Lecture 1: Overview

I. Reading
II. Asset Classes
III. Financial System.
IV. Financial Markets
V. Financial Intermediaries
VI. Issues addressed by Finance Theory
VII. Key Concepts.
Lecture 1 Foundations of Finance

Lecture 1: Overview

I. Reading
   A. BKM Chapter 1.
   B. Skim BKM Chapters 2 and 4.

II. Asset Classes
   A. Real Assets
      1. natural resources.
      2. physical capital.
      3. human capital.
   B. Financial Assets (referred to as securities)
      1. Money (as a medium of exchange)
         a. is held to allow the completion of transactions.
      2. Debt
         a. a claim to a predetermined payment stream secured on a set of real
            or financial assets.
         b. maturity is time from issue to expiration.
      3. Equity
         a. residual claim to a set of real or financial assets (usually of a
            corporation) usually coupled with corporate control.
      4. Derivatives
         a. payoff is dependant on the value of some other (usually financial)
            asset.
C. Illustration.
   1. Debt vs. Equity.
      a. Suppose XYZ Co’s assets pay off a random amount CF in 1 year’s
time and XYZ has issued debt with a promised payment of $100 in
1 year’s time, and equity.

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<td>CF</td>
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b. If CF is uncertain, XYZ’s equity is riskier than XYZ’s debt.

2. Derivatives.
   a. A call option gives its holder the right (but not the obligation) to
buy an asset by paying a prespecified price (the strike price).
   b. Consider a call option on XYZ Co’s equity with a strike price of
$40 that can be exercised in 1 year’s time.

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<td>0</td>
<td>Equity-40</td>
<td>20</td>
<td>40</td>
<td>60</td>
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   c. Notice that the call option’s payoff at the exercise date is never
less than 0.

D. Example: IBM Corporation.
   1. Real Assets: plant used to build Thinkpads.
   2. Claims on the Real Assets:
      a. Equity: IBM stock.
      b. Debt: IBM bonds.
      c. IBM stock is much more volatile than IBM bonds.
   3. Derivatives: Claims on IBM stock.
      a. A call option on IBM stock gives the holder the right (but not the
obligation) to buy the stock at a given exercise price.
III. Financial System.
   A. The financial system refers to the collection of institutions by which financial assets are created and traded.
   B. Purposes (which allow the financial system to create wealth)
      1. transfer capital from savers (investors) to capital users (usually corporations).
      2. discipline investment decisions by firms.

Example: A firm may want to expand by going public; i.e., by issuing equity to the public in return for cash. Since the public knows that the firm is going to use cash to expand, an investor will only subscribe to the IPO if she thinks expansion is a value enhancing strategy.

3. allow investors to smooth consumption intertemporally.

Example: An MBA student has low income now but high future income. A student loan allows the student to smooth her consumption through time relative to her income through time.

4. facilitate the reduction of riskbearing by repackaging risks.
5. disseminate information.

C. Institutions
   1. Government
   2. Financial Markets: institutions which trade financial assets.
   3. Financial Intermediaries: entities which operate within or outside financial markets to facilitate the trading of financial assets.
IV. Financial Markets
A. Primary vs Secondary Markets
1. Primary Market: new issues of a security are sold to initial buyers.

Example: An IPO is an initial public offering of equity by a privately-held firm.

2. Secondary Market: previously issued securities are traded in a secondary market.

Example: NYSE and the National Association of Securities Dealers Automated Quotation System (NASDAQ) are examples of secondary markets for equities.

B. Exchange vs Over-the-Counter Market
1. Exchange: Buyers and sellers of securities meet in one central location to conduct trades.

Examples: 1) NYSE (stocks); 2) Chicago Board of Trade (futures).

2. Over-the Counter Market: Dealers at different locations stand ready to buy and sell securities "over the counter" to anyone that accepts their prices.

Examples: 1) government bonds are traded over the counter through primary and secondary dealers; 2) NASDAQ for stocks.

C. Money vs Capital Markets
2. Capital: long term debt instruments (>1 year maturity) and equity.
V. Financial Intermediaries
   A. Services Provided
      1. reduce search costs associated with finding saving or investment opportunities.
      2. generate information needed by investors.
      3. provide risk and portfolio management services.
      4. issue financial assets that repackage risks.
      5. take advantage of the economies of scale associated with buying and selling financial assets.
   B. Types
      1. Depository Institutions
         a. Commercial Banks.
         b. Savings and Loan Associations, Mutual Savings Banks.
         c. Credit Unions.
      2. Contractual Savings Institutions
         a. Life Insurance Companies.
         b. Fire and Casualty Insurance Companies.
         c. Pension Funds.
      3. Investment Intermediaries
         a. Brokers.
         b. Mutual Funds.
         c. Money Market Mutual Funds.
         d. Finance Companies.
C. Growth of Mutual Funds.

1. Definition:
   a. A mutual fund is a firm that manages a pool of money that has been placed with the fund by other people.
   b. Money placed with the fund is invested in certain specified types of assets.
   c. People buy shares in the fund and their value changes over time with changes in the value of the fund’s assets.
   d. All investors in the fund earn the same return over any given interval of time.

2. Over the last 30 years, there has been tremendous growth in:
   a. number of funds.
   b. types of funds.
   c. dollars invested in funds.

3. Index Funds: Particularly high growth has occurred for a type of mutual fund known as an index fund.
   a. An index fund is a mutual fund whose investment goal is to track the return on a particular stock index (for example, the S&P 500 index).
   b. A stock index is a portfolio of stocks formed according to a predetermined rule. For example, the S&P 500 index is a portfolio of 500 stocks chosen so that the index mirrors the U.S. stock market. A stock is chosen (according to the S&P Corporation) for inclusion in the index if its performance is representative of the performance of its industry. The S&P 500 index invests more in a large stock contained in the index than a small stock: it is a value-weighted index.

Example:
### Number of Mutual Funds by Type of Fund, Selected Years
(percentage of all funds)

<table>
<thead>
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<th>Year</th>
<th>Money Market Funds</th>
<th>Bond and Hybrid Funds</th>
<th>Equity Funds</th>
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<td>2003</td>
<td>12.0</td>
<td>56.6</td>
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Total Number of Funds:
- 1970*: 361
- 1980*: 564
- 1990: 3,079
- 2000: 8,155
- 2003: 8,126

*Prior to 1984, there was no hybrid fund category. All funds were reclassified in 1984, and a separate category was created for hybrid funds.

### Assets of Mutual Funds by Type of Fund, Selected Years
(percentage of total fund assets)

<table>
<thead>
<tr>
<th>Year</th>
<th>Money Market Funds</th>
<th>Bond and Hybrid Funds</th>
<th>Equity Funds</th>
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<td>2003</td>
<td>22.6</td>
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Total Fund Assets (billions of dollars):
- 1970*: $47.6
- 1980*: $134.8
- 1990: $1,065.2
- 2000: $6,964.7
- 2003: $7,414.1

*Prior to 1984, there was no hybrid fund category. All funds were reclassified in 1984, and a separate category was created for hybrid funds.
VI. Issues addressed by Finance Theory
   A. Financial decision-making by corporations. How do corporations decide whether
to undertake an investment project? (Corporate Finance)
   B. Financial decision-making by individuals. How do individuals invest their
savings?
   C. Valuation of assets both real and financial. Why do expected returns vary across
assets?

Examples: 1) CAPM is a asset pricing model; 2) Black-Scholes model values call options; 3)
Cox Ingersoll Ross model values fixed income assets.

Why is this an important question? Because expected returns vary greatly across
assets.

Mean Nominal 1 Month Return on U.S. Stock and Bond Portfolios:
7/26–12/95
TB - 1 mth Treasury Bills
GB - Long-term U.S. Government Bonds
CB - Corporate Bonds
S&P - S&P 500 Index
SMV - Portfolio of Small Market Value Stocks (Small Caps)
HBM - Portfolio of High Book-to-market Stocks (Value Stocks)

Mean Nominal 5 Year Return on U.S. Stock and Bond Portfolios:
7/26/631 - 1/91/12/95

Portfolio

Mean Return (%)
VII. Key Concepts.
   A. Time value of money: a dollar today is worth more than a dollar later.

Example:
Treasury strips pay a face value of $100 at the maturity date. Strips always trade for less than $100. See for example yesterday’s Wall Street Journal for Jan 21 Friday.
## Explanatory Notes

Representative Over-the-Counter quotation based on transactions of $1 million or more. Treasury bond, note and bill quotes are as of mid-afternoon. Colons in bid-and-asked quotes represent 32nds; 101 01 means 101 1/32. Net changes in 32nds. t-Nature of note. r-Inflation-Indexed note. Treasury bill quotes in hundreds, quoted on terms of a rate of discount. Days to maturity calculated from settlement date. All yields are to maturity and based on the asked quote. Latest 13-week and 26-week bills are boldfaced. For bonds callable prior to maturity, yields are computed to the earliest call date for issues quoted above par and to the maturity date for issues below par. *When issued.

Source: eSpeed/Cantor Fitzgerald

U.S. Treasury strips as of 3 p.m. Eastern time, also based on transactions of $1 million or more. Colons in bid and asked quotes represent 32nds; 99 01 means 99 1/32. Net changes in 32nds. Yields calculated on the asked quotation. ci-stripped coupon interest. bp-Treasury bond, stripped principal. np-Treasury note, stripped principal. For bonds callable prior to maturity, yields are computed to the earliest call date for issues quoted above par and to the maturity date for issues below par.

Source: Bear, Stearns & Co. via Street Software Technology Inc.

### U.S. Treasury Strips

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Lecture 1 Foundations of Finance

B. Diversification: don’t put all your eggs in one basket.
   1. Portfolios of assets and individual assets have similar average returns; but
   2. Portfolios volatility declines as the number of assets in the portfolio increases.

Example:
Figure 6. Excess standard deviation against time and number of stocks. The excess standard deviation of a portfolio is the difference between the portfolio's standard deviation and the standard deviation of an equally weighted index. The top panel plots annualized excess standard deviation against time. Excess standard deviation is calculated each year from daily data within the year, for randomly selected portfolios containing two stocks (solid line), five stocks (top dashed line), 20 stocks (long dashed line), and 50 stocks (bottom dashed line). The bottom panel plots annualized excess standard deviation against the number of stocks in the portfolio, for sample periods 1963 to 1973 (solid line), 1974 to 1985 (bottom dashed line), and 1986 to 1997 (top dashed line).
C. Risk-adjustment: riskier assets offer higher expected returns.
   1. Assets offer different average returns because they have different risk levels. The flip side is that investors require different returns on different investments depending on their risk levels.
   2. Need to quantify what we mean by risk.

Example:
Above discussion of differences in average return across risk classes. Stocks offer higher average return than government and corporate debt but risk (however defined) is also higher.
5 Year Returns on U.S. Stocks and Treasury Bills:
7/26:6/31 – 1/91:12/95

- 1 mth T-bills
- S&P 500

5 Year Returns on U.S. Stocks and Treasury Bills:
7/26:6/31 – 1/91:12/95

- 1 mth T-bills
- High Book-to-Market
D. No arbitrage: 2 assets with the same cash flows must have the same price.
1. An investment that does not require *any* cash outflows and generates a strictly positive cash inflow with some probability is known as an arbitrage opportunity.
2. Well-functioning market: arbitrage opportunities can not exist since any individual who prefers more to less wants to invest as much as possible in the arbitrage opportunity.
3. The absence of arbitrage implies that any two assets with the same stream of cash flows must have the same price. This implication is known as the law of one price. Even small price differences represent a riskless profit.

Example: Monday Jan 24 WSJ

**U.S. Treasury Strips - Prices Friday Jan 21**

<table>
<thead>
<tr>
<th>Maturity</th>
<th>Type</th>
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<td>94:19</td>
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4. Price differences of assets with identical cash flows must be due to tax and liquidity differences plus transaction costs.
Option value: a right (without obligation) to do any action in the future must have a non-negative value today
1. An option gives the holder the right but not the obligation to take a certain action in the future.
2. An option always has non-negative value for the holder.

Example:
A firm has two bond issues outstanding. The first is 5% semi-annual coupon bonds maturing in 11/08. The second is 5% semi-annual coupon bonds maturing in 11/08 but the holder has the option to convert the bonds to stock at any time prior to 11/08. For a par value of $100, which bond is more expensive? The second is more expensive since the option to convert is valuable: the second bond cannot be less valuable than the first.
Lecture 1 Foundations of Finance

F. Market Efficiency: price is an unbiased estimate of value
   1. In an efficient market: the price of a security is an unbiased estimate of its value.
   2. U.S. stock market is probably efficient with respect to publicly available information. So cannot use publicly available information to earn higher than average risk-adjusted returns on average.
   3. Market efficiency is one of the big warnings issued by the course.

Example:
   a) Studies that examine the cross-sectional relation between U.S. mutual fund performance and expense ratio find that annual fund return varies inversely 1 for 1 with the expense ratio. So if a fund increases its expense ratio from 0.5% p.a. to 1.5% p.a., its annual performance can be expected to decline by about 1%.
   b) Using account data for over 60,000 households from a large discount brokerage firm, Barber and Odean (2000) analyze the common stock investment performance of individual investors from February 1991 through December 1996.
      - On one hand, the gross returns (before accounting for transaction costs) earned by the average household are unremarkable; the average household earned an annualized geometric mean gross return of 17.7 per cent while the value-weighted market index earned 17.1 per cent.
      - On the other hand, the net returns earned by the average household lag reasonable benchmarks by economically and statistically significant amounts; the average household earned an annualized geometric mean net return of 15.3 per cent.
      - The 20 per cent of households that trade most (which average at least 9.6 per cent turnover per month) earned an annualized geometric mean net return of 10.0 per cent.
      - The central message is that trading is hazardous to your wealth.