

Financial Management
FINA 2010, Semester II, 2020-2021
Assignment 9 (Solution)
22 March, 2021

1. Questions from Chapter 13 of the text book (Page450, Concepts Review and Critical Thinking Questions)

Q1: Some of the risk in holding any asset is unique to the asset in question. By investing in a variety of assets, this unique portion of the total risk can be eliminated at little cost. On the other hand, there are some risks that affect all investments. This portion of the total risk of an asset cannot be costlessly eliminated. In other words, systematic risk can be controlled, but only by a costly reduction in expected returns.

Q2: If the market expected the growth rate in the coming year to be 2 percent, then there would be no change in security prices if this expectation had been fully anticipated and priced. However, if the market had been expecting a growth rate other than 2 percent and the expectation was incorporated into security prices, then the government's announcement would most likely cause security prices in general to change; prices would drop if the anticipated growth rate had been more than 2 percent, and prices would rise if the anticipated growth rate had been less than 2 percent.

Q4: *a.* a change in systematic risk has occurred; market prices in general will most likely decline.
b. no change in unsystematic risk; company price will most likely stay constant.
c. no change in systematic risk; market prices in general will most likely stay constant.
d. a change in unsystematic risk has occurred; company price will most likely decline.
e. no change in systematic risk; market prices in general will most likely stay constant assuming the market believed the legislation would be passed.

Q6: False. The variance of the individual assets is a measure of the total risk. The variance on a well-diversified portfolio is a function of systematic risk only.

Q7: Yes, the standard deviation can be less than that of every asset in the portfolio. However, σ_p cannot be less than the smallest beta because σ_p is a weighted average of the individual asset betas.

Q8: Yes. It is possible, in theory, to construct a zero beta portfolio of risky assets whose return would be equal to the risk-free rate. It is also possible to have a negative beta; the return would be less than the risk-free rate. A negative beta asset would carry a negative risk premium because of its value as a diversification instrument.

2. Questions from Chapter 13 of the text book (Page 451, Questions and Problems)

Q18: There are two ways to correctly answer this question so we will work through both. First, we can use the CAPM. Substituting in the value we are given for each stock, we find:

$$E(R_Y) = .024 + .072(1.20)$$

$$E(R_Y) = .1104, \text{ or } 11.04\%$$

It is given in the problem that the expected return of Stock Y is 11.1 percent, but according to the CAPM the expected return of the stock should be 11.04 percent based on its level of risk. This means the stock return is too high, given its level of risk. Stock Y plots above the SML and is undervalued. In other words, its price must increase to reduce the expected return to 11.04 percent.

For Stock Z, we find:

$$E(R_Z) = .024 + .072(.80)$$

$$E(R_Z) = .0816, \text{ or } 8.16\%$$

The return given for Stock Z is 7.85 percent, but according to the CAPM the expected return of the stock should be 8.16 percent based on its level of risk. Stock Z plots below the SML and is overvalued. In other words, its price must decrease to increase the expected return to 8.16 percent.

We can also answer this question using the reward-to-risk ratio. All assets must have the same reward-to-risk ratio. The reward-to-risk ratio is the risk premium of the asset divided by its beta. We are given the market risk premium, and we know the beta of the market is one, so the reward-to-risk ratio for the market is .072, or 7.2 percent. Calculating the reward-to-risk ratio for Stock Y, we find:

$$\text{Reward-to-risk ratio } Y = (.1110 - .024)/1.20$$

$$\text{Reward-to-risk ratio } Y = .0725, \text{ or } 7.25\%$$

The reward-to-risk ratio for Stock Y is too high, which means the stock plots above the SML, and the stock is undervalued. Its price must increase until its reward-to-risk ratio is equal to the market reward-to-risk ratio. For Stock Z, we find:

$$\text{Reward-to-risk ratio } Z = (.0785 - .024)/.80$$

$$\text{Reward-to-risk ratio } Z = .0681, \text{ or } 6.81\%$$

The reward-to-risk ratio for Stock Z is too low, which means the stock plots below the SML, and the stock is overvalued. Its price must decrease until its reward-to-risk ratio is equal to the market reward-to-risk ratio.

Q22: We know that the reward-to-risk ratios for all assets must be equal. This can be expressed as:

$$[E(R_A) - R_f]/\beta_A = [E(R_B) - R_f]/\beta_B$$

The numerator of each equation is the risk premium of the asset, so:

$$RP_A/\beta_A = RP_B/\beta_B$$

We can rearrange this equation to get:

$$\beta_B/\beta_A = RP_B/RP_A$$

If the reward-to-risk ratios are the same, the ratio of the betas of the assets is equal to the ratio of the risk premiums of the assets.

Q27: Here we have the expected return and beta for two assets. We can express the returns of the two assets using CAPM. If the CAPM is true, then the security market line holds as well, which means all assets have the same risk premium. Setting the risk premiums of the assets equal to each other and solving for the risk-free rate, we find:

$$(.1323 - R_f)/1.25 = (.0967 - R_f)/.87$$

$$.87(.1323 - R_f) = 1.25(.0967 - R_f)$$

$$.11510 - .87R_f = .12088 - 1.25R_f$$

$$.38R_f = .00577$$

$$R_f = .0152, \text{ or } 1.52\%$$

Now using CAPM to find the expected return on the market with both stocks, we find:

$$.1323 = .0152 + 1.25(R_M - .0152)$$

$$.0967 = .0152 + .87(R_M - .0152)$$

$$R_M = .1089, \text{ or } 10.89\%$$

$$R_M = .1089, \text{ or } 10.89\%$$

Q28: a. The expected return of an asset is the sum of the probability of each return occurring times the probability of that return occurring. So, the expected return of each stock is:

$$E(R_A) = .15(-.08) + .60(.11) + .25(.30)$$

$$E(R_A) = .1290, \text{ or } 12.90\%$$

$$E(R_B) = .15(-.10) + .60(.09) + .25(.27)$$

$$E(R_B) = .1065, \text{ or } 10.65\%$$

b. We can use the expected returns we calculated to find the slope of the SML. We know that the beta of Stock A is .35 greater than the beta of Stock B. Therefore, as beta increases by .35, the expected return on a security increases by .0225 ($= .1290 - .1065$). The slope of the SML equals: $\text{Slope}_{\text{SML}} = \text{Rise}/\text{Run}$

$$\text{Slope}_{\text{SML}} = \text{Increase in expected return}/\text{Increase in beta}$$

$$\text{Slope}_{\text{SML}} = (.1290 - .1065)/.35$$

$$\text{Slope}_{\text{SML}} = .0643, \text{ or } 6.43\%$$

Since the market's beta is 1 and the risk-free rate has a beta of zero, the slope of the SML equals the expected market risk premium. So, the expected market risk premium must be 6.43 percent.

We could also solve this problem using CAPM. The equations for the expected returns of the two stocks are:

$$E(R_A) = .1290 = R_f + (\beta_B + .35)(MRP)$$

$$E(R_B) = .1065 = R_f + \beta_B(MRP)$$

Subtracting the CAPM equation for Stock B from the CAPM equation for Stock A yields:

$$.0225 = .35MRP$$

$$MRP = .0643, \text{ or } 6.43\%$$

which is the same answer as our previous result.

3. Which one of the following is a risk that applies to most securities?

- A. unsystematic
- B. diversifiable
- C. systematic**
- D. asset-specific
- E. total

4. A news flash just appeared that caused about a dozen stocks to suddenly drop in value by about 20 percent. What type of risk does this news flash represent?

- A. portfolio
- B. nondiversifiable
- C. market
- D. unsystematic**
- E. total

5. The principle of diversification tells us that:

- A. concentrating an investment in two or three large stocks will eliminate all of the unsystematic risk.
- B. concentrating an investment in three companies all within the same industry will greatly reduce the systematic risk.
- C. spreading an investment across five diverse companies will not lower the total risk.
- D. spreading an investment across many diverse assets will eliminate all of the systematic risk.
- E. spreading an investment across many diverse assets will eliminate some of the total risk.**

6. Which one of the following measures the amount of systematic risk present in a particular risky asset relative to the systematic risk present in an average risky asset?

- A. beta**
- B. reward-to-risk ratio
- C. risk ratio
- D. standard deviation
- E. price-earnings ratio

7. Which one of the following is represented by the slope of the security market line?

- A. reward-to-risk ratio
- B. market standard deviation
- C. beta coefficient
- D. risk-free interest rate
- E. market risk premium**

8. Treynor Industries is investing in a new project. The minimum rate of return the firm requires on this project is referred to as the:

- A. average arithmetic return.
- B. expected return.
- C. market rate of return.
- D. internal rate of return.
- E. cost of capital.**

9. The expected return on a stock computed using economic probabilities is:

- A. guaranteed to equal the actual average return on the stock for the next five years.
- B. guaranteed to be the minimal rate of return on the stock over the next two years.
- C. guaranteed to equal the actual return for the immediate twelve month period.
- D. a mathematical expectation based on a weighted average and not an actual anticipated outcome.**
- E. the actual return you should anticipate as long as the economic forecast remains constant.

10. Standard deviation measures which type of risk?

- A. total**
- B. nondiversifiable
- C. unsystematic
- D. systematic
- E. economic

11. The expected rate of return on a stock portfolio is a weighted average where the weights are based on the:

- A. number of shares owned of each stock.
- B. market price per share of each stock.
- C. market value of the investment in each stock.**
- D. original amount invested in each stock.
- E. cost per share of each stock held.

12. The expected return on a portfolio:

- I. can never exceed the expected return of the best performing security in the portfolio.
 - II. must be equal to or greater than the expected return of the worst performing security in the portfolio.
 - III. is independent of the unsystematic risks of the individual securities held in the portfolio.
 - IV. is independent of the allocation of the portfolio amongst individual securities.
- A. I and III only
 - B. II and IV only
 - C. I and II only
 - D. I, II, and III only**
 - E. I, II, III, and IV

13. The standard deviation of a portfolio:

- A. is a weighted average of the standard deviations of the individual securities held in the portfolio.
 - B. can never be less than the standard deviation of the most risky security in the portfolio.
 - C. must be equal to or greater than the lowest standard deviation of any single security held in the portfolio.
 - D. is an arithmetic average of the standard deviations of the individual securities which comprise the portfolio.
- E. can be less than the standard deviation of the least risky security in the portfolio.**

14. Which one of the following events would be included in the expected return on Sussex stock?

- A. The chief financial officer of Sussex unexpectedly resigned.
- B. The labor union representing Sussex' employees unexpectedly called a strike.
- C. This morning, Sussex confirmed that its CEO is retiring at the end of the year as was anticipated.**
- D. The price of Sussex stock suddenly declined in value because researchers accidentally discovered that one of the firm's products can be toxic to household pets.
- E. The board of directors made an unprecedented decision to give sizeable bonuses to the firm's internal auditors for their efforts in uncovering wasteful spending.

15. Unsystematic risk:

- A. can be effectively eliminated by portfolio diversification.**
- B. is compensated for by the risk premium.
 - C. is measured by beta.
 - D. is measured by standard deviation.
 - E. is related to the overall economy.

16. Which one of the following is least apt to reduce the unsystematic risk of a portfolio?

- A. reducing the number of stocks held in the portfolio**
- B. adding bonds to a stock portfolio
 - C. adding international securities into a portfolio of U.S. stocks
 - D. adding U.S. Treasury bills to a risky portfolio
 - E. adding technology stocks to a portfolio of industrial stocks

17. Which one of the following is the best example of a diversifiable risk?

- A. interest rates increase
- B. energy costs increase
- C. core inflation increases
- D. a firm's sales decrease**
- E. taxes decrease

18. The primary purpose of portfolio diversification is to:

- A. increase returns and risks.
- B. eliminate all risks.
- C. eliminate asset-specific risk.**
- D. eliminate systematic risk.
- E. lower both returns and risks.

19. At a minimum, which of the following would you need to know to estimate the amount of additional reward you will receive for purchasing a risky asset instead of a risk-free asset?

- I. asset's standard deviation
 - II. asset's beta
 - III. risk-free rate of return
 - IV. market risk premium
- A. I and III only
 - B. II and IV only**
 - C. III and IV only
 - D. I, III, and IV only
 - E. I, II, III, and IV

20. A stock with an actual return that lies above the security market line has:

- A. more systematic risk than the overall market.
- B. more risk than that warranted by CAPM.
- C. a higher return than expected for the level of risk assumed.**
- D. less systematic risk than the overall market.
- E. a return equivalent to the level of risk assumed.

21. The market rate of return is 11 percent and the risk-free rate of return is 3 percent. Lexant stock has 3 percent less systematic risk than the market and has an actual return of 12 percent. This stock:

- A. is underpriced.**
- B. is correctly priced.
- C. will plot below the security market line.
- D. will plot on the security market line.
- E. will plot to the right of the overall market on a security market line graph.

22. Which one of the following will be constant for all securities if the market is efficient and securities are priced fairly?

- A. variance
- B. standard deviation
- C. reward-to-risk ratio**
- D. beta
- E. risk premium

23. The capital asset pricing model (CAPM) assumes which of the following?

- I. a risk-free asset has no systematic risk.
 - II. beta is a reliable estimate of total risk.
 - III. the reward-to-risk ratio is constant.
 - IV. the market rate of return can be approximated.
- A. I and III only
 - B. II and IV only
 - C. I, III, and IV only**
 - D. II, III, and IV only
 - E. I, II, III, and IV

24. According to CAPM, the amount of reward an investor receives for bearing the risk of an individual security depends upon the:

- A. amount of total risk assumed and the market risk premium.
- B. market risk premium and the amount of systematic risk inherent in the security.**
- C. risk free rate, the market rate of return, and the standard deviation of the security.
- D. beta of the security and the market rate of return.
- E. standard deviation of the security and the risk-free rate of return.

25. You want your portfolio beta to be 0.95. Currently, your portfolio consists of \$4,000 invested in stock A with a beta of 1.47 and \$3,000 in stock B with a beta of 0.54. You have another \$9,000 to invest and want to divide it between an asset with a beta of 1.74 and a risk-free asset. How much should you invest in the risk-free asset?

- A. \$4,316.08
- B. \$4,425.29
- C. \$4,902.29
- D. \$4,574.71**
- E. \$4,683.92

$$\text{Beta}_{\text{Portfolio}} = 0.95 = (\$4,000/\$16,000)(1.47) + (\$3,000/\$16,000)(0.54) + (x/\$16,000)(1.74) + ((\$9,000 - x)/\$16,000)(0); \text{ Investment in risk-free asset} = \$9,000 - \$4,425.29 = \$4,574.71$$

26. Jerilu Markets has a beta of 1.09. The risk-free rate of return is 2.75 percent and the market rate of return is 9.80 percent. What is the risk premium on this stock?

- A. 6.47 percent
- B. 7.03 percent
- C. 7.68 percent**
- D. 8.99 percent
- E. 9.80 percent

$$\text{Risk premium} = 1.09 (0.098 - 0.0275) = 7.68 \text{ percent}$$

27. You have a portfolio consisting solely of stock A and stock B. The portfolio has an expected return of 8.7 percent. Stock A has an expected return of 11.4 percent while stock B is expected to return 6.4 percent. What is the portfolio weight of stock A?

- A. 39 percent
- B. 46 percent**
- C. 54 percent
- D. 61 percent
- E. 67 percent

$$0.087 = [0.114x] + [0.064(1-x)]; x = 46 \text{ percent}$$

28. What is the expected return on a portfolio which is invested 25 percent in stock A, 55 percent in stock B, and the remainder in stock C?

State of Economy	Probability of State of Economy	Returns if State Occurs		
		Stock A	Stock B	Stock C
Boom	5%	19%	9%	6%
Normal	45%	11%	8%	13%
Recession	50%	-23 %	5%	25%

- A. -1.06 percent
- B. 2.38 percent
- C. 2.99 percent
- D. 5.93 percent**
- E. 6.10 percent

$$E(r)_{\text{Boom}} = (0.25 \times 0.19) + (0.55 \times 0.09) + (0.20 \times 0.06) = 0.109$$

$$E(r)_{\text{Normal}} = (0.25 \times 0.11) + (0.55 \times 0.08) + (0.20 \times 0.13) = .0975$$

$$E(r)_{\text{Bust}} = (0.25 \times -0.23) + (0.55 \times 0.05) + (0.20 \times 0.25) = 0.02$$

$$E(r)_{\text{Portfolio}} = (0.05 \times 0.109) + (0.45 \times 0.0975) + (0.50 \times 0.02) = 5.93 \text{ percent}$$

29. What is the variance of the returns on a portfolio that is invested 60 percent in stock S and 40 percent in stock T?

State of Economy	Probability of State of Economy	Returns if State Occurs	
		Stock S	Stock T
Boom	20%	17%	7%
Normal	80%	13%	10%

- A. .000017
- B. .000023**
- C. .000118
- D. .000136
- E. .000161

$$E(r)_{\text{Boom}} = (0.60 \times 0.17) + (0.40 \times 0.07) = 0.13$$

$$E(r)_{\text{Normal}} = (0.60 \times 0.13) + (0.40 \times 0.10) = 0.118$$

$$E(r)_{\text{Portfolio}} = (0.20 \times 0.13) + (0.80 \times 0.118) = 0.1204$$

$$\text{Var}_{\text{Portfolio}} = 0.20 (0.13 - 0.1204)^2 + 0.80 (0.118 - 0.1204)^2 = .000023$$

30. What is the standard deviation of the returns on a portfolio that is invested in stocks A, B, and C? Twenty five percent of the portfolio is invested in stock A and 40 percent is invested in stock C.

<u>State of Economy</u>	<u>Probability of State of Economy</u>	<u>Returns if State Occurs</u>		
		<u>Stock A</u>	<u>Stock B</u>	<u>Stock C</u>
Boom	5%	17%	6%	22%
Normal	55%	8%	10%	15%
Recession	40%	-3%	19%	-25%

- A. 6.31 percent
- B. 6.49 percent
- C. 7.40 percent
- D. 7.83 percent**
- E. 8.72 percent

$$E(r)_{\text{Boom}} = (0.25 \times 0.17) + (0.35 \times 0.06) + (0.40 \times 0.22) = 0.1515$$

$$E(r)_{\text{Normal}} = (0.25 \times 0.08) + (0.35 \times 0.10) + (0.40 \times 0.15) = 0.115$$

$$E(r)_{\text{Bust}} = (0.25 \times -0.03) + (0.35 \times 0.19) + (0.40 \times -0.25) = -0.041$$

$$E(r)_{\text{Portfolio}} = (0.05 \times 0.1515) + (0.55 \times 0.115) + (0.40 \times -0.041) = 0.054425$$

$$\text{Var}_{\text{Portfolio}} = [0.05 \times (0.1515 - 0.054425)^2] + [0.55 \times (0.115 - 0.054425)^2] + [0.40 \times (-0.041 - 0.054425)^2] = 0.006132$$

$$\text{Std dev} = \sqrt{0.006132} = 7.83 \text{ percent}$$

31. What is the beta of the following portfolio?

<u>Stock</u>	<u>Amount Invested</u>	<u>Security</u>
	<u>Invested</u>	<u>Beta</u>
A	\$6,700	1.58
B	\$4,900	1.23
C	\$8,500	0.79

- A. 1.04
- B. 1.07
- C. 1.13
- D. 1.16**
- E. 1.23

$$\text{Value}_{\text{Portfolio}} = \$6,700 + \$4,900 + \$8,500 = \$20,100$$

$$\text{Beta}_{\text{Portfolio}} = (\$6,700/\$20,100 \times 1.58) + (\$4,900/\$20,100 \times 1.23) + (\$8,500/\$20,100 \times 0.79) = 1.16$$

32. Which one of the following stocks is correctly priced if the risk-free rate of return is 3.7 percent and the market risk premium is 8.8 percent?

<u>Stock</u>	<u>Beta</u>	<u>Expected Return</u>
A	0.64	9.47%
B	0.97	12.03%
C	1.22	14.44%
D	1.37	15.80%
E	1.68	18.37%

- A. A
- B. B
- C. C**
- D. D
- E. E

$$E(r)_A = 0.037 + (0.64 \times 0.088) = 0.0933$$

$$E(r)_B = 0.037 + (0.97 \times 0.088) = 0.1224$$

$E(r)_C = 0.037 + (1.22 \times 0.088) = 0.1444$ Stock C is correctly priced.

$$E(r)_D = 0.037 + (1.37 \times 0.088) = 0.1576$$

$$E(r)_E = 0.037 + (1.68 \times 0.088) = 0.1848$$