J., S. Ross, and M. Rubinstein, 1979, Option pricing: a simplified approach, *Journal of Financial Economics* 7, 229-263.

(e) Duffie, D., 2003, Intertemporal asset pricing theory, in *Handbook of the Economics of Finance*, G. Constantinides, M. Harris, and R. Stulz (eds.), North-Holland, Amsterdam, The Netherlands.

(f) Harrison, M. and D. Kreps, 1979, Martingales and arbitrage in multi-period securities markets, *Journal of Economic Theory*, 20, 381-408.

(g) Naik, V., 1995, Finite state securities market models and arbitrage, in *Handbooks in OR and MS*, Volume 9, R. Jarrow et. al (eds.), Elsevier, North-Holland.