Investment Analysis (FIN 383)
Fall 2009

Homework 4

Instructions: please read carefully

- **You should show your work how to get the answer for each calculation question to get full credit**
- **The due date is Tuesday, Nov 3, 2009. Late homework will not be graded.**

Name(s): **Student ID**

1. Historically, which security had the lowest standard deviation?
   a. U.S. large stocks
   b. World bond portfolio
   c. U.S. long-term Treasury bonds
   d. U.S. Treasury bills

1. d

2. What is the risk premium of a stock that has an expected return of 20%, assuming the rate of return on Treasury bills is 3%?
   a. 20%
   b. 23%
   c. 17%
   d. Cannot be determined.

2.c

3. What is the effective annual rate of return on a bond that has a holding period return of 10%, assuming it pays coupons semi-annually?
   a. 10.25%
   b. 10%
   c. 21%
   d. 8.25%

3.a

4. You purchased 100 shares of ABC stock for $20 per share. One year later you received $1 cash dividend and sold the shares for $22 each. Your holding-period return was _____.
   a. 5%
   b. 10%
   c. 15%
   d. 20%

4. c HPR = (1 + 22 – 20)/20 = 15%

5. The geometric average return of 10%, -20%, -10%, and 20% is _____.
   a. 0%
   b. 1.26%
   c. -1.26%
   d. -2%

5. c [(1+0.1)(1-0.2)(1-0.1)(1+0.2)]^(1/4) -1 = -1.26%

6. The sample standard deviation of returns of 18%, -15%, -10% and 30% is _____.
   a. 15.2%
   b. 18.8%
   c. 21.7%
   d. 25.3%

$\bar{r} = (18 - 15 - 10 + 30)/4 = 5.75$

6. c $\sigma = \sqrt{\frac{1}{3}\left[(18-5.75)^2 + (-15-5.75)^2 + (-10-5.75)^2 + (30-5.75)^2\right]} = 21.7$

7. What is the ending price of a stock if its beginning price was $20, its cash dividend was $2, and the holding period return on a stock was 10%?
    a. $18
    b. $20
    c. $22
    d. $24

7. b 0.1 = (2+P1-20)/20 P1 = 20

8. A complete portfolio holds _____.
    a. all risky assets
    b. all risk-free assets
    c. risky and risk-free assets
    d. bonds and stocks

8. c

9. Which of the following is most correct concerning the standard deviation of a stock's returns?
    a. It represents the chance of making negative returns from investing in the stock.
    b. It should be zero if the stock has the same return every year.
    c. It should be greater than the stock's geometric mean return.
    d. All of the above are correct.

9. b

10. The _____ return ignores the compounding effect
    a. Geometric average
    b. Arithmetic average
    c. Dollar-weighted
    d. Both B and C above

10. b

11. The risk-free asset is proxied by the _____.
    a. Treasury bills
    b. AAA corporate bonds
    c. inflation-index bonds
    d. money market mutual funds

11. a

Using the following expectations on Stocks X and Y to answer questions 12 through 14

	Bear Market	Normal Market	Bull Market
Probability	0.2	0.5	0.3
Stock X	-20%	18%	50%
Stock Y	-15%	20%	10%

12. What are the expected returns for X and Y

$$E(r_X) = [0.2 \times (-20\%)] + [0.5 \times 18\%] + [0.3 \times 50\%)] = 20\%$$
$$E(r_Y) = [0.2 \times (-15\%)] + [0.5 \times 20\%] + [0.3 \times 10\%)] = 10\%$$

13. What are standard deviation of returns on X and Y

$$\sigma_X^2 = [0.2 \times (-20 - 20)^2] + [0.5 \times (18 - 20)^2] + [0.3 \times (50 - 20)^2] = 592$$
$$\sigma_X = 24.33\%$$
$$\sigma_Y = [0.2 \times (-15 - 10)^2] + [0.5 \times (20 - 10)^2] + [0.3 \times (10 - 10)^2] = 175$$
$$\sigma_Y = 13.23\%$$

14. Assume that of your $10,000 portfolio, you invest $9000 in stock X and $1000 in stock Y. What is the expected return on your portfolio?

$$E(r) = (0.9 \times 20\%) + (0.1 \times 10\%) = 19\%$$

Using the following information to answer question 15-17

Assume you manage a risky portfolio with an expected rate of return of 17% and a standard deviation of 27%. The T-bill rate (risk-free rate) is 7%

15. Your client chooses to invest 70% of a portfolio in your fund (risky portfolio) and 30% in a T-bill money market fund. What is expected return and standard deviation of your client's complete portfolio.

$$E(r_c) = (0.3 \times 7\%) + (0.7 \times 17\%) = 14\% \text{ per year}$$

$$\sigma_c = 0.7 \times 27\% = 18.9\% \text{ per year}$$

16. Suppose your risky portfolio includes the following investments in the given proportions:

Stock A	27%
Stock B	33%
Stock C	40%

(K)

What are the investment proportions of each security in your client's overall portfolio, including the position in T-bills?

Security		Investment Proportions
T-Bills		30.0%
Stock A	$0.7 \times 27\% =$	18.9%
Stock B	$0.7 \times 33\% =$	23.1%
Stock C	$0.7 \times 40\% =$	28.0%

17. What is the reward-to-variability ratio of your risky portfolio and your client's overall complete portfolio.

$$\text{Your Reward-to-variability ratio} = S = \frac{17-7}{27} = 0.3704$$

$$\text{Client's Reward-to-variability ratio} = \frac{14-7}{18.9} = 0.3704$$

18. Suppose your client decides to invest in your risky portfolio a proportion (y) of his total investment budget so that his overall portfolio will have an expected rate of return of 15%.

a. What is the proportion y?

$E(r_c) = (1-y)r_f + y\,E(r_P) = (1\text{-}y)7 + 17y = 7 + 10y$

If the expected rate of return for the portfolio is 15%, then, solving for y:

$$15 = 7 + 10y \Rightarrow y = \frac{15-7}{10} = 0.8$$

Therefore, in order to achieve an expected rate of return of 15%, the client must invest 80% of total funds in the risky portfolio and 20% in T-bills.

b. What are your client's investment proportions in your three stocks and the T-bill fund?

Security		Investment Proportions
T-Bills		20.0%
Stock A	$0.8 \times 27\% =$	21.6%
Stock B	$0.8 \times 33\% =$	26.4%
Stock C	$0.8 \times 40\% =$	32.0%

c. What is the standard deviation of your client's portfolio?

$\sigma_P = 0.8 \times 27\% = 21.6\%$ per year

19. A portfolio of nondividend-paying stocks earned geometric mean return of 5 percent between January 1, 2001 and December 31, 2007. The arithmetic mean return for the same period was 6 percent. If the market value of the portfolio at the beginning of 2001 was $100,000, what was the market value of the portfolio at the end of 2007?

$$\text{Value}(12/31/2007) = \text{Value}(1/1/2001) \times (1 + g)^7$$
$$= \$100{,}000 \times (1.05)^7 = \$140{,}710.04$$