**Chapter 3: EQUILIBRIUM MODELS OF ASSET PRICING (1)**

1. ***(IFM sample questions)***Consider a portfolio of four stocks as displayed in the following table:

|  |  |  |
| --- | --- | --- |
| Stock | Weight | Beta |
| 1 | 0.1 | 1.3 |
| 2 | 0.2 | -0.6 |
| 3 | 0.3 | β3 |
| 4 | 0.4 | 1.1 |

Assume( cho) the expected return of the portfolio is 0.12, the annual effective risk-free rate( lợi suất phi rủi ro) is 0.05, and the market risk premium(phần bù rủi ro thị trường: E(r\_M)-r\_f ) is 0.08.

Assuming the Capital Asset Pricing Model holds, calculate β3.

1. 0.80
2. 1.06
3. 1.42
4. 1.83
5. 2.17
6. *(IFM sample questions)* Which of following statements represents the homogeneous expectations assumption that underlies the Capital Asset Pricing Model (CAPM)? (Câu nào thể hiện giả định kỳ vọng đồng nhất làm nền tảng cho mô hình CAPM )
7. Investors can only buy and sell at competitive market prices.(
8. Investors can borrow(vay) or lend(cho vay) at the risk-free interest rate.
9. There are no taxes or transaction costs.( không có thuế và chi phí giao dịch)
10. All investors have identical estimates for the volatilities, correlations, and  
    expected returns of securities.(các nhà đầu tư đều có ước lượng giống nhau về độ biến động, mối tương quan và lợi suất kỳ vọng của chứng khoán)
11. Investors only hold portfolios that yield maximum expected return for a given level of volatility.( chỉ nắm giữ danh mục mang lại lợi suất kỳ vọng cao nhất với mức độ biến động nhất định)
12. *(IFM sample questions)* The following table shows the beta and expected return for each of five stocks.

|  |  |  |
| --- | --- | --- |
| Stock (*i*) | β*i* | E(ri) |
| 1 | 1.2 | 0.124 |
| 2 | 1.0 | 0.110 |
| 3 | 0.7 | 0.103 |
| 4 | 0.4 | 0.068 |
| 5 | 0.1 | 0.047 |

All of these stocks except one lie on the Security Market Line.

Calculate the alpha of the stock that does NOT lie on the Security Market Line.

1. –0.026
2. -0.014
3. 0.000
4. 0.014
5. 0.026
6. *(IFM sample questions)* You are given the following information about Stock X, Stock Y, and the market:
7. The annual effective risk-free rate is 4%.
8. The expected return and volatility for Stock X, Stock Y, and the market are shown in the table below:

|  |  |  |
| --- | --- | --- |
|  | **Expected Return** | **Volatility** |
| **Stock X** | 5.5% | 40% |
| **Stock Y** | 4.5% | 35% |
| **Market** | 6.0% | 25% |

1. The correlation between the returns of stock X and the market is –0.25.
2. The correlation between the returns of stock Y and the market is 0.30.

Assume the Capital Asset Pricing Model holds. Calculate the required returns for Stock X and Stock Y and determine which of the two stocks an investor should choose.

1. The required return for Stock X is 3.20%, the required return for Stock Y is 4.84%, and the investor should choose Stock X.
2. The required return for Stock X is 3.20%, the required return for Stock Y is  
   4.84%, and the investor should choose Stock Y.
3. The required return for Stock X is 4.80%, the required return for Stock Y is  
   4.84%, and the investor should choose Stock X.
4. The required return for Stock X is 6.40%, the required return for Stock Y is  
   3.16%, and the investor should choose Stock Y.
5. The required return for Stock X is 3.50%, the required return for Stock Y is 3.16%, and the investor should choose both Stock X and Stock Y.
6. *(IFM sample questions)* You are given the following information about Stock X, Stock Y, and the market:
7. The expected return and volatility for Stock X, Stock Y, and the market are shown in the table below:

|  |  |  |
| --- | --- | --- |
|  | **Required Return** | **Volatility** |
| **Stock X** | 3.0% | 50% |
| **Stock Y** | ? | 35% |
| **Market** | 6.0% | 25% |
|  |  |  |

1. The correlation between the returns of stock X and the market is –0.25.
2. The correlation between the returns of stock Y and the market is 0.30.

Assume the Capital Asset Pricing Model holds. Calculate the required return for Stock Y.

1. 1.48%
2. 2.52%
3. 3.16%
4. 4.84%
5. 6.52%
6. *(IFM sample questions)* You are given the following information about Stock X and the market:
7. The annual effective risk-free rate is 5%.
8. The expected return and volatility for Stock X and the market are shown in the table below:

|  |  |  |
| --- | --- | --- |
|  | **Expected Return** | **Volatility** |
| **Stock X** | 5% | 40% |
| **Market** | 8% | 25% |

1. The correlation between the returns of stock X and the market is –0.25.

Assume the Capital Asset Pricing Model holds. Calculate the required return for Stock X and determine if the investor should invest in Stock X.

1. The required return is 1.8%, and the investor should invest in Stock X.
2. The required return is 3.8%, and the investor should NOT invest in stock X.
3. The required return is 3.8%, and the investor should invest in stock X.
4. The required return is 6.2%, and the investor should NOT invest in Stock X.
5. The required return is 6.2%, and the investor should invest in stock X.
6. ***(IFM Study Manual)***A portfolio consist of two stocks, A and B. You are given:

|  |  |  |
| --- | --- | --- |
|  | A | B |
| Expected return | 0.15 | 0.18 |
| Volatility | 0.20 | 0.25 |
| Proportion(tỷ lệ hay trọng số) of portfolio | 0.50 | 0.50 |

Beta of stock A with the portfolio is 0.8

The annual effective risk-free interest rate is 0.05.

Determine the correlation of stock A with the portfolio.

1. *(IFM Study Manual)* A portfolio consists of two stocks, A and B. You are given:

|  |  |  |
| --- | --- | --- |
|  | A | B |
| Expected return | 0.15 | 0.25 |
| Volatility | 0.20 | 0.50 |
| Proportion of portfolio | 0.60 | 0.40 |

The correlation between the stocks is 0.8.

The annual effective risk-free interest rate is 0.04.

Calculate beta of stock A with the portfolio.

1. *(IFM Study Manual)* A portfolio has Sharpe ratio 0.4. The stock of Bigwin has volatility 0.3 and its correlation with the portfolio is 0.2. The annual effective risk-free interest rate is 0.05.

Calculate the required return of Bigwin.

1. *(IFM Study Manual)* You are considering an investment. Your current portfolio has Sharpe ratio 0.3. The investment has expected return 0.1 and volatility 0.5. The annual effective risk-free interest rate is 0.04.

Let ρ be the correlation between the investment and your current portfolio.

Determine the range of ρ for which the investment would be considered.

**Use the following information for exercises 11 and 12.**

An investment of 10,000 in stock S has an expected return of 10% and volatility 30%. The annual effective risk-free interest rate is 4%.

You will borrow x at the risk-free and invest it in stock S in order to increase your expected return to 12%.

1. *(IFM Study Manual)* Determine x
2. *(IFM Study Manual)* Determine the volatility of the portfolio after the loan is taken.
3. *(IFM Study Manual)* For investment A, you are given:
4. The required rate of return is 0.20
5. The Sharpe ratio is 0.30
6. Beta is 1.5
7. The correlation of investment A with the market portfolio is 0.6

The annual effective risk-free interest rate is 0.05.

Determine the volatility of the market portfolio.

1. *(IFM Study Manual)* The Capital Asset Pricing Model is assumed to hold.

A share of a firm’s stock is expected to have a value of 40 one year from now. No dividends are paid, and the beta coefficient is less than 1.0.

The market conditions are such that the rate of return on market is 13% and the risk-free asset rate of return is 5%.

Which of the following is/are TRUE?

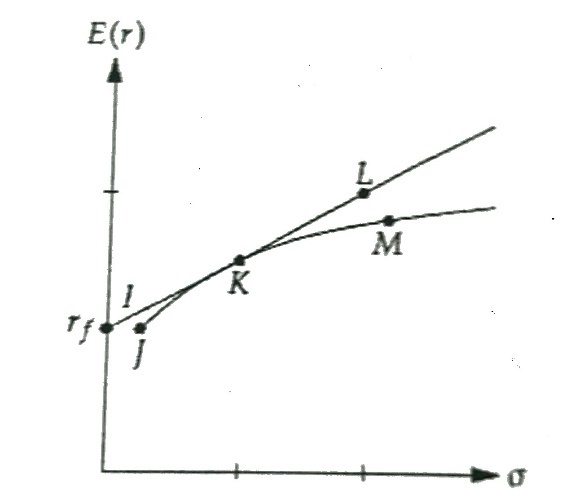
1. The current price of the stock is at least 35.40.
2. If beta increases, the current price of the stock increases.
3. If the risk-free asset rate of return increases, the current price of the stock decreases.
4. II only
5. I and II only
6. I and III only
7. II and III only
8. I, II, III
9. *(IFM Study Manual)* Which of the following statements about portfolio risk are true?
10. The variability of an investment portfolio that is balanced evenly between two stocks is lower than the average variability of the two individual stocks.
11. Full diversification of an investment portfolio eliminates market risk.
12. The total risk of an individual stock held in isolation determines its contribution to the risk of a well-diversified portfolio.
13. I only
14. III only
15. I and II only
16. II and III only
17. I, II and III
18. *(IFM Study Manual)* You are given:
19. The effective annual risk-free interest rate is 0.05.
20. The market portfolio has an annual rate of return of 0.15 and volatility of 0.35.

Calculate the point on the Capital Market Line corresponding to an annual rate of return of 0.20.

1. *(IFM Study Manual)* You are given:
2. The effective annual risk-free interest rate is 0.04.
3. The market portfolio has an expected annual rate of return of 0.14 and a volatility of 0.3.

Calculate the point on the Security Market Line corresponding to a security that has an expected annual rate of return of 0.10.

1. *(IFM Study Manual)* You are given following efficient frontier JKM:



Assume you can borrow and lend at the risk-free rate, rf.

According to modern portfolio theory, which of the following portfolios would a rational investor hold?

1. IJK
2. IKL
3. IKM
4. JKM
5. KLM
6. *(IFM Study Manual)* You are given:
7. The effective annual risk-free rate is 0.03
8. The market portfolio has an expected annual rate of return of 0.15 and a volatility of 0.3.

Calculate beta for a security whose volatility is 0.5 and whose correlation with the market portfolio is -0.4 => beta = 0.5 => E(r\_i) = 0.09

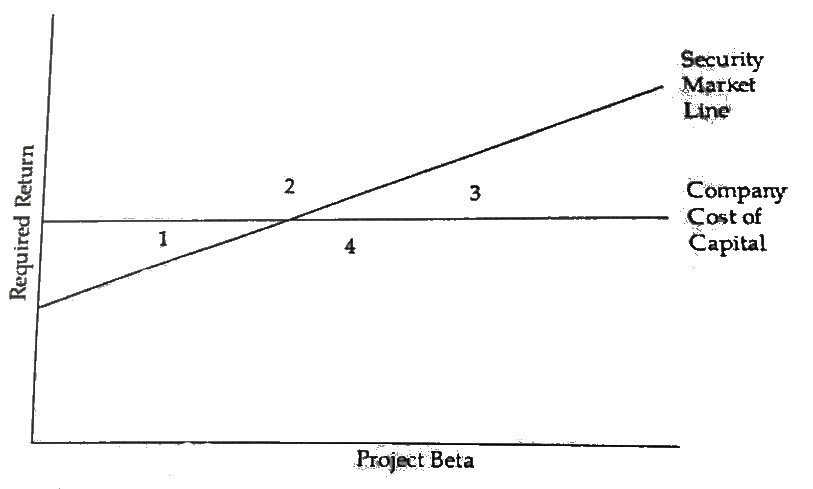
1. *(IFM Study Manual)* The beta for QRS Life Insurance Company is 0.4, while the beta for the life insurance industry is x. The risk-free rate of interest is 4% and the market return is 14%. The expected return on QRS stock minus the expected return for the industry is 0.5%.

Calculate x.

1. -0.10
2. 0.10
3. 0.25
4. -0.35
5. 0.45
6. *(IFM Study Manual)* The market risk premium is 7%. Stock X has a beta of 2.0 and an expected rate of return of 18%. Stock Y has a beta of 0.5

What is the expected rate of return of Stock **Y**?

1. 6.0%
2. 6.5%
3. 7.0%
4. 7.5%
5. 8.0%
6. *(IFM Study Manual)* If a firm uses the company cost of capital to determine which project to accept, a number of projects that do not have the same beta as the average beta of firm may be incorrectly accepted or rejected.



Which of sections of the graph above would contain projects that would be incorrectly accepted or rejected using the company cost of capital?

1. 1 and 3 only
2. 1 and 4 only
3. 2 and 3 only
4. 2 and 4 only
5. 3 and 4 only
6. *(IFM Study Manual)* A portfolio consists of three stocks with the following characteristics:

|  |  |  |
| --- | --- | --- |
| Stock | Amount invested | Beta |
| A | 5000 | 1.2 |
| B | 3000 | 1.5 |
| C | 2000 | 2.0 |

Calculate beta for the portfolio.

1. *(IFM Study Manual)* Jack has an equally weighted portfolio of stocks X and Y. The beta of his portfolio is 0.9. Jill has an equally weighted portfolio of stock X, Y, and Z. The beta of stock Z is 1.2, the Treasury bill rate of return is 6%, and the expected return on the market portfolio is 14.4%.

What is the expected risk premium on Jill’s portfolio?

1. 6.0%
2. 7.6%
3. 8.4%
4. 8.8%
5. 10.1%
6. ***(IFM sample questions)***Determine which one of the following statements regarding multi-factor models is NOT true.
7. A collection of well-diversified portfolios, from which an efficient portfolio can be constructed, can be used to measure risk.
8. These models are also referred to as the Arbitrage Pricing Theory.
9. Taxes and transaction costs are incorporated when estimating the expected rate of return for a multi-factor model.
10. The market portfolio of securities is not necessarily efficient.
11. Small-Minus-Big (SMB) and High-Minus-Low (HML) portfolios are part of the  
    Fama-French-Carhart multi-factor model.

*Note:* ***FFC model, Fama – French – Carhart factor model****, is discussed in IMF Study Manual (page 105) and Coporate Finance (page 504).*

1. *(IFM sample questions)* You are given the following information about the return of a security, using a two-factor model.

|  |  |  |
| --- | --- | --- |
| Factors | Beta | Expected Return |
| T | 0.10 | 25% |
| U | 0.15 | 20% |

The annual effective risk-free rate of return is 5%.

Calculate the expected return of this security using the given two–factor model.

1. 6.52%
2. 8.33%
3. 9.25%
4. 11.33%
5. 13.32%

**Chapter 3: EQUILIBRIUM MODELS OF ASSET PRICING (2)**

*Use the following information for question 27 and 28.*

A non-dividend paying stock’s price on De, 31, 2018 is 40. It is equally likely to increase 10% or decrease 5% every quarter. An investor buys 100 shares of the stocks. He sells the stock at the end of a quarter if it went up in price that quarter and holds the stock at the end of a quarter if it went down in price in that quarter. At the end of three quarters, he sells the stocks regardless.

1. *(IFM Study Manual)* The probability that the stock’s price goes up is 0.5.

Calculate the expected amount the investor receives on sale. Also calculate the expected value of the stock price at the end of three quarters.

1. *(IFM Study Manual)* The probability that the stock’s price goes up in the first quarter is 0.5. After the first quarter, the probability that the stock’s price goes up is 0.6 if its price went up in the previous quarter and 0.4 if its price went down in the previous quarter.

Calculate the expected amount the investor receives on sale.

1. *(IFM Study Manual)* An investment manager for a mutual fund is able to generate an alpha of 1.5% on 200,000,000 of assets. For assets above 200,000,000, the investment manager’s return is the equilibrium market return.

The investment management fee is 1% of assets.

Investors invest in the mutual fund only if the fund performs at least as well as the market portfolio.

Determine the maximum size of the fund.

1. *(IFM Study Manual)* Due to estimation error in CAPM, a firm is assigned a beta of 1.5 when its true beta is 1.4.

The risk-free interest rate is 0.03 and the market risk premium is 0.06.

Calculate the alpha that is observed using the assigned beta.

1. *(IFM Study Manual)* For which of the following investment strategies is there evidence that they may result in a positive alpha?
2. Investing in a mutual fund with a fund manager who has generated positive alpha in the past.
3. Investing in companies with high recent earnings.
4. Investing in stocks recommended by an article in *Money* magazine.
5. *(IFM Study Manual)* Which of following are advantages of Arbitrage Pricing Theory (APT) over the Capital Asset Pricing Model?
6. APT does not need a market portfolio
7. The risk factors are dictated by the design of APT.
8. APT has a simpler mathematical structure.
9. I only
10. II only
11. I and II only
12. I and III only
13. II and III only
14. Consider the following multifactor (APT) model of return for a particular stock.

|  |  |  |
| --- | --- | --- |
| **Factor** | **Factor Beta** | **Factor Risk Premium** |
| Inflation | 1.2 | 6% |
| Industrial production | 0.5 | 8% |
| Oil prices | 0.3 | 3% |

If T-bills currently offer a 6% yield, calculate the expected return of this stock using the given three–factor model.

1. *(IFM Study Manual)* Company XYZ uses the **FFC model** to calculate the cost of capital. You are given the following factor betas and annual rates of return:

|  |  |  |
| --- | --- | --- |
| Factor | Beta | Rate of Return |
| MKT | 0.88 | 0.07 |
| HML | 0.21 | 0.03 |
| SMB | -0.44 | 0.02 |
| PR1YR | 0.05 | 0.04 |

The annual risk-free rate is 0.04.

Calculate the annual cost of capital.

1. *(IFM Study Manual)* Company A uses the FFC modelto calculate the cost of capital. Based on a regression, the betas are 1.5 for market, - 0.50 for SMB, 0.22 for HML, and 0.70 for PR1YR. The annual risk-free rate is 0.05 and the expected return for market portfolio is 0.11. The annual returns for other factors are 0.023 for SMB, 0.034 for HML, and 0.052 for PR1YR.

Calculate the annual cost of capital.

1. *(IMF Study Manual)* Which of the following statements about Arbitrage Pricing Theory (APT) is FALSE?
2. The CAPM yields an equation equivalent to the one-factor APT with the factor being the stock market index.
3. The factors in the APT must be yield curve slope, level of interest rates, level of exchange rates, real GDP, and inflation.
4. A portfolio with no exposure to any APT risk factors should earn the risk-free rate on average.
5. The APT can be used to estimate the cost of equity capital for a firm.
6. All (A), (B), (C), or (D) are true.
7. *(IMF sample questions)* Since the development of the CAPM model, it is not uncommon that practitioners use market capitalization, book-to-market ratio and past returns to form portfolios that have a positive alpha.

Thus, the market portfolio may not be efficient, and therefore a stock’s beta is not an adequate measure of systematic risk.

Determine which of the following is NOT a reason why a market portfolio may not be efficient.

1. Alternative Risk Preferences
2. Non-Tradable Wealth
3. Proxy Error
4. Behavioral Biases
5. No portfolios are efficient

**EFFICIENT MARKETS HYPOTHESIS**

1. *(IFM Study Manual)* A company has 5 million shares outstanding. You estimate that it will generate free cash flows of 10 million per year, increasing 4% per year, perpetually. Its cost of capital is 8%. However, its stock price is 40.00. Assuming the market shares all of your other assumptions, what is market’s assumption for the annual growth in free cash flow?
2. *(IFM Study Manual)* A company has 5 million shares outstanding. The company announces a new project that will generate free cash flows of 6 million per year. The cost of capital for company is 0.15. The stock price immediately increases by 5.38.

Based on this stock price increase, how long does the market expect the additional cash flows of 6 million per year to continue?

1. *(IFM Study Manual)* It has been suggested that companies often overstate earnings in bad years and understate them in good years because they want investors to believe that the cash flows are less variable than they actually are.

Which of the following, if true, would cast the most doubt on the sensibility of this strategy?

1. Investors are risk averse.
2. Earnings follow a random walk.
3. The strong efficient market hypothesis holds.
4. Investors rely on historically observed betas.
5. Corporate tax rates increase with earnings.
6. *(IFM Study Manual)* Which of following statements is an implication of the semi-strong form of the Efficient Market Hypothesis?
7. Market price reflects all information.
8. Prices slowly adjust over time to incorporate past information.
9. Past price data should have predictive power for stock returns.
10. Actively managed portfolios using publicly available information cannot consistently outperform the market.
11. The correct answer is not given by (A), (B), (C), or (D).
12. *(IFM Study Manual)* A company’s common stock is currently selling for 25 per share. All of the financial analysts following the firm are surprised when the company unexpectedly announces that it expects its future economic income to be lower after the next quarter. Assume that the stock market is semi-strong efficient.

How should this news affect the stock price?

1. The price should not change at all
2. The price should not change until the next quarter.
3. The price should fall immediately to adjust for the expected slowing earnings growth.
4. The price should fall gradually over the next quarter.
5. The price should go up following the announcement.
6. *(IFM Study Manual)* Which of following statements about efficient markets are true?
7. In the strong form of the efficient market theory, prices reflect all public information.
8. In an efficient market, a portfolio manager is not expected to consistently outperform the market.
9. In the weak form of the efficient market theory, prices reflect all information contained in the record of past price.
10. I only
11. I and II only
12. I and III only
13. II and III only
14. I, II and III
15. *(IFM Study Manual)* Which of following are not a market anomaly?
16. New issues tend to underperform in the 3-5-year period after issue.
17. 60% of the time, diversified equity-based mutual funds underperformed the market.
18. At announcement of a takeover bid, stock price does not rise to bid price
19. Stock returns tend to be higher in January.
20. *(IFM sample questions)* Determine which of the following statements is most similar to the semi-strong version of the efficient markets hypothesis.
21. It should not be possible to consistently profit by selling winners and hanging on to losers.
22. It should not be possible to consistently profit by trading on information in past prices.
23. It should not be possible to consistently profit by trading on any public information, such as that found on the Internet or in the financial press.
24. It should not be possible to consistently profit by trading on private information, such as that obtained from a thorough analysis of the company and its industry.
25. It should not be possible to consistently profit by trading on inside information.
26. *(IFM sample questions)* Determine which version of the efficient markets hypotheses is contradicted by a momentum strategy whereby investors can use past stock returns to form a portfolio with positive alpha.
27. Weak form only
28. Weak form and semi-strong form only
29. Weak form, semi-strong form, and strong form
30. Strong form only
31. It does not contradict any of the three forms of the efficient markets hypothesis.
32. *(IFM sample questions)* Determine which of the following situations demonstrates evidence that is contrary to the efficient market hypothesis.
33. A takeover bid for a firm is announced at a higher price than the current market price. The firm’s share price then increases sharply upon the announcement.
34. By purchasing stocks with high returns over the past year, investors can earn positive excess returns over the next year.
35. Skilled fund managers earn no excess returns relative to their benchmarks, even before fees and transaction costs are taken into account.
36. In research studies completed several years after a severe market decline, many firms were determined to be overvalued prior to the decline.
37. A firm announces that it will increase its dividend in the future, upon which its stock price increases immediately.
38. *(IMF sample questions)* The following four observations were made about prices and/or returns:
39. The annualized market return on perfectly sunny days in New York City is much higher than on perfectly cloudy days.
40. A company’s stock price dropped sharply on the day it issued a warning that upcoming earnings would likely be lower than previously expected.
41. A company’s stock price increased sharply on the day it was announced that they were a strong candidate to soon be taken over by a stronger company.
42. Trader S consistently earned positive abnormal returns when using a momentum strategy that relied upon investing in stocks that had outperformed the S&P 500 index the previous year.

Determine which two of the four trends described above are consistent with the efficient markets hypothesis (EMH):

1. I and II
2. I and III
3. II and III
4. II and IV
5. III and IV