

CHAPTER 2 RISK AND RATES OF RETURN

DETAILED SOLUTIONS ARE AT THE END OF THIS DOCUMENT

Required return

Answer: d

1. The risk-free rate of interest, k_{RF} , is 6 percent. The overall stock market has an expected return of 12 percent. Hazlett, Inc. has a beta of 1.2. What is the required return of Hazlett, Inc. stock?
- a. 12.0%
 - b. 12.2%
 - c. 12.8%
 - d. 13.2%
 - e. 13.5%

Required return

Answer: b

2. The risk-free rate is 5 percent. Stock A has a beta = 1.0 and Stock B has a beta = 1.4. Stock A has a required return of 11 percent. What is Stock B's required return?
- a. 12.4%
 - b. 13.4%
 - c. 14.4%
 - d. 15.4%
 - e. 16.4%

CAPM and market risk premium

Answer: c

3. Consider the following information for three stocks, Stock A, Stock B, and Stock C. The returns on each of the three stocks are positively correlated, but they are not perfectly correlated. (That is, all of the correlation coefficients are between 0 and 1.)

<u>Stock</u>	<u>Expected Return</u>	<u>Standard Deviation</u>	<u>Beta</u>
Stock A	10%	20%	1.0
Stock B	10	20	1.0
Stock C	12	20	1.4

Portfolio P has half of its funds invested in Stock A and half invested in Stock B. Portfolio Q has one third of its funds invested in each of the three stocks. The risk-free rate is 5 percent, and the market is in equilibrium. (That is, required returns equal expected returns.) What is the market risk premium ($k_M - k_{RF}$)?

- a. 4.0%
- b. 4.5%
- c. 5.0%
- d. 5.5%
- e. 6.0%

Market risk premium**Answer: d**

4. A stock has an expected return of 12.25 percent. The beta of the stock is 1.15 and the risk-free rate is 5 percent. What is the market risk premium?
- a. 1.30%
 - b. 6.50%
 - c. 15.00%
 - d. 6.30%
 - e. 7.25%

Beta coefficient**Answer: b**

5. Given the following information, determine which beta coefficient for Stock A is consistent with equilibrium:

$$\hat{k}_A = 11.3\%; k_{RF} = 5\%; k_M = 10\%$$

- a. 0.86
- b. 1.26
- c. 1.10
- d. 0.80
- e. 1.35

Beta coefficient**Answer: a**

6. Assume that the risk-free rate is 5 percent and that the market risk premium is 7 percent. If a stock has a required rate of return of 13.75 percent, what is its beta?
- a. 1.25
 - b. 1.35
 - c. 1.37
 - d. 1.60
 - e. 1.96

Portfolio beta**Answer: b**

7. You hold a diversified portfolio consisting of a \$10,000 investment in each of 20 different common stocks (that is, your total investment is \$200,000). The portfolio beta is equal to 1.2. You have decided to sell one of your stocks that has a beta equal to 0.7 for \$10,000. You plan to use the proceeds to purchase another stock that has a beta equal to 1.4. What will be the beta of the new portfolio?
- a. 1.165
 - b. 1.235
 - c. 1.250
 - d. 1.284
 - e. 1.333

Portfolio return**Answer: a**

8. An investor is forming a portfolio by investing \$50,000 in stock A that has a beta of 1.50, and \$25,000 in stock B that has a beta of 0.90. The return on the market is equal to 6 percent and Treasury bonds have a yield of 4 percent. What is the required rate of return on the investor's portfolio?
- a. 6.6%
 - b. 6.8%
 - c. 5.8%
 - d. 7.0%
 - e. 7.5%

Portfolio return**Answer: b**

9. You are an investor in common stocks, and you currently hold a well-diversified portfolio that has an expected return of 12 percent, a beta of 1.2, and a total value of \$9,000. You plan to increase your portfolio by buying 100 shares of AT&E at \$10 a share. AT&E has an expected return of 20 percent with a beta of 2.0. What will be the expected return and the beta of your portfolio after you purchase the new stock?
- a. $\hat{k}_p = 20.0\%$; $b_p = 2.00$
 - b. $\hat{k}_p = 12.8\%$; $b_p = 1.28$
 - c. $\hat{k}_p = 12.0\%$; $b_p = 1.20$
 - d. $\hat{k}_p = 13.2\%$; $b_p = 1.40$
 - e. $\hat{k}_p = 14.0\%$; $b_p = 1.32$

Coefficient of variation**Answer: b**

10. Below are the stock returns for the past five years for Agnew Industries:

<u>Year</u>	<u>Stock Return</u>
2002	22%
2001	33
2000	1
1999	-12
1998	10

What was the stock's coefficient of variation during this 5-year period? (Use the population standard deviation to calculate the coefficient of variation.)

- a. 10.80
- b. 1.46
- c. 15.72
- d. 0.69
- e. 4.22

Required return**Answer: e**

11. Partridge Plastic's stock has an estimated beta of 1.4, and its required rate of return is 13 percent. Cleaver Motors' stock has a beta of 0.8, and the risk-free rate is 6 percent. What is the required rate of return on Cleaver Motors' stock?
- a. 7.0%
 - b. 10.4%
 - c. 12.0%
 - d. 11.0%
 - e. 10.0%

Expected and required returns**Answer: b**

12. You have been scouring *The Wall Street Journal* looking for stocks that are "good values" and have calculated expected returns for five stocks. Assume the risk-free rate (k_{RF}) is 7 percent and the market risk premium ($k_M - k_{RF}$) is 2 percent. Which security would be the best investment? (Assume you must choose just one.)

<u>Expected Return</u>	<u>Beta</u>
a. 9.01%	1.70
b. 7.06%	0.00
c. 5.04%	-0.67
d. 8.74%	0.87
e. 11.50%	2.50

Portfolio return**Answer: c**

13. A portfolio manager is holding the following investments:

<u>Stock</u>	<u>Amount Invested</u>	<u>Beta</u>
X	\$10 million	1.4
Y	20 million	1.0
Z	40 million	0.8

The manager plans to sell his holdings of Stock Y. The money from the sale will be used to purchase another \$15 million of Stock X and another \$5 million of Stock Z. The risk-free rate is 5 percent and the market risk premium is 5.5 percent. How many percentage points higher will the required return on the portfolio be after he completes this transaction?

- a. 0.07%
- b. 0.18%
- c. 0.39%
- d. 0.67%
- e. 1.34%

Portfolio return and beta**Answer: a**

14. A portfolio manager is holding the following investments in her portfolio:

Stock	Amount Invested	Beta
1	\$300 million	0.7
2	200 million	1.0
3	500 million	1.6

The risk-free rate, k_{RF} , is 5 percent and the portfolio has a required return of 11.655 percent. The manager is thinking about selling all of her holdings of Stock 3, and instead investing the money in Stock 4, which has a beta of 0.9. If she were to do this, what would be the new portfolio's required return?

- a. 9.73%
- b. 11.09%
- c. 9.91%
- d. 7.81%
- e. 10.24%

CHAPTER 2

ANSWERS AND SOLUTIONS

1. Required return**Answer: d Diff: E N**

$$\begin{aligned}
 k_S &= k_{RF} + (k_M - k_{RF})b \\
 &= 6\% + (12\% - 6\%)1.2 \\
 &= 13.2\%.
 \end{aligned}$$

2. Required return**Answer: b Diff: E N**

Step 1: We must determine the market risk premium using the CAPM equation with data inputs for Stock A:

$$\begin{aligned}
 k_A &= k_{RF} + (k_M - k_{RF})b_A \\
 11\% &= 5\% + (k_M - k_{RF})1.0 \\
 6\% &= (k_M - k_{RF}).
 \end{aligned}$$

Step 2: We can now find the required return of Stock B using the CAPM equation with data inputs for Stock B:

$$\begin{aligned}
 k_B &= k_{RF} + (k_M - k_{RF})b_B \\
 k_B &= 5\% + (6\%)1.4 \\
 k_B &= 13.4\%.
 \end{aligned}$$

3. CAPM and market risk premium**Answer: c Diff: E N**

Using Stock A (or any stock),

$$\begin{aligned}
 10\% &= k_{RF} + (k_M - k_{RF})b_A \\
 10\% &= 5\% + (k_M - k_{RF})1.0 \\
 (k_M - k_{RF}) &= 5\%.
 \end{aligned}$$

4. Market risk premium

Answer: d Diff: E

$$\begin{aligned}12.25\% &= 5\% + (RP_M)1.15 \\7.25\% &= (RP_M)1.15 \\RP_M &= 6.3043\% \approx 6.30\%.\end{aligned}$$

5. Beta coefficient

Answer: b Diff: E

In equilibrium

$$\begin{aligned}k_A &= \hat{k}_A = 11.3\%. \\k_A &= k_{RF} + (k_M - k_{RF})b \\11.3\% &= 5\% + (10\% - 5\%)b \\b &= 1.26.\end{aligned}$$

6. Beta coefficient

Answer: a Diff: E

$$\begin{aligned}13.75\% &= 5\% + (7\%)b \\8.75\% &= 7\%b \\b &= 1.25.\end{aligned}$$

7. Portfolio beta

Answer: b Diff: E

$$\begin{aligned}1.2 &= 1/20(0.7) + (19/20)b \\b &\text{ is average beta for other 19 stocks.} \\1.165 &= (19/20)b \\ \text{New Beta} &= 1.165 + 1/20(1.4) = 1.235.\end{aligned}$$

8. Portfolio return

Answer: a Diff: E

The portfolio's beta is a weighted average of the individual security betas as follows:

$$(\$50,000/\$75,000)1.5 + (\$25,000/\$75,000)0.9 = 1.3. \quad \text{The required rate of return is then simply: } 4\% + (6\% - 4\%)1.3 = 6.6\%.$$

9. Portfolio return

Answer: b Diff: E

$$\begin{aligned}\hat{k}_p &= 0.9(12\%) + 0.1(20\%) = 12.8\%. \\b_p &= 0.9(1.2) + 0.1(2.0) = 1.28.\end{aligned}$$

10. Coefficient of variation

Answer: b Diff: E

Using your financial calculator you find the mean to be 10.8% and the population standard deviation to be 15.715%. The coefficient of variation is just the standard deviation divided by the mean, or $15.715\%/10.8\% = 1.4551 \approx 1.46$.

11. Required return

Answer: e Diff: M

Step 1: Calculate the market risk premium ($k_M - k_{RF}$) using the information for Partridge:

$$13\% = 6\% + (k_M - k_{RF})1.4$$

$$k_M - k_{RF} = 5\%.$$

Step 2: Now calculate the required return for Cleaver:

$$k_s = 6\% + (5\%)0.8 = 10\%.$$

12. Expected and required returns

Answer: b Diff: M

By calculating the required returns on each of the securities and comparing required and expected returns, we can identify which security is the best investment alternative; that is, the security for which the expected return exceeds the required return by the largest amount. The expected and required returns and the differences between them are shown below:

Security	Expected Return	Required Return	Expected-Required
A	9.01%	$7\% + 2\%(1.7) = 10.40\%$	-1.39%
B	7.06%	$7\% + 2\%(0.0) = 7.00\%$	0.06%
C	5.04%	$7\% + 2\%(-0.67) = 5.66\%$	-0.62%
D	8.74%	$7\% + 2\%(0.87) = 8.74\%$	0.00%
E	11.50%	$7\% + 2\%(2.50) = 12.00\%$	-0.50%

Clearly, security B is the best alternative.

13. Portfolio return

Answer: c Diff: M

Find the initial portfolio's beta and its required return. Then, find the new beta and new required return. Then subtract the two.

Step 1: The portfolio beta is the weighted average beta of the stocks in the portfolio. The total invested is \$70 million (\$10 + \$20 + \$40).

$$b_{old} = \left(\frac{\$10}{\$70}\right)(1.4) + \left(\frac{\$20}{\$70}\right)(1.0) + \left(\frac{\$40}{\$70}\right)(0.8)$$

$$b_{old} = 0.9429.$$

$$\begin{aligned} k_{old} &= k_{RF} + (k_M - k_{RF})b \\ &= 5\% + (5.5\%)(0.9429) \\ &= 10.1857\%. \end{aligned}$$

Step 2: Now, change the weights. The amount of X owned is now \$25 million (\$10 + \$15), the amount of Y owned is now \$0 million, and the amount of Z owned is \$45 million (\$40 + \$5).

$$b_{New} = \left(\frac{\$25}{\$70}\right)(1.4) + \left(\frac{\$0}{\$70}\right)(1.0) + \left(\frac{\$45}{\$70}\right)(0.8)$$

$$b_{New} = 1.0143.$$

$$\begin{aligned} k_{New} &= k_{RF} + (k_M - k_{RF})b \\ &= 5\% + (5.5\%)(1.0143) \\ &= 10.5786\%. \end{aligned}$$

Step 3: Now subtract the two returns:
 $10.5786\% - 10.1857\% = 0.3929\%.$

14. Portfolio return and beta

Answer: a Diff: M

Step 1: Calculate the beta of the original portfolio:

Right now, the total dollars invested in the portfolio is:

$\$300 + \$200 + \$500 = \$1,000$ million. The portfolio's beta is:

$$b = 0.7(\$300/\$1,000) + 1.0(\$200/\$1,000) + 1.6(\$500/\$1,000) \\ = 1.21.$$

Step 2: Calculate the market risk premium using the CAPM, given the original beta calculated in Step 1:

$$k_p = k_{RF} + (k_M - k_{RF})b \\ 11.655\% = 5\% + (k_M - k_{RF})1.21 \\ 6.655\% = 1.21(k_M - k_{RF}) \\ 5.5\% = k_M - k_{RF}.$$

Step 3: Calculate the new portfolio's beta:

Now, if she changes her portfolio and gets rid of Stock 3 (with a beta of 1.6) and replaces it with Stock 4 (with a beta of 0.9), the new portfolio's beta will be:

$$b = 0.7(\$300/\$1,000) + 1.0(\$200/\$1,000) + 0.9(\$500/\$1,000) \\ = 0.86.$$

Step 4: Calculate the new portfolio's required return:

The required return will be:

$$k_p = 5.0\% + 5.5\%(0.86) \\ k_p = 9.73\%.$$