CLASS NOTES for Wednesday, September 12, 2012
Financial Markets and Instruments 3560
Professor Goldstein

By Alex Guerra, Section 1 (Dr. Goldstein's comments in this maroon color)

WEDNESDAY SEPTEMBER 19→ MINI QUIZ ON REQUIRED RATE OF RETURN

Also, prepare: how much is price going to change with change of interest rate (math method to generically change rate of price with rate of change in interest rate)

News

- Read in WSJ→ look for "exchanges" articles and "dividends" articles (NY stock exchange and Nasdaq) pg. C1 of today's paper
- Look for systematically important articles (story that goes on for a while, stories that will continue in future articles, "trends"), the rest of the articles just read the headings
- Inflation in treasury bonds
- Pg. A1-Studies show that people are not using banks as much anymore since the financial crisis!
- Egypt (KEY, very important country to follow- as well as Pakistan, India, China…)- pg. C4- "stability returns"
- Iran is said to sell oil to Egypt partly to attempt to make up for lost of EU sales
- Massive chunk of AIG is sold by the Treasury. This ended the US government's majority ownership of the firm
- Japan buying islands, in dispute with China. (Note: I am not certain I said that Japan is "Buying" islands?)
- "Bad loans and worries about Vietnam's banks have dragged down growth and stock prices"
- DJIA= ^ 13,1356.69 (+33.33 pts)
- Unemployment currently= 8.2%

HOMEWORK→ Chap. 3 pg. 72-89; problems: ALL

Group Paper

- 4 people is ideal group number
- Pick or 4 topics that you would be interested in writing your paper on
- Don't pick group just because you are friends!
- Topic can be on any market
    - Examples: foreign exchange, hedge funds (VERY hard to write about), gold, euro, NY stock exchange, DO NOT pick laptop markets
- Not a book report, have to do something with raw data, for instance run a a regression
- Find instructions for paper in Professor's website under "instructions for 2nd midterm paper"
- Can work with people in the other section

CHAPTER 3- INTEREST RATES AND SECURITY VALUATION

Interest rate measures:

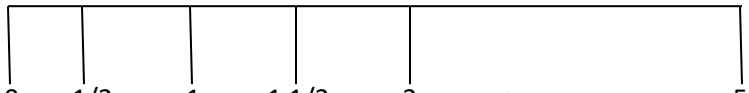
- Coupon rate- "periodic cash flow a bond issuer contractually promises to pay a bond holder"
- Required rate of return- what you want to earn; "rates used by individual market participants to calculate **fair present values (*PV*)**"
- Expected rate of return- expect to earn; used as a discount rate; rates participants would earn by buying securities at **current market prices (*P*)**"
- Realized rate of return- actually get from investment, not necessarily required or expected rates

- Required rate (r)
  - Cash flow in period of time
  - Discount them to figure out PV
  - $$PV = \frac{\widetilde{CF}_1}{(1+r)^1} + \frac{\widetilde{CF}_2}{(1+r)^2} + \frac{\widetilde{CF}_3}{(1+r)^3} + \ldots + \frac{\widetilde{CF}_n}{(1+r)^n}$$
  - $\boldsymbol{CF_t}$ = cash flow in period $\boldsymbol{t}$ ($\boldsymbol{t} = 1, \ldots, \boldsymbol{n}$)
  - ~ = indicates the projected cash flow is uncertain
  - $\boldsymbol{n}$ = number of periods in the investment horizon
- Expected rate ***E(r)***
  - Price you see in market not necessarily what you are going to receive
  - $$P = \frac{\widetilde{CF}_1}{(1+E(r))^1} + \frac{\widetilde{CF}_2}{(1+E(r))^2} + \frac{\widetilde{CF}_3}{(1+E(r))^3} + \ldots + \frac{\widetilde{CF}_n}{(1+E(r))^n}$$
  - $\boldsymbol{CF_t}$ = cash flow in period $\boldsymbol{t}$ ($\boldsymbol{t} = 1, \ldots, \boldsymbol{n}$)
  - ~ = indicates the projected cash flow is uncertain
  - $\boldsymbol{n}$ = number of periods in the investment horizon
- Realized rate ($\bar{\mathbf{r}}$)
  - *important!
  - What did you earn after investing
  - What was the return actually received?
  - "The **realized rate of return (*r*)** is the discount rate that just equates the **actual purchase price** ( ) to the present value of the realized cash flows (RCF_t) t ($t = 1, \ldots, n$)"
  - $$\bar{P} = \frac{RCF_1}{(1+\bar{r})^1} + \frac{RCF_2}{(1+\bar{r})^2} + \frac{RCF_3}{(1+\bar{r})^3} + \ldots + \frac{RCF_n}{(1+\bar{r})^n}$$

Bond Valuation:

- "A **premium bond** has a coupon rate (*INT*) greater than the required rate of return (r) and the fair present value of the bond (V_b) is greater than the face or par value (Par)"
- **"Premium bond:** If $INT > r$; then $V_b > Par$"
- **"Discount bond:** if $INT < r$, then $V_b < Par$"
- **"Par bond:** if $INT = r$, then $V_b = Par$"
- Formula on slide not really correct

- Look at this one instead:
  - Example of a discount bond (interest rate higher than coupon rate):
    - Coupon rate 6%
    - Bonds pay semi-annual coupon bond (3% 2x a year)
    - Par value (or "face value"= FV)= $1000
    - 5 year bond
    - Interest rate= 8% (compounded semi- annually which means 4% every 6 months)
  - First step, MAKE TIMELINE
  -



$30 \quad \frac{30}{(1+r)^{1/2}} \quad \frac{30}{(1+r)^{1}} \quad \frac{30}{(1+r)^{1\,1/2}} \quad \frac{30}{(1+r)^{2}} \quad \text{....} \rightarrow \quad \frac{1030}{(1+r)^{5}}$

(1+r=1.04) ← This is the semi-annual rate.

- Calculate EFFECTIVE annual rate for r=

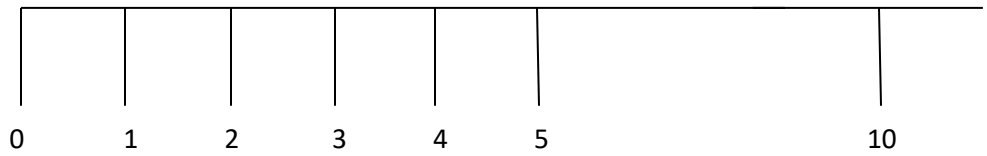
  (1.04)^2 – 1= 1.0816

  EAR (effective annual rate)= 8.16%

  Plug in the EAR for r to equations in timeline AS WRITTEN ABOVE, where it was written in terms of years.

  Add them and discount to get present value of bond

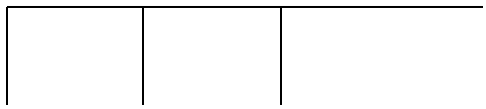
  - Can also write timeline in SEMI-ANNUAL PERIODS (EVERY 6 MONTHS):



$30 \quad \frac{30}{(1+r)^{1}} \quad \frac{30}{(1+r)^{2}} \quad \text{...}\rightarrow$

- ESR (effective semi-annual rate, every 6 months)= 4%
  n (payments)= 10
  i (interest rate)= 4
  pmt (payment per period)= 30
  FV (face value)= 1000
  PV (present value)= 918.89 (calculation might give you a negative, but the answer is positive)

- **New version of above question**: (may seem slightly the same but it's not)
  - 5 year, 6% semi-annual coupon-bond, FV= $1000, 8% EAR (this is the part that is new; I changed the discount rate from 8% compounded semi-annually in the problem above to 8% EAR in this problem. Therefore, how we deal with the interest rate in this problem will be DIFFERENT than in the problem above, because the interest rate is DIFFERENT because the way it which it was quoted was DIFFERENT.)
  - *you can't change bond pmt structure
  - Only thing different in this new version IS THE INTEREST RATE- where I put in annualized information



0 ½ 1

$\frac{30}{(1.08)^{1/2}}$ $\frac{30}{(1.08)^{1}}$ …>

  - Get ESR→ (1.08)^1/2 - 1= 3.923%
  - Change in ESR timeline:
    - i= 3.92
    - PV changes to 924.84 (increases) (Since int. rate decreased!)
    - NOTE: In the first problem above, the EAR was 8.16%, now in this second version, it was EAR=8%. Lower interest rate, so increase in bond value!

Equity Valuation:

- Value of anything in finance is PV
- "The **present value of a stock** (P_t) assuming zero growth in dividends can be written as:
  - D = dividend paid at end of every year
  - P_t = the stock's price at the end of year t
  - r_s = the interest rate used to discount future cash flows"

$$P_t = D / r_s$$

- ''The **present value of a stock** (P_t) assuming constant growth in dividends can be written as:

- D_0 = current value of dividends
- D_t = value of dividends at time t = 1, 2, …, ∞
- g = the constant dividend growth rate''
- (THIS IS THE IMPORTANT FORMULA)

$$P_t = \frac{D_0(1+g)^t}{r_s - g} = \frac{D_{t+1}}{r_s - g}$$

- 'The return on a stock with zero dividend growth, if purchased at current price $\boldsymbol{P_0}$, can be written as:'

$$r_s = D / P_0$$

- 'The return on a stock with constant dividend growth, if purchased at price $\boldsymbol{P_0}$, can be written as:'

$$r_s = \frac{D_0(1+g)}{P_0} + g = \frac{D_1}{P_0} + g$$

- Bond pays you in principal
- Stock pays in dividends, tends to grow at constant rate
- Growing perpetuity:

0 1 2 3 4

PV= c/(1+r) (c(1+g))/((1+r)^2) (c(1+g)^2)/((1+r)^3) (c(1+g)^3)/((1+r)^4) …>

a/1-x= a + ax + ax^2 + ax^3…>

(a would = c/1+r

X=(1+g)/(1+r)

a/1-x = c/r-g (after cancelling)

- Growing perpetuity (use for stocks): c/r-g = PV
- Growing annuity (use for salary): c/r-g [1-(1+g/1+r)^N] = PV
- P_0 (stock)= Div_1/r-g (Div_1=next dividend, r-g= discount rate
  - Return on a stock
  - You price many securities with this equation
  - Another way of writing the equation= (D_1/ P_0) +g = r
- PV of stock= value of next dividend/ r_s-g
- Stocks pay no dividend, PV=0
- There is a life cycle for small companies that make it big, eventually they will pay dividends
- 3 things that affect stock value: growth, discount rate, future dividend value

- Expectations of future growth affect stocks
- Interest rate affects stocks too
- Chart in slide ("relation between interest rates and bond value) is semi-annual→ as interest rates increase, price decreases. If interest rates decrease, price increase
- Changes in value of bond is affected by maturity, coupon, and interest rate
- "impact of maturity on price volatility" slide
- 12 year bond bounces around more than 3 year bond
    - Change interest rate- more changes in longer term bonds
    - Less changes in shorter term bonds
- Coupon rate affects bond

READINGS FOR WEDNESDAY SEPTEMBER 19- "DURATION"- Chap.3 pg. 90-101 and appendices