BROWN UNIVERSITY

Econ 175 Investments II (Section 01) Fall 2009

Class meeting: Tuesday and Thursday, 10:30 am - 11:50 am in Smith-Buonanno G12

Instructor: A. Yasuhara
Office: to be announced (will move to a new office).
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Office hours: to be announced.

Teaching Assistant: to beannounced.

Textbook (required):
- John C. Hull (2009), *Options, Futures, and Other Derivatives*, 7th edition, Prentice Hall.
- Lecture notes and homework sets on our Course Web Page at:
  http://mycoruses.brown.edu

Grading Rule

The course grade will be based on your performance on homework sets (30 percent of the final grade), one mid-term exam (30 percent) and the final exam (40 percent).

Homework problems must be solved by yourself without any discussion or consultation with other students. Homework due dates shall be strictly enforced. If you can not attend the class meeting on the homework due day, submit your homework answers by e-mail attachment (to Akio_Yasuhara@brown.edu) before the end of the class meeting.

Show a 90-percent-or-above weighted average performance to receive an "A" for the course, and 80-percent-or-above performance to receive a "B".

Auditing Student – Auditors must hand in all homework answers and show a passing grade.

The dates of the exams are:

Midterm exam ..... to be announced.
Final exam ..... to be announced.

COURSE OUTLINE

Part 0. Review of Ec171 and Mathematical Tools

0.1. Math and statistics tools (by TA)
- Calculus
  – Derivative and partial derivative
  – The MacLaughlin-series and Taylor-series
  – Riemann-Stieltjes Integrals.
- (optional) Linear algebra – matrix, vector, and operations.
- Statistics
  – The uncertainty tree and the probability distribution
  – The expected (mean) value, variance, standard deviation, covariance, and correlation coefficient.
  – The normal distribution, and the log-normal distribution
  – the Central Limit theorem
- Econometrics – linear regression, estimation and hypothesis testing.

0.2. Review of Ec171.
- The danger and excitement of financial leverage

- The mean-variance portfolio-selection theory
- The CAPM
- The term structure of interest rates
- Present values and future values
  - Basic formulas
  - Bond valuation
  - Stock valuation
- Duration and the Market Risk
- Options and Futures
  - Maturity value and financial engineering
  - The spot-futures parity
  - The call-put parity
- Market efficiency

Part I. Introduction

1.1. Markets for derivatives

- The structure of financial markets
  - instruments:
    Stocks, bonds, Treasury securities,
    Mortgage passthroughs, collateralized mortgage obligations, collateralized loan/debt obligations, and other asset-backed securities
    Options, futures, swaps, credit-default swaps and other derivatives,
  - Participants:
    Issuers and investors
    Brokers, dealers, investment bankers etc and their roles
  - Financial intermediaries and their roles:
    Commercial banks and other depository institutions
    Insurance firms, pension funds
    Investment companies: mutual funds, closed-end funds, exchange-traded funds (ETFs)
    Hedge funds, private equity firms, etc
  - Regulatory authorities and regulations
    The SEC and the CFTC
    The Federal Reserve System
    The 1933 Securities Act and amendments
    The 1734 Securities Exchange Act and amendments
- What we will learn (chapter 1)
- Market for futures (part of chapter 2)
- Market for swaps (part of chapter 7)
- Market for options (part chapter chapter 8)
- Other derivatives

Part II. Futures Contracts

2.0. Various Types of Futures Contracts

- Commodity Futures
- Equity Futures
- Index Futures
- Interest-Rate Futures
- Currency Futures
- Energy Futures – electricity, crude oil, heating oil, etc.
- Weather Futures
- Real Estate Futures, and others

2.1. General characteristics of futures (chapter 3)

- Maturity-date value.

- Parity (non-arbitrage) conditions
- Arbitrage strategies
- Cost of carry and convenience yield

2.2 Hedging with futures (chapter 3)
- Short and long hedge
- Basis and basis risk – maturity mismatch and asset mismatch
- Minimum-variance strategy

2.3 Spread position (lecture notes)
- What a spread position is.
- Gains and losses.

2.4 Interest rates and futures (chapters 4, 5 and 6)
- Futures and the term structure of interest rate.
- Interest-rate futures
- Arbitrage strategies
- Calendar spread position

2.5 Duration and Hedging (lecture notes)
- Duration of any cash flows
- Duration and the PV sensitivity
- Duration and Future Value sensitivity
- Immunization

Part III. Swaps

3.1 Interest-rate swap and currency swap (chapter 7)

3.2 Analysis of interest-rate swaps (lecture notes)
- Present values and "fair" swap rate
- Deruations and the interest-rate sensitivity

3.3 Analysis of currency swaps (lecture notes)
- When forward-rates are observed
- When forward markets do not exist

Part IV. Options

4.1. General characteristics (chapters 8 and 9)
- Maturity-date value.
- Parity (non-arbitrage) conditions
- Arbitrage strategies
- Upper and lower bounds on the option prices
- Convexity and other properties
- Dividend

4.2 Trading strategies (chapter 10)
- Spread
- Straddle
- Collar
- Dynamic hedging

4.3 Binomial-tree model (chapter 11)
- State-Contingent-Claims Market
- Micro-economics (Ec111) foundation
- Discrete-time model of state-contingent claims
- Relation to the Present-Value formula
- A complete financial market
- Relation to the CAPM
- Option price

4.4 From the discrete-time model to a continuous-time model (chapter 12)
- Process of convergence

- stochastic calculus (the Ito version)
- Some strange properties
- The log-normal distribution

4.5 The Black-Scholes option model (chapter 13)

- Assumptions
- Derivation of the key equation
- Solving the equation

4.6 Applications (if time allows; chapters 14 and 15)

- The volatility index, stock options, etc.
- Δ ("delta"), Θ ("theta"), Γ ("gamma"), $\mathcal{V}$ ("vega"?), and ρ ("rho")
- Portfolio insurance