
INVESTMENT
INSURANCE
TRANSACTION
DEPOSIT
PORTFOLIO
SAFE
CASH
MARKET
PROFIT
CAPITAL
OBLIGATION
BUSINESS
BANK
FUNDS
BAIL
TRADE
SAVINGS
FINANCE
CURRENCY
ESTATE
PENSION
INVESTING
BONDS
STOCKS

Investment Analysis & Portfolio Management

Assistant Professor
Nattawoot Koowattanatianchai, DBA, CFA

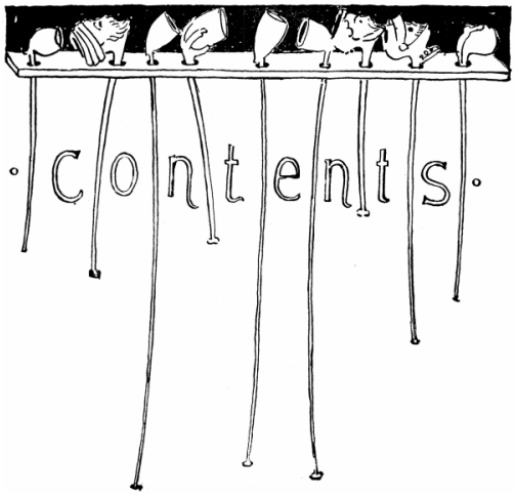
- Email:
  - fbusnwk@ku.ac.th
- Homepage:
  - http://fin.bus.ku.ac.th/nattawoot.htm
- Phone:
  - 02-9428777 Ext. 1212
- Mobile:
  - 087- 5393525
- Office:
  - 9th floor, KBS Building 4

Lecture 1

Fixed income securities

Discussion topics

- Bond and bond valuation
- Government and corporate bonds
- Bond markets
- Determinants of bond yields



Readings

- Ross, S., Westerfield, R. and Jaffe, J. (2010), *Corporate Finance* (9th Edition), McGraw Hill/Irvin. (Chapter 8)
- CFA Program Curriculum 2015 - Level II – Volume 4: Equity.

Bonds and Bond Valuation

- A bond is a legally binding agreement between a borrower and a lender that specifies the:
  - Par (face) value
  - Coupon rate
  - Coupon payment
  - Maturity Date
- The yield to maturity is the required market interest rate on the bond.

Bond Valuation

- Primary Principle:
  - Value of financial securities = PV of expected future cash flows
- Bond value is, therefore, determined by the present value of the coupon payments and par value.
- Interest rates are inversely related to present (i.e., bond) values.

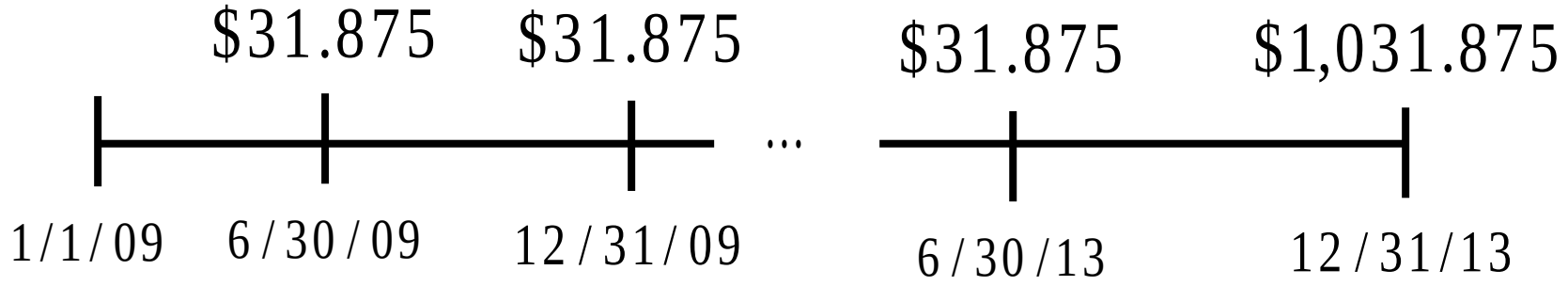
The Bond-Pricing Equation

- Notation
  - C = coupon payment each period
  - F = par/face value
  - r = discount rate (yield to maturity)
  - n = number of coupon payments

$$\text{Bond Value} = C\left[\frac{1-\frac{1}{(1+r)^n}}{r}\right]+\frac{F}{(1+r)^n}$$

Bond Example

- Consider a U.S. government bond with as 6 3/8% coupon that expires in December 2013.
  - The *Par Value* of the bond is $1,000.
  - *Coupon payments* are made semiannually (June 30 and December 31 for this particular bond).
  - Since the *coupon rate* is 6 3/8%, the payment is $31.875.
  - On January 1, 2009 the size and timing of cash flows are:



Bond Example

- On January 1, 2009, the required yield is 5%.
- The current value is:

$$P = \frac{\$31.875}{.05/2}\left[1 - \frac{1}{(1.025)^{10}}\right] + \frac{\$1{,}000}{(1.025)^{10}} = \$1{,}060.17$$

Bond Example: Calculator

Find the present value (as of January 1, 2009), of a 6 3/8% coupon bond with semi-annual payments, and a maturity date of December 2013 if the YTM is 5%.

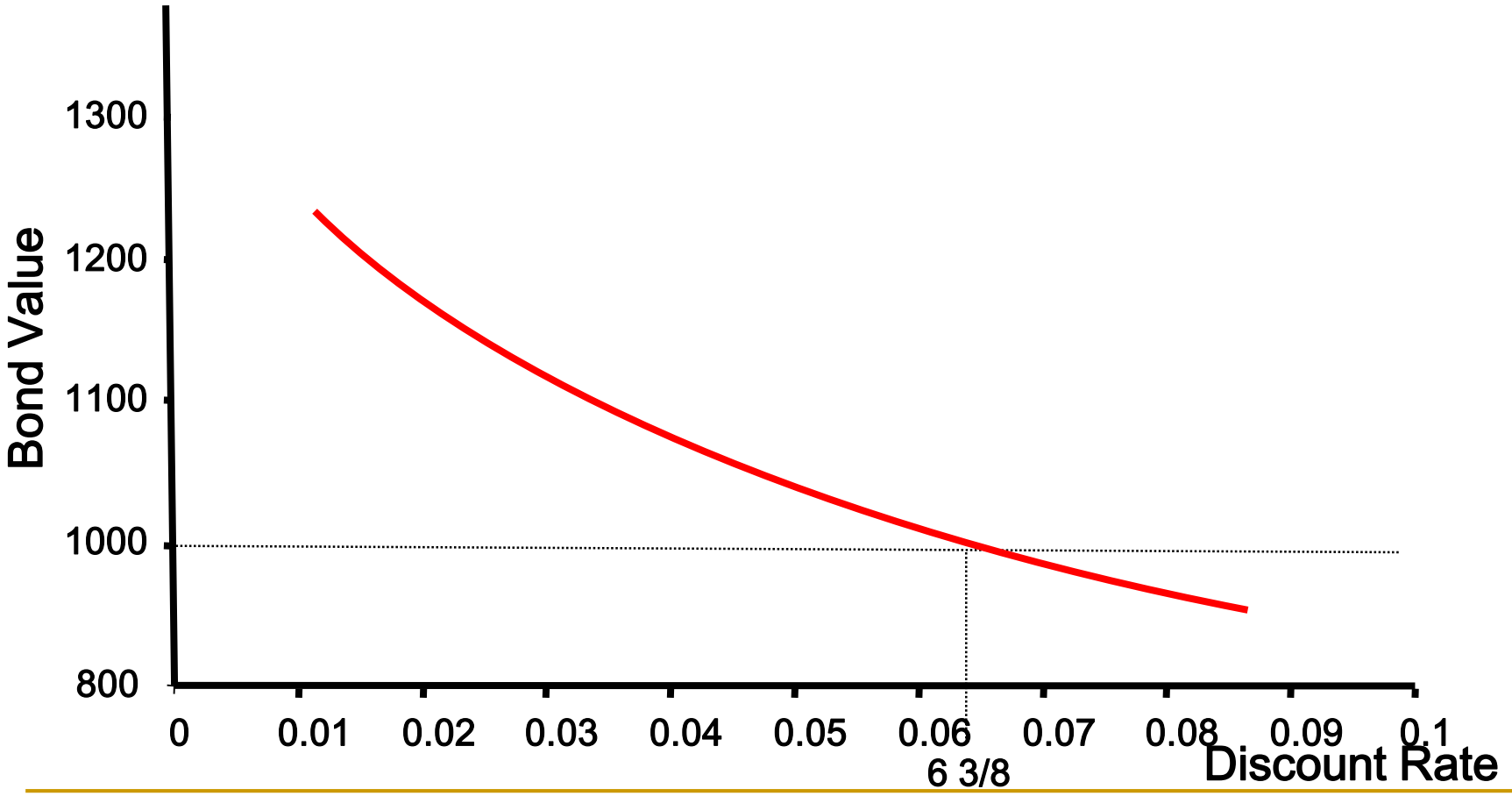
N	10
I/Y	2.5
PV	– 1,060.17
PMT	$31.875 = \frac{1{,}000 \times 0.06375}{2}$
FV	1,000

Bond Example

- Now assume that the required yield is 11%.
- How does this change the bond's price?

$$P = \frac{\$31.875}{.11/2}\left[1 - \frac{1}{(1.055)^{10}}\right] + \frac{\$1{,}000}{(1.055)^{10}} = \$825.69$$

YTM and Bond Value



Bond Concepts

- Bond prices and market interest rates move in opposite directions.
- When coupon rate = YTM, price = par value
- When coupon rate > YTM, price > par value (premium bond)
- When coupon rate < YTM, price < par value (discount bond)

Computing Yield to Maturity

- Yield to maturity is the rate implied by the current bond price.
- Finding the YTM requires trial and error if you do not have a financial calculator and is similar to the process for finding r with an annuity.
- If you have a financial calculator, enter N, PV, PMT, and FV, remembering the sign convention (PMT and FV need to have the same sign, PV the opposite sign).

YTM with Annual Coupons

- Consider a bond with a 10% annual coupon rate, 15 years to maturity, and a par value of $1,000. The current price is $928.09.
  - Will the yield be more or less than 10%?
  - N = 15; PV = -928.09; FV = 1,000; PMT = 100
  - CPT I/Y = 11%

YTM with Semiannual Coupons

- Suppose a bond with a 10% coupon rate and semiannual coupons has a face value of $1,000, 20 years to maturity, and is selling for $1,197.93.
  - Is the YTM more or less than 10%?
  - What is the semi-annual coupon payment?
  - How many periods are there?
  - N = 40; PV = -1,197.93; PMT = 50; FV = 1,000; CPT I/Y = 4% (Is this the YTM?)
  - YTM = 4%*2 = 8%

Current Yield vs. Yield to Maturity

- Current Yield = annual coupon / price
- Yield to maturity = current yield + capital gains yield
- Example: 10% coupon bond, with semi-annual coupons, face value of 1,000, 20 years to maturity, $1,197.93 price
  - Current yield = 100 / 1197.93 = .0835 = 8.35%
  - Price in one year, assuming no change in YTM = 1,193.68
  - Capital gain yield = (1193.68 – 1197.93) / 1197.93 = -.0035 = -.35%
  - YTM = 8.35 - .35 = 8%, which is the same YTM computed earlier

Bond Pricing Theorems

- Bonds of similar risk (and maturity) will be priced to yield about the same return, regardless of the coupon rate.
- If you know the price of one bond, you can estimate its YTM and use that to find the price of the second bond.
- This is a useful concept that can be transferred to valuing assets other than bonds.

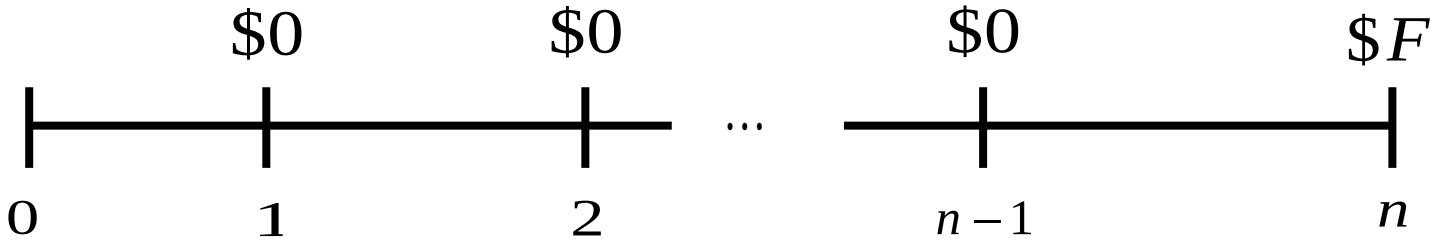
Zero Coupon Bonds

- Make no periodic interest payments (coupon rate = 0%)
- The entire yield to maturity comes from the difference between the purchase price and the par value
- Cannot sell for more than par value
- Sometimes called zeroes, deep discount bonds, or original issue discount bonds (OIDs)
- Treasury Bills and principal-only Treasury strips are good examples of zeroes

Pure Discount Bonds

Information needed for valuing pure discount bonds:

- Time to maturity (n) = Maturity date - today's date = number of discounting periods
- Face value (F)
- Discount rate (r)



Present value of a pure discount bond at time 0:

$$P = \frac{F}{(1+r)^n}$$

Government and Corporate Bonds

- Treasury Securities
  - Federal government debt
  - T-bills – pure discount bonds with original maturity less than one year
  - T-notes – coupon debt with original maturity between one and ten years
  - T-bonds – coupon debt with original maturity greater than ten years
- Municipal Securities
  - Debt of state and local governments
  - Varying degrees of default risk, rated similar to corporate debt
  - Interest received is tax-exempt at the federal level

After-tax Yields

- A taxable bond has a yield of 8%, and a municipal bond has a yield of 6%.
  - If you are in a 40% tax bracket, which bond do you prefer?
    - 8%(1 - .4) = 4.8%
    - The after-tax return on the corporate bond is 4.8%, compared to a 6% return on the municipal
  - At what tax rate would you be indifferent between the two bonds?
    - 8%(1 – T) = 6%
    - T = 25%

Corporate Bonds

- Greater default risk relative to government bonds
- The promised yield (YTM) may be higher than the expected return due to this added default risk

Bond Ratings – Investment Quality

- High Grade
  - Moody's Aaa and S&P AAA – capacity to pay is extremely strong
  - Moody's Aa and S&P AA – capacity to pay is very strong
- Medium Grade
  - Moody's A and S&P A – capacity to pay is strong, but more susceptible to changes in circumstances
  - Moody's Baa and S&P BBB – capacity to pay is adequate, adverse conditions will have more impact on the firm's ability to pay

Bond Ratings - Speculative

- Low Grade
  - Moody's Ba and B
  - S&P BB and B
  - Considered speculative with respect to capacity to pay.
- Very Low Grade
  - Moody's C
  - S&P C & D
  - Highly uncertain repayment and, in many cases, already in default, with principal and interest in arrears.

Bond Markets

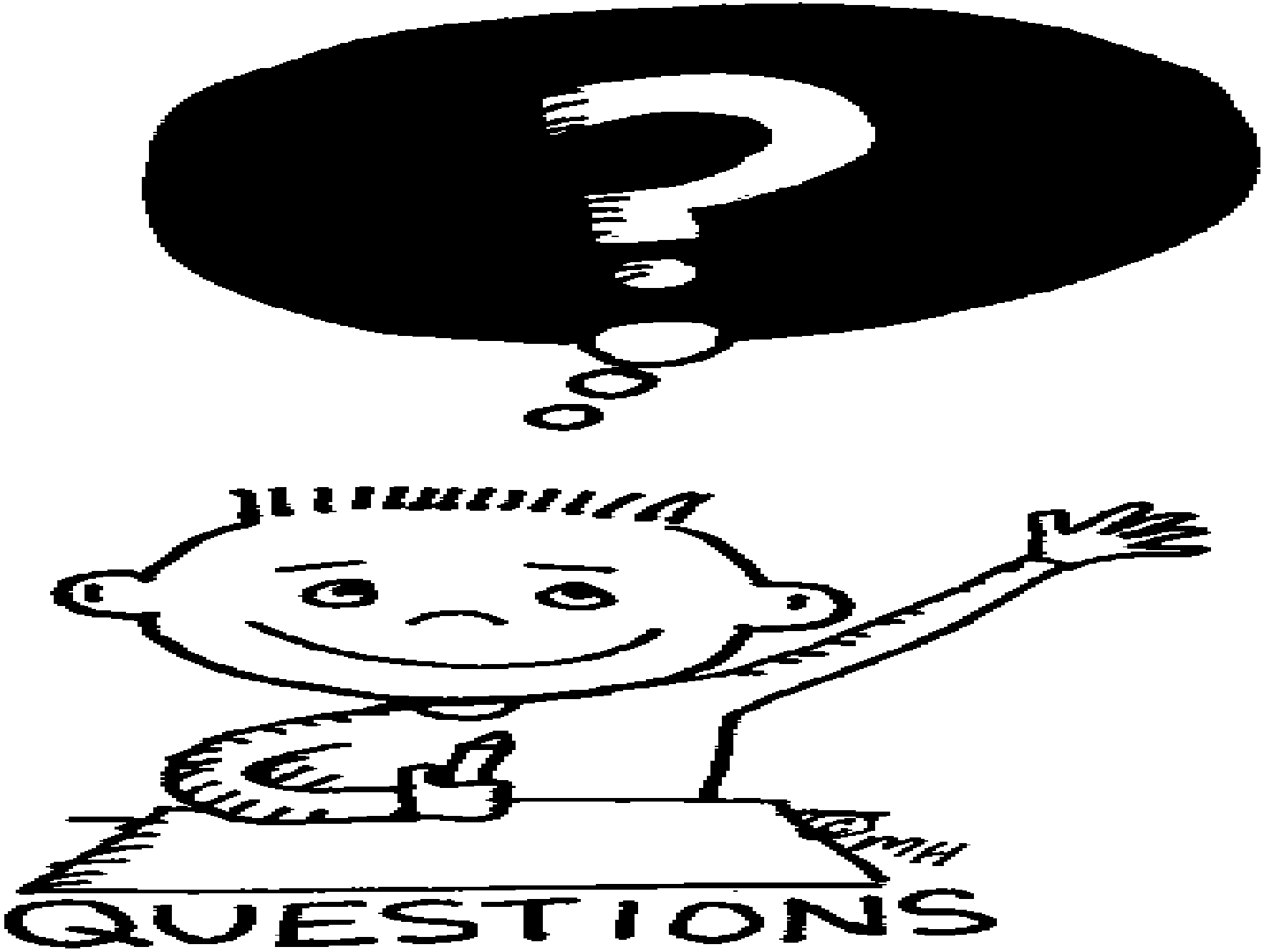
- Primarily over-the-counter transactions with dealers connected electronically
- Extremely large number of bond issues, but generally low daily volume in single issues
- Makes getting up-to-date prices difficult, particularly on a small company or municipal issues
- Treasury securities are an exception

Determinants of Bond Yields

- Term structure is the relationship between time to maturity and yields, all else equal.
- It is important to recognize that we pull out the effect of default risk, different coupons, etc.
- Yield curve – graphical representation of the term structure
  - Normal – upward-sloping, long-term yields are higher than short-term yields
  - Inverted – downward-sloping, long-term yields are lower than short-term yields

Factors Affecting Required Return

- Default risk premium – remember bond ratings
- Taxability premium – remember municipal versus taxable
- Liquidity premium – bonds that have more frequent trading will generally have lower required returns (remember bid-ask spreads)
- Anything else that affects the risk of the cash flows to the bondholders will affect the required returns.


QUESTIONS