University of Alabama

(514)

FI 414/Investments

Dr. Anup Agrawal

Test 1 (Sample)

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

Name ______________________________ SS# ______________________.
Print

Part A (4 problems, 80 points)

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

1. The table below provides a history of stock prices and dividends for Bleeko Company stock.

Date	Dividend	Market Price When Dividend Is Received
February 20, 1998		$85
May 15, 1998	$1.50	$88
August 15, 1998	1.50	$82
November 15, 1998	1.50	$78
February 15, 1999	1.50	$90
February 20, 1999		$94

Calculate the 1-year adjusted (compound) return for an investor who buys 100 shares on February 20, 1998.

(10 points)

2. Suppose there are only two possible outcomes for Stock X and Stock Z:

Outcome	Probability	R_x	R_z
A	0.4	20%	30%
B	0.6	-10%	5%

Gummy Garfield plans to invest 30% of her money in Stock X and the rest in Stock Z.

A. Calculate the expected return on Gummy's portfolio.

B. Calculate the variance of Gummy's portfolio.

C. Calculate the expected return of each stock.

D. Calculate the variance of each stock.

E. Calculate the covariance and correlation of Stock X with Stock Z.

(30 points)

3. Suppose only four assets exist and the correlation between any two assets is zero. Each asset has the same expected return (12%) and standard deviation (40%). Assume that investors always form equally weighted portfolios.

A. Calculate the expected return and standard deviation of a randomly selected one-stock portfolio, two stock portfolio, three stock portfolio, and four-stock portfolio.

B. Suppose there are an infinite number of assets, all with expected return of 12% and standard deviation of 40%, but the correlation between any two assets is 0.45. What are the highest possible expected return and the lowest possible standard deviation in this case?

(20 points)

4. Suppose you invest one-half of your money in the risk-free asset. The remainder is invested in Portfolio X, which is split equally between Corporal Motors and Divided Airlines. The risk-free rate is 9% and the correlation between Corporal Motors and Divided Airlines is 0.4.

	Corporal Motors	**Divided Airlines**
Expected Return	15%	24%
Variance	0.0484	0.0324
Beta	0.6	1.5

A. What are the expected return and standard deviation of your total portfolio?

B. What is the market's expected return?

(20 points)

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

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

1. Which of the following issues is typically covered in corporate finance?

    a. security analysis
    b. capital budgeting
    c. working capital management
    d. both a and c
    e. both b and c

2. The exchange generating the largest volume in the United States is the:

    a. New York Stock Exchange
    b. National Market System
    c. American Stock Exchange
    d. Pacific Stock Exchange
    e. Chicago Stock Exchange

3. An order to buy or sell a specified quantity of a stock at a specified price or better is called a:

    a. limit order
    b. day order
    c. market order
    d. stop order
    e. not-held order

4. Which of the following statements about dual listing is wrong?

    a. Dual listing enhances the level of competition and is thought to lower the cost of trading.
    b. Securities listed on the NYSE can also be listed on the AMEX.
    c. Securities can be listed on more than one exchange.
    d. Dual listing on the east and west coasts in the United States expands the hours when trading can occur.
    e. Securities listed on the NYSE can also be listed on the Chicago Stock Exchange and Pacific Stock Exchange.

5. The advantage of preferred stocks relative to common stocks is:

a. preferred stocks can be converted into common stocks
b. preferred stockholders have preference over the dividend payments to common stockholders
c. preferred stocks have a much higher rate of return
d. preferred stock dividends are always cumulative
e. preferred stock dividends are tied to the success of the firm according to some stated formula in the earnings of the firm

6. The third market refers to:

a. trading of exchange-listed securities that takes place off the exchange floor with the aid of a broker
b. trading of exchange-listed securities that is arranged by the buyers and sellers without the aid of brokers
c. trading of foreign stock exchange listed securities
d. trading of over-the-counter securities
e. trading of large blocks of securities arranged from a network of trading desks

7. The Securities and Exchange Commission was created by the:

a. Securities Act of 1933
b. Glass-Steagall Act of 1933
c. Securities Exchange Act of 1934
d. Maloney Act of 1938
e. Investment Company Act of 1940

8. An example of municipal bonds is:

a. junk bond
b. Federal agency bond
c. mortgage
d. revenue bond
e. swap

9. The owner of a futures contract:

a. has the right to buy a specified stock at a fixed price
b. has the right to sell a specified stock at a fixed price
c. agrees to exchange specific assets at future points in time
d. has the obligation to buy or sell a specified amount of an asset at a stated price on a particular date
e. can convert the contract into a specified number of stocks

10. Blue chip stocks:

a. are common stocks of older, more mature firms that pay higher dividends and are not growing rapidly
b. are common stocks of medium-size firms having earnings growth in excess of the industry average
c. are common stocks of large, financially sound corporations with a good history of dividend payments and consistent earnings growth
d. have high growth potential but are very risky
e. tend to do well in recessionary periods, but do not do well when the economy is booming

FORMULAE

1. One period bond return,

$$r_t = \frac{p_t - p_{t-1} + I_t}{p_{t-1}}, \quad \text{where}$$

p_t = bond price at time t

I_t = Coupon interest at time t

T-period time weighted return $= (1+r_1)(1+r_2)\cdots(1+r_T) - 1$,

where r_t = return over period t.

2. Expected return on a stock,

$$E = E(r) = \sum_{s=1}^{S} p_s r_s = p_1 r_1 + p_2 r_2 + \cdots + p_S r_S$$

Variance of returns,

$$\sigma^2 = \sigma_r^2 = Var(r) = \sum_{s=1}^{S} p_s (r_s - E)^2,$$

where p_s = probability of state s

r_s = return in state s

3. Correlation between returns on stocks A and B, denoted r_A and r_B,

$$\rho_{AB} = Corr(r_A, r_B) = \sum_{s=1}^{S} p_s (r_{As} - E_A)(r_{Bs} - E_B),$$

4. If E_A and E_B are the expected returns on stocks A and B; σ_A and σ_B are their ~~respective~~ standard deviations; and σ_{AB} is the covariance between them, then

$$E_p = x_A E_A + x_B E_B, \text{ and}$$

$$\sigma_p^2 = x_A^2 \sigma_A^2 + x_B^2 \sigma_B^2 + 2 x_A x_B \sigma_{AB},$$

where p is a portfolio that has x_A proportion invested in stock A and x_B in stock B. Notice that:

$$x_A + x_B = 1$$

5. If σ_{AB} and ρ_{AB} are the covariance and correlations, respectively, between the returns on stocks A and B; and σ_A and σ_B are their respective standard deviations, then

$$\rho_{AB} = \frac{\sigma_{AB}}{\sigma_A \cdot \sigma_B}$$

6. If stocks A and B have a correlation of -1, then a zero-variance portfolio of the two stocks can be formed using weights:

$$x_A = \text{weight of stock A} = \frac{\sigma_B}{\sigma_A + \sigma_B}$$

$$x_B = \text{" " B} = 1 - x_A .$$

The portfolio's expected return (E_p) and standard deviation (σ_p) are:

$$E_p = x_A E_A + x_B E_B$$

$$\sigma_p = x_A \sigma_A - x_B \sigma_B$$

7. $$\underbrace{\sigma_A^2}_{\text{Total risk of stock A}} = \underbrace{\beta_A^2 \sigma_m^2}_{\text{Systematic risk of A}} + \underbrace{\sigma_{e_A}^2}_{\text{Unique risk of A}},$$

where σ_A = Std. deviation of stock A

β_A = Beta of stock A

σ_m = S.d. of market portfolio

σ_{e_A} = Residual s.d. of stock A

8. E and σ of an equal-weighted portfolio p of n assets: ~~with~~ ~~cov~~

$$E_p = \frac{1}{n}\sum_{i=1}^{n} E_i = \frac{1}{n}(E_1 + E_2 + \cdots + E_n)$$

$$\sigma_p^2 = \frac{1}{n}\overline{Var} + \left(1-\frac{1}{n}\right)\overline{Cov},$$

where $\overline{Var}$ = Average variance of the n assets, and

$\overline{Cov}$ = Average covariance among pairs of the n assets

$$\lim_{n\to\infty} \sigma_p^2 = \overline{Cov}$$

9. E and σ of portfolio p which is ~~s~~ invested in a riskfree asset f with weight x_f and the remaining in a risky portfolio or asset i:

$$E_p = x_f r_f + (1-x_f)E_i, \text{ and}$$

$$\sigma_p = (1-x_f)\sigma_i$$

FI 414 (514) Investments

Dr. Anup Agrawal

Solutions to Test 1 (Sample)

Part A

1.

Date	Interim Period (t)	Interim Rate of Return (r_t)
Feb. 20, '98		
May 15	1	$\frac{88-85+1.5}{85} = .052941$
Aug. 15	2	$\frac{82-88+1.5}{88} = -.051136$
Nov. 15	3	$-.030488$
Feb. 15	4	$.173077$
Feb. 20	5	$.04444$

∴ 1-year ~~time weighted~~ adjusted (or compound) return

$$= (1+r_1)\cdot(1+r_2)\cdot(1+r_3)\cdot(1+r_4)\cdot(1+r_5) - 1$$

$$= 1.052941(.948864)(.969512)(1.173077)(1.04444)$$

$$= .1867872 \text{ or } 18.6787\%$$

2. a, b.

p	r_p^* (%)	$p\cdot r$	$p(r-E)^2$
.4	27	10.8	~~134.355~~ 101.124
.6	0.5	0.3	67.416
1		$E_p = 11.1\%$	$\sigma_p^2 = 168.54$

$^*r_{p,1} = .3(20) + .7(30)$

$r_{p2} = .3(-10) + .7(5)$

c, d, e.

p	$p r_x$	$p(r_x - E_x)^2$	$p r_y$	$p(r_y - E_y)^2$	$p(r_x - E_x)(r_y - E_y)$
.4	8	~~14.4~~ 129.6	12	90	108
.6	−6	~~38.4~~ 86.4	3	60	72
	$E_x = 2\%$	$\sigma_x^2 =$ ~~52.8~~ 216	$E_y = 15\%$	$\sigma_y^2 = 150$	$\sigma_{xy} = 180$

Cov(r_x, r_y)

$\therefore \sigma_x = 14.697\%$ $\quad \sigma_y = 12.247\%$

$$\therefore \rho_{xy} = \text{Corr}(r_x, r_y) = \frac{\sigma_{xy}}{\sigma_x \cdot \sigma_y} = \frac{180}{14.697(12.247)} = +1$$

3. ~~Here,~~ For an EW portfolio,

$$\sigma_n^2 = \frac{1}{n}\overline{Var} + \left(1 - \frac{1}{n}\right)\overline{Cov}$$

a. Here, $\overline{Var} = 40^2 = 1600$, and $\overline{Cov} = 0$

n	σ_n^2	σ_n
1	1600	40
2	$\frac{1600}{2} = 800$	28.284
3	$\frac{1600}{3} = 533.33$	23.094
4	$\frac{1600}{4} = 400$	20

$$E_p = \frac{1}{n}\sum_{i=1}^{n}\bar{E} = \frac{1}{n}\cdot n\bar{E} = \bar{E} = 12\% \text{ for all } n$$

b. Again, $E_p = \bar{E} = 12\%$.

$\overline{Var} = 40^2 = 1600$, $\quad \overline{Cov} = .45(1600) = 720$

σ_p^2 is lowest as $n \to \infty$.

$$\lim_{n\to\infty}\sigma_p^2 = \overline{Cov} = 720$$

$\therefore$ Lowest $\sigma_p = \sqrt{720} = 26.83\%$.

4. a. $E_p = \frac{1}{2}(9) + \frac{1}{4}(15) + \frac{1}{4}(24) = 14.25\%$

$$\sigma_x^2 = \left(\tfrac{1}{2}\right)^2(.0484) + \left(\tfrac{1}{2}\right)^2(.0324) + 2\left(\tfrac{1}{2}\right)\left(\tfrac{1}{2}\right)(.4)(.22)(.18)$$

$$= .02812$$

$\therefore \sigma_x = .1677$ or 16.77%.

$\therefore \sigma_p = \frac{1}{2}(0) + \frac{1}{2}(16.77) = 8.385\%$.

b. CAPM: $E_C = r_f + \beta_C(E_m - r_f)$

For stock C: $15 = 9 + .6(E_m - 9)$

$\therefore E_m = 19\%$.

46. (contd...) verify that CAPM is satisfied for stock D also, with $E_m = 19\%$.

Part B

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