

University of Alabama

FI 414
Investments

Dr. Anup Agrawal

Test 2 (Sample)

Instructions: Answer all questions in both parts. All the best!

Name _____ SS# _____
Print

Part A (4 problems, 20 points each)

Instructions: Show all work, but be precise. There is partial credit for method.

1. A bond has a \$1,000 par value, 25 years to maturity, and an 8% annual coupon, paid semi-annually. Calculate the price of the bond if the required return is A) 6%, B) 8%, and C) 10%. What general relationship between bond prices and yields is demonstrated by this problem?
2. Bond P is a perpetuity that pays \$120 once a year. Bond Z is a zero-coupon bond that matures 5 years from today. The yield to maturity for both bonds is 8%. Acme Company wants to invest a sum of money in bonds today that will ensure that it will have \$800,000 available 10 years from today. What investment strategy will immunize Acme against a one-time shift in interest rates? (Note that the duration of a perpetuity is equal to $(1+y)/y$.)
3. Bofors Company expects to enjoy record growth over the next 3 years. Because of this, it will pay a dividend of \$2.25 at the end of the next year, followed 1 year later by a dividend of \$2.75. Three years from today, the company expects the dividend to be \$3.50. After that, dividends are expected to grow at a constant rate of 2% per year forever. If the required return on the stock is 8%, what is its price today?
4. The current price of Westman Kadok stock is \$78 per share. Suppose you buy a 6 week call with an exercise price of \$75 for \$5.75. Calculate the profits and losses for this strategy if the stock price at expiration is \$70, \$75, \$80, and \$85. Use your results to construct a payoff diagram that depicts the P/L line for this strategy.

Part B: Multiple Choice Problems
(10 problems, 2 points each)

Instructions: Encircle the *one* correct answer to each problem.

1. Which of the following statements represents implications of EMT to investors?
 - a. Fundamental analysis can be used to earn abnormal profit.
 - b. If the price-to-book value ratio is low, then the stock tends to outperform.
 - c. Changes in variance are somewhat predictable from past data.
 - d. Prior returns on an equally weighted portfolio of gold stocks predict gold returns.
 - e. The best portfolio management style is a passive one.

2. In an efficient market:
 - a. security prices are seldom far above or below their justified level
 - b. stocks with low P/E ratios tend to have higher returns
 - c. firms that are not followed by many analysts tend to yield higher returns
 - d. stock prices do not rapidly adjust to new information
 - e. returns tend to be positive on the last trading day before a holiday

3. If the strong form of the EMT is true, then:
 - a. NYSE specialists can generate significant profits
 - b. insiders can profit from valuable information they possess
 - c. before load fees but after other expenses, mutual funds do about average
 - d. spectral analysis can generate abnormal profits
 - e. investors can profit from information on the firm size and the market-to-book-value ratio

4. Which of the following is not a benefit of investing in mutual funds?
 - a. diversification
 - b. professional management
 - c. switching services
 - d. increasing an economy's capital supply
 - e. lower transaction costs

5. Shares of open-end funds often trade:
- on an exchange such as the NYSE
 - at a discount to the net asset value
 - exactly at the net asset value
 - at a price premium to the net asset value
 - at a discount or premium to the net asset value, depending on investors' sentiment
6. A closed-end fund owns foreign securities with a market value of \$95 million, has 5 million shares outstanding, owes its employees \$500,000, and trades at a 5% discount. The net asset value per share is:
- \$17.90
 - \$18.90
 - \$17.96
 - \$19.00
 - \$18.05
7. Mutual funds do not pay federal income taxes if they:
- distribute at least 98% of the interest and dividends received on investment
 - distribute at least 80% of the capital gains
 - require shareholders to pay federal income taxes on the distributions
 - earn only interest and dividend income
 - close their doors to new investors

Problems 8-10 are based on the following information.

We have the following information for five mutual funds. The risk-free rate of return is 3%, and the average rate of return on the market is 11%.

| Fund | Average Return | Standard Deviation | Beta |
|------------|----------------|--------------------|------|
| Scudder | 15.3% | 25% | 1.19 |
| Royce | 13.7% | 21% | 1.11 |
| Templeton | 18.1% | 29% | 1.48 |
| Value Line | 10.5% | 18% | 0.92 |
| Oberweis | 11.1% | 20% | 1.05 |

8. Refer to Scenario 15-2. According to Sharpe's index, the ranking of these funds from best to worst is:

- a. Scudder, Templeton, Royce, Oberweis, Value Line
- b. Templeton, Royce, Scudder, Value Line, Oberweis
- c. Royce, Templeton, Scudder, Oberweis, Value Line
- d. Value Line, Templeton, Royce, Scudder, Oberweis
- e. Templeton, Royce, Value Line, Scudder, Oberweis

9. Refer to Scenario 15-2. According to Treynor's index, the ranking of these funds from best to worst is:

- a. Scudder, Templeton, Royce, Oberweis, Value Line
- b. Templeton, Scudder, Oberweis, Royce, Value Line
- c. Royce, Templeton, Scudder, Value Line, Oberweis
- d. Oberweis, Scudder, Value Line, Royce, Templeton
- e. Scudder, Templeton, Royce, Value Line, Oberweis

10. Refer to Scenario 15-2. According to Jensen's index, the ranking of these funds from best to worst is:

- a. Scudder, Templeton, Royce, Oberweis, Value Line
- b. Templeton, Scudder, Royce, Value Line, Oberweis
- c. Royce, Scudder, Oberweis, Templeton, Value Line
- d. Scudder, Templeton, Royce, Value Line, Oberweis
- e. Value Line, Scudder, Templeton, Royce, Oberweis

FORMULAE

Bond Valuation:

1. PV of a bond with coupon rate i , face value F and T periods to maturity, at a discount rate k :

$$PV = iF \underset{\substack{\downarrow \\ \text{Annuity Discount Factor}}}{(ADF_{k,T})} + F \underset{\substack{\downarrow \\ \text{Discount Factor}}}{(DF_{k,T})}$$

2. Yield to maturity (ytm) of a bond is the discount rate y at which PV of bond = its price.

$$y \approx \frac{\frac{F - P_0}{T} + iP}{.6P_0 + .4F}$$

3. Duration, D of a bond (see also next page)

$$D = \frac{1}{P_0} \left[\left(\sum_{t=1}^T t \cdot \frac{iF}{(1+y)^t} \right) + T \cdot \frac{F}{(1+y)^T} \right]$$
$$= \frac{i(1+y)ADF_{T,y} + T(\gamma - i)DF_{T,y}}{i + (\gamma - i)DF_{T,y}}$$

Common Stock Valuation:

1. constant dividend model: If a stock is expected to pay a dividend of $\$d$ per period and investors require a rate of return of k , from it, then the intrinsic value of the stock

$$V_0 = \frac{d}{k}$$

2. constant Dividend Growth model:

If a stock paid a dividend of $\$d_0$ at time 0, and dividends are expected to grow at a rate g per period and investors require a rate of return of k , the value of the stock,

$$V_0 = \frac{d_0(1+g)}{k-g}$$

3. 2-stage growth model:

If a stock paid a dividend of \$ d_0 at time 0, dividends are growing at g_s per period for T periods and at g_n per period after that and investors require a return of k on the stock, then its value

$$V_0 = \left(\sum_{t=1}^T \frac{d_0 (1+g_s)^t}{(1+k)^t} \right) + \frac{1}{(1+k)^T} \left[\frac{d_0 (1+g_s)^T (1+g_n)}{k-g_n} \right]$$

CAPM: $E_i = r_f + \beta_i (E_m - r_f)$,

where E_i & E_m are the expected return on stock i & market portfolio

r_f = risk free rate

$$\beta_i = \frac{\sigma_{im}}{\sigma_m^2} = \text{systematic risk of stock } i$$

Duration of a bond portfolio:

Portfolio p has n bonds. The weight of bond i is x_i and its duration is D_i years. Then the duration of portfolio p is:

$$D_p = \sum_{i=1}^n x_i D_i = x_1 D_1 + x_2 D_2 + \dots + x_n D_n$$

Duration of a level perpetuity = $\frac{1+y}{y}$, where y = yield to maturity

Duration of a coupon bond with ytm of y , maturity of T periods and coupon rate i ,

$$D = \frac{1+y}{y} - \frac{(1+y) + T(i-y)}{i[(1+y)^T - 1] + y}$$

Solutions to Test 2 (Sample)

Part A

1. Using a financial calculator,
 $FV = \$1,000$; $N = \frac{50}{25}$, $PMT = \cancel{\$80} \40

A. $1/y = 3\%$, $\therefore PV = \$1,257.30$

B. $1/y = 4\%$, $\therefore PV = \$1,000$

C. $1/y = 5\%$, $\therefore PV = \$817.44$

So, as y increases, bond price \downarrow .

2. Duration of perpetuity, $D_p = \frac{1+y}{y} = \frac{1.08}{.08} = 13.5$ years

$D_z = 5$ years

PV of asset = $\frac{\$800,000}{1.08^{10}} = \$370,555$

Duration of the asset, $D_A = 10$ years

To immunize, we want a bond portfolio that has $D_A = D_L = 10$ years.

Let x be the proportion of portfolio assets invested in P.

Then, $D_A = x(13.5) + (1-x)5 = 10$

$\therefore x = \frac{5}{8.5} = .588235$

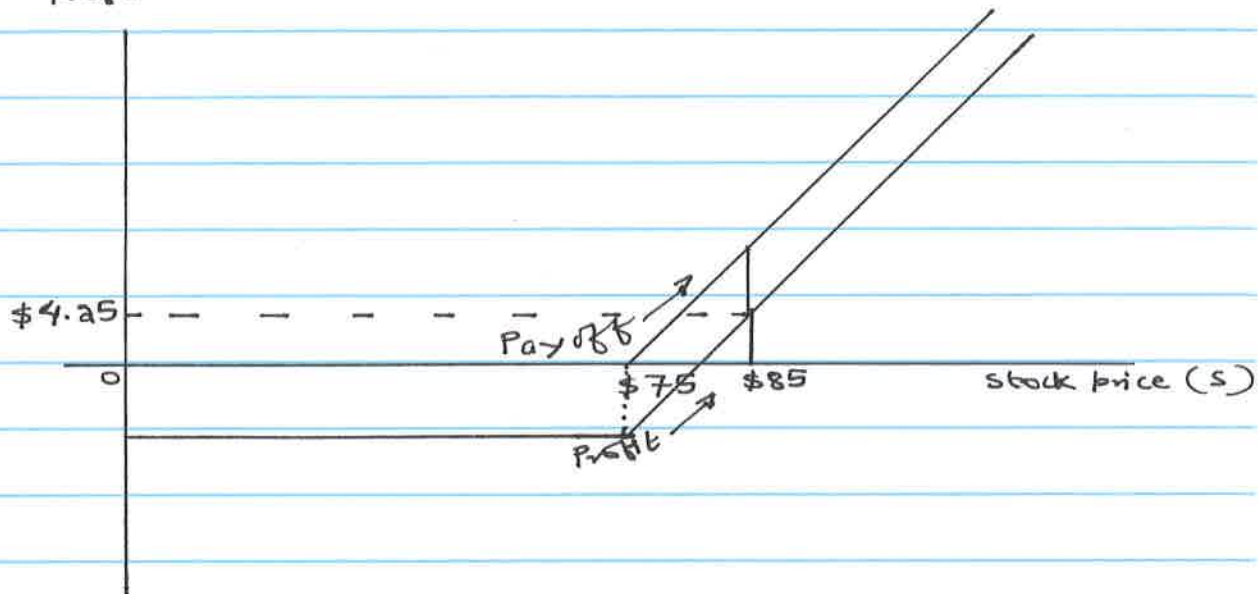
\therefore You should invest $\cancel{588235} .588235(370,555) = \$217,974$ in P and the remaining $\$152,581$ in Z.

3. $P_0 = \frac{2.25}{1.08} + \frac{2.75}{1.08^2} + \frac{3.50}{1.08^3} + \frac{3.5(1.02)}{(.08 - .02)1.08^3} = \54.45

4.

| | Payoffs \rightarrow | | | | |
|----------------------|-----------------------|---------------------|---------|-------------|------|
| | at $t=0$ | at $t=T$, if $S =$ | | | |
| | | \$70 | \$75 | \$80 | \$85 |
| Buy 6 week \$75 call | -5.75 | 0 | 0 | \$5 | \$10 |
| Profit | | -\$5.75 | -\$5.75 | -.75 + 4.25 | |

Payoffs &
Profit



Part B

- | | | | |
|----|---|-----|----------------|
| 1. | E | 6. | B |
| 2. | A | 7. | A |
| 3. | C | 8. | E B |
| 4. | E | 9. | E |
| 5. | C | 10. | B B |