

## Chapter 12

### An Alternative View of Risk and Return: The Arbitrage Pricing Theory

#### Multiple Choice Questions

1. In the equation  $R = \bar{R} + U$ , the three symbols stand for:
  - A. average return, expected return, and unexpected return.
  - B. required return, expected return, and unbiased return.
  - C. actual total return, expected return, and unexpected return.
  - D. required return, expected return, and unbiased risk.
  - E. risk, expected return, and unsystematic risk.
  
2. The acronym APT stands for:
  - A. Arbitrage Pricing Techniques.
  - B. Absolute Profit Theory.
  - C. Arbitrage Pricing Theory.
  - D. Asset Putting Theory.
  - E. Assured Price Techniques.
  
3. The acronym CAPM stands for:
  - A. Capital Asset Pricing Model.
  - B. Certain Arbitrage Pressure Model.
  - C. Current Arbitrage Prices Model.
  - D. Cumulative Asset Price Model.
  - E. None of the above.
  
4. The unexpected return on a security,  $U$ , is made up of:
  - A. market risk and systematic risk.
  - B. systematic risk and unsystematic risk.
  - C. idiosyncratic risk and unsystematic risk.
  - D. expected return and market risk.
  - E. expected return and idiosyncratic risk.

5. Systematic risk is defined as:

- A. a risk that specifically affects an asset or small group of assets.
- B. any risk that affects a large number of assets.
- C. any risk that has a huge impact on the return of a security.
- D. the random component of return.
- E. None of the above.

6. The term  $\text{Corr}(\varepsilon_R, \varepsilon_T) = 0$  tells us that:

- A. all error terms of company R and T are 0.
- B. the unsystematic risk of companies R and T is unrelated or uncorrelated.
- C. the correlation between the returns of companies R and T is -1.
- D. the systematic risk of companies R and T is unrelated.
- E. None of the above.

7. A factor is a variable that:

- A. affects the returns of risky assets in a systematic fashion.
- B. affects the returns of risky assets in an unsystematic fashion.
- C. correlates with risky asset returns in a unsystematic fashion.
- D. does not correlate with the returns of risky assets in an systematic fashion.
- E. None of the above.

8. A security that has a beta of zero will have an expected return of:

- A. zero.
- B. the market risk premium.
- C. the risk free rate.
- D. less than the risk free rate but not negative.
- E. less than the risk free rate which can be negative.

9. Which of the following is true about the impact on market price of a security when a company makes an announcement and the market has discounted the news?
- A. The price will change a great deal; even though the impact is primarily in the future, the future value is discounted to the present.
  - B. The price will change little, if at all, since the impact is primarily in the future.
  - C. The price will change little, if at all, since the market considers this information unimportant.
  - D. The price will change little, if at all, since the market considers this information untrue.
  - E. The price will change little, if at all, since the market has already included this information in the security's price.
10. Shareholders discount many corporate announcements because of their prior expectations. If an announcement causes the price to change it will mostly be driven by:
- A. the expected part of the announcement.
  - B. market inefficiency.
  - C. the unexpected part of the announcement.
  - D. the systematic risk.
  - E. None of the above.
11. A company owning gold mines will probably have a \_\_\_\_\_ inflation beta because an \_\_\_\_\_ increase in inflation is usually associated with an increase in gold prices.
- A. negative; anticipated
  - B. positive; anticipated
  - C. negative; unanticipated
  - D. positive; unanticipated
  - E. None of the above.

12. If company A, a medical research company, makes a new product discovery and their stock rises 5%, this will have:

- A. no effect on Company B's, a newspaper, stock price because it is a systematic risk element.
- B. no effect on Company B's, a newspaper, stock price because it is an unsystematic risk element.
- C. a large effect on Company B's, a newspaper, stock price because it is a systematic risk element.
- D. a large effect on Company B's, a newspaper, stock price because it is an unsystematic risk element.
- E. None of the above.

13. What would not be true about a GNP beta?

- A. If a stock's  $\beta_{\text{GNP}} = 1.5$ , the stock will experience a 1.5% increase for every 1% surprise increase in GNP.
- B. If a stock's  $\beta_{\text{GNP}} = -1.5$ , the stock will experience a 1.5% decrease for every 1% surprise increase in GNP.
- C. It is a measure of risk.
- D. It measures the impact of systematic risk associated with GNP.
- E. None of the above.

14. If the expected rate of inflation was 3% and the actual rate was 6.2%; the systematic response coefficient from inflation,  $\beta_I$ , would result in a change in any security return of \_\_\_\_  $\beta_I$ .

- A. 9.2
- B. 3.2
- C. -3.2
- D. 3.0
- E. 6.2

15. In a portfolio of risky assets, the response to a factor,  $F_i$ , can be determined by:

- A. summing the weighted  $\beta_i$  s and multiplying by the factor  $F_i$ .
- B. summing the  $F_i$  s.
- C. adding the average weighted expected returns.
- D. summing the weighted random errors.
- E. All of the above.

16. In the one factor (APT) model, the characteristic line to estimate  $\beta_i$  passes through the origin, unlike the estimate used in the CAPM because:

- A. the relationship is between the actual return on a security and the market index.
- B. the relationship measures the change in the security return over time versus the change in the market return.
- C. the relationship measures the change in excess return on a security versus GNP.
- D. the relationship measures the change in excess return on a security versus the return on the factor about its mean of zero.
- E. Cannot be determined without actual data.

17. The betas along with the factors in the APT adjust the expected return for:

- A. calculation errors.
- B. unsystematic risks.
- C. spurious correlations of factors.
- D. differences between actual and expected levels of factors.
- E. All of the above.

18. The single factor APT model that resembles the market model uses \_\_\_\_\_ as the single factor.

- A. arbitrage fees
- B. GNP
- C. the inflation rate
- D. the market return
- E. the risk-free return

19. For a diversified portfolio including a large number of stocks, the:

- A. weighted average expected return goes to zero.
- B. weighted average of the betas goes to zero.
- C. weighted average of the unsystematic risk goes to zero.
- D. return of the portfolio goes to zero.
- E. return on the portfolio equals the risk-free rate.

20. Which of the following statements is true?

- A. A well-diversified portfolio has negligible systematic risk.
- B. A well-diversified portfolio has negligible unsystematic risk.
- C. An individual security has negligible systematic risk.
- D. An individual security has negligible unsystematic risk.
- E. Both A and D.

21. Assuming that the single factor APT model applies, the beta for the market portfolio is:

- A. zero.
- B. one.
- C. the average of the risk free beta and the beta for the highest risk security.
- D. impossible to calculate without collecting sample data.
- E. None of the above.

22. In normal market conditions if a security has a negative beta:

- A. the security always has a positive return.
- B. the security has an expected return above the risk-free return.
- C. the security has an expected return less than the risk-free rate.
- D. the security has an expected return equal to the market portfolio.
- E. Both A and B.

23. A criticism of the CAPM is that it:

- A. ignores the return on the market portfolio.
- B. ignores the risk-free return.
- C. requires a single measure of systematic risk.
- D. utilizes too many factors.
- E. None of the above.

24. To estimate the cost of equity capital for a firm using the CAPM, it is necessary to have:

- A. company financial leverage, beta, and the market risk premium.
- B. company financial leverage, beta, and the risk-free rate.
- C. beta, company financial leverage, and the industry beta.
- D. beta, company financial leverage, and the market risk premium.
- E. beta, the risk-free rate, and the market risk premium.

25. An advantage of the APT over CAPM is:

- A. APT can handle multiple factors.
- B. if the factors can be properly identified, the APT may have more explanation/predictive power for returns.
- C. the APT forces unsystematic risk to be negative to offset systematic risk; thus making the total portfolio risk free, allowing for an arbitrage opportunity for the astute investor.
- D. Both A and B.
- E. All of the above.

26. Parametric or empirical models rely on:

- A. security betas explaining systematic factor relationships.
- B. finding regularities and relations in past market data.
- C. there being no true explanations of pricing relationships.
- D. always being able to find the exception to the rule.
- E. None of the above

27. A growth stock portfolio and a value portfolio might be characterized:

- A. each by their P/E relative to the index P/E; high P/E for growth and lower for value.
- B. as earning a high rate of return for a growth security and a low rate of return for value security irrespective of risk.
- C. low unsystematic risk and high systematic risk respectively.
- D. moderate systematic risk and zero systematic risk respectively.
- E. None of the above.

28. Style portfolios are characterized by:

- A. their stock attributes; P/Es less than the market P/E are value funds.
- B. their systematic factors, higher systematic factors are benchmark portfolios.
- C. their stock attributes; higher stock attribute factors are benchmark portfolios.
- D. their systematic factors, P/Es greater than the market are value portfolios.
- E. There is no difference between systematic factors and stock attributes.

29. The most realistic APT model would likely include:

- A. multiple factors.
- B. only one factor.
- C. a factor to measure inflation.
- D. Both A and C.
- E. Both B and C.

30. Which of the following statements is/are true?

- A. Both APT and CAPM argue that expected excess return must be proportional to the beta(s).
- B. APT and CAPM are the only approaches to measure expected returns in risky assets.
- C. Both CAPM and APT are risk-based models.
- D. Both A and B.
- E. Both A and C.

31. Three factors likely to occur in the APT model are:

- A. unemployment, inflation, and current rates.
- B. inflation, GNP, and interest rates.
- C. current rates, inflation and change in housing prices.
- D. unemployment, college tuition, and GNP.
- E. This cannot be determined or even estimated.

32. Both the APT and the CAPM imply a positive relationship between expected return and risk. The APT views risk:

- A. very similarly to the CAPM via the beta of the security.
- B. in terms of individual intersecurity correlation versus the beta of the CAPM.
- C. via the industry wide or marketwide factors creating correlation between securities.
- D. as the standardized deviation of the covariance.
- E. None of the above.



33. The Fama-French three factor model includes the following factors:
- A. beta, expected return on the market, risk free rate of interest, a size factor, and a value factor.
  - B. the market risk premium, a volume factor, and a size factor.
  - C. beta, expected return on the market, risk free rate of interest, a volume factor, and a value factor.
  - D. the yield on corporate bonds, a size factor, and a market factor.
  - E. None of the above.
34. A value company is defined as one that:
- A. tends to have a lower average return than a growth company.
  - B. tends to have higher average return than a growth company.
  - C. has a high ratio of book equity to market equity.
  - D. a and b.
  - E. a and c.
35. The Fama-French three factor model predicts the expected return on a portfolio increases:
- A. linearly with its factor loading of the size factor.
  - B. linearly with its factor loading of the volume.
  - C. exponentially with its factor loading of the size factor.
  - D. exponentially with its factor loading of the volume factor.
  - E. None of the above.
36. The systematic response coefficient for productivity,  $\beta_p$ , would produce an unexpected change in any security return of \_\_\_  $\beta_p$  if the expected rate of productivity was 1.5% and the actual rate was 2.25%.
- A. 0.75%
  - B. -0.75%
  - C. 2.25%
  - D. -2.25%
  - E. 1.5%

37. Assume that the single factor APT model applies and a portfolio exists such that 2/3 of the funds are invested in Security Q and the rest in the risk-free asset. Security Q has a beta of 1.5. The portfolio has a beta of:

- A. 0.00
- B. 0.50
- C. 0.75
- D. 1.00
- E. 1.50

38. Suppose the JumpStart Corporation's common stock has a beta of 0.8. If the risk-free rate is 4% and the expected market return is 9%, the expected return for JumpStart's common stock is:

- A. 3.2%.
- B. 4.0%.
- C. 7.2%.
- D. 8.0%.
- E. 9.0%.

39. Suppose the MiniCD Corporation's common stock has a return of 12%. Assume the risk-free rate is 4%, the expected market return is 9%, and no unsystematic influence affected Mini's return. The beta for MiniCD is:

- A. 0.89.
- B. 1.60.
- C. 2.40.
- D. 3.00.
- E. It is impossible to calculate beta without the inflation rate.

Suppose that we have identified three important systematic risk factors given by exports, inflation, and industrial production. In the beginning of the year, growth in these three factors is estimated at -1%, 2.5%, and 3.5% respectively. However, actual growth in these factors turns out to be 1%, -2%, and 2%. The factor betas are given by  $\beta_{EX} = 1.8$ ,  $\beta_I = 0.7$ , and  $\beta_{IP} = 1.0$ .

40. If the expected return on the stock is 6%, and no unexpected news concerning the stock surfaces, calculate the stock's total return.

- A. 2.95%
- B. 4.95%
- C. 6.55%
- D. 7.40%
- E. 8.85%

41. Calculate the stock's total return if the company announces that an important patent filing has been granted sooner than expected and will earn the company 5% more in return.

- A. 7.95%
- B. 9.95%
- C. 11.55%
- D. 7.90%
- E. 9.35%

42. Calculate the stock's total return if the company announces that they had an industrial accident and the operating facilities will close down for some time thus resulting in a loss by the company of 7% in return.

- A. -4.05%
- B. -2.05%
- C. 4.55%
- D. 0.40%
- E. 1.85%

43. What would the stock's total return be if the actual growth in each of the factors was equal to growth expected? Assume no unexpected news on the patent.

- A. 4%
- B. 5%
- C. 6%
- D. 7%
- E. 8%

#### Essay Questions

44. An investor is considering the three stocks given below:

<u>Stock</u>	<u>Expected Return</u>	<u>Beta</u>
A	6.0%	-0.10
B	13.3%	2.10
C	9.2%	0.75
Market Portfolio	10.0%	1.00
T-Bills	7.0%	0.00

Calculate the expected return and beta of a portfolio equally weighted between stocks B and C. Demonstrate that holding stock A actually reduces risk by comparing the risk of a portfolio equally weighted between stock B and T-Bills with a portfolio equally weighted between stocks B and A.

45. Explain the conceptual differences in the theoretical development of the CAPM and APT.

46. You have a 3 factor model to explain returns. Explain what a factor represents in the context of the APT? Each factor is multiplied by a beta. What do these represent and how do they relate to the actual return?

47. Discuss the Fama-French three factor model; both what it means and the factors of the model.

## Chapter 12 An Alternative View of Risk and Return: The Arbitrage Pricing Theory **Answer Key**

### Multiple Choice Questions

1. In the equation  $R = \bar{R} + U$ , the three symbols stand for:
- A. average return, expected return, and unexpected return.
  - B. required return, expected return, and unbiased return.
  - C. actual total return, expected return, and unexpected return.**
  - D. required return, expected return, and unbiased risk.
  - E. risk, expected return, and unsystematic risk.

*Difficulty level: Easy*

*Topic: ARBITRAGE PRICING THEORY*

*Type: DEFINITIONS*

2. The acronym APT stands for:
- A. Arbitrage Pricing Techniques.
  - B. Absolute Profit Theory.
  - C. Arbitrage Pricing Theory.**
  - D. Asset Putting Theory.
  - E. Assured Price Techniques.

*Difficulty level: Easy*

*Topic: ARBITRAGE PRICING THEORY*

*Type: DEFINITIONS*

3. The acronym CAPM stands for:

- A. Capital Asset Pricing Model.
- B. Certain Arbitrage Pressure Model.
- C. Current Arbitrage Prices Model.
- D. Cumulative Asset Price Model.
- E. None of the above.

*Difficulty level: Easy*

*Topic: CAPITAL ASSET PRICING MODEL*

*Type: DEFINITIONS*

4. The unexpected return on a security,  $U$ , is made up of:

- A. market risk and systematic risk.
- B. systematic risk and unsystematic risk.
- C. idiosyncratic risk and unsystematic risk.
- D. expected return and market risk.
- E. expected return and idiosyncratic risk.

*Difficulty level: Medium*

*Topic: UNEXPECTED RETURN*

*Type: DEFINITIONS*

5. Systematic risk is defined as:

- A. a risk that specifically affects an asset or small group of assets.
- B. any risk that affects a large number of assets.
- C. any risk that has a huge impact on the return of a security.
- D. the random component of return.
- E. None of the above.

*Difficulty level: Easy*

*Topic: SYSTEMATIC RISK*

*Type: DEFINITIONS*

6. The term  $\text{Corr}(\varepsilon_R, \varepsilon_T) = 0$  tells us that:

- A. all error terms of company R and T are 0.
- B.** the unsystematic risk of companies R and T is unrelated or uncorrelated.
- C. the correlation between the returns of companies R and T is -1.
- D. the systematic risk of companies R and T is unrelated.
- E. None of the above.

*Difficulty level: Medium*

*Topic: CORRELATION*

*Type: DEFINITIONS*

7. A factor is a variable that:

- A.** affects the returns of risky assets in a systematic fashion.
- B. affects the returns of risky assets in an unsystematic fashion.
- C. correlates with risky asset returns in a unsystematic fashion.
- D. does not correlate with the returns of risky assets in an systematic fashion.
- E. None of the above.

*Difficulty level: Easy*

*Topic: FACTORS*

*Type: DEFINITIONS*

8. A security that has a beta of zero will have an expected return of:

- A. zero.
- B. the market risk premium.
- C.** the risk free rate.
- D. less than the risk free rate but not negative.
- E. less than the risk free rate which can be negative.

*Difficulty level: Medium*

*Topic: ZERO BETA*

*Type: DEFINITIONS*



9. Which of the following is true about the impact on market price of a security when a company makes an announcement and the market has discounted the news?
- A. The price will change a great deal; even though the impact is primarily in the future, the future value is discounted to the present.
  - B. The price will change little, if at all, since the impact is primarily in the future.
  - C. The price will change little, if at all, since the market considers this information unimportant.
  - D. The price will change little, if at all, since the market considers this information untrue.
  - E. The price will change little, if at all, since the market has already included this information in the security's price.

*Difficulty level: Easy*

*Topic: ANNOUNCEMENT EFFECTS*

*Type: CONCEPTS*

10. Shareholders discount many corporate announcements because of their prior expectations. If an announcement causes the price to change it will mostly be driven by:
- A. the expected part of the announcement.
  - B. market inefficiency.
  - C. the unexpected part of the announcement.
  - D. the systematic risk.
  - E. None of the above.

*Difficulty level: Medium*

*Topic: ANNOUNCEMENT EFFECTS*

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11. A company owning gold mines will probably have a \_\_\_\_\_ inflation beta because an \_\_\_\_\_ increase in inflation is usually associated with an increase in gold prices.
- A. negative; anticipated
  - B. positive; anticipated
  - C. negative; unanticipated
  - D. positive; unanticipated
  - E. None of the above.

*Difficulty level: Medium*

*Topic: INFLATION AND BETA*

*Type: CONCEPTS*

12. If company A, a medical research company, makes a new product discovery and their stock rises 5%, this will have:

- A. no effect on Company B's, a newspaper, stock price because it is a systematic risk element.
- B.** no effect on Company B's, a newspaper, stock price because it is an unsystematic risk element.
- C. a large effect on Company B's, a newspaper, stock price because it is a systematic risk element.
- D. a large effect on Company B's, a newspaper, stock price because it is an unsystematic risk element.
- E. None of the above.

*Difficulty level: Easy*

*Topic: UNSYSTEMATIC RISK*

*Type: CONCEPTS*

13. What would not be true about a GNP beta?

- A. If a stock's  $\beta_{\text{GNP}} = 1.5$ , the stock will experience a 1.5% increase for every 1% surprise increase in GNP.
- B. If a stock's  $\beta_{\text{GNP}} = -1.5$ , the stock will experience a 1.5% decrease for every 1% surprise increase in GNP.
- C. It is a measure of risk.
- D. It measures the impact of systematic risk associated with GNP.
- E.** None of the above.

*Difficulty level: Medium*

*Topic: BETA*

*Type: CONCEPTS*

14. If the expected rate of inflation was 3% and the actual rate was 6.2%; the systematic response coefficient from inflation,  $\beta_I$ , would result in a change in any security return of \_\_\_\_  $\beta_I$ .

- A. 9.2
- B.** 3.2
- C. -3.2
- D. 3.0
- E. 6.2

*Difficulty level: Easy*

*Topic: FACTORS AND INFLATION*

*Type: CONCEPTS*

15. In a portfolio of risky assets, the response to a factor,  $F_i$ , can be determined by:

- A. summing the weighted  $\beta_i$  s and multiplying by the factor  $F_i$ .
- B. summing the  $F_i$  s.
- C. adding the average weighted expected returns.
- D. summing the weighted random errors.
- E. All of the above.

*Difficulty level: Medium*

*Topic: FACTORS*

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16. In the one factor (APT) model, the characteristic line to estimate  $\beta_i$  passes through the origin, unlike the estimate used in the CAPM because:

- A. the relationship is between the actual return on a security and the market index.
- B. the relationship measures the change in the security return over time versus the change in the market return.
- C. the relationship measures the change in excess return on a security versus GNP.
- D. the relationship measures the change in excess return on a security versus the return on the factor about its mean of zero.
- E. Cannot be determined without actual data.

*Difficulty level: Challenge*

*Topic: APT AND CAPM*

*Type: CONCEPTS*

17. The betas along with the factors in the APT adjust the expected return for:

- A. calculation errors.
- B. unsystematic risks.
- C. spurious correlations of factors.
- D. differences between actual and expected levels of factors.
- E. All of the above.

*Difficulty level: Challenge*

*Topic: BETAS AND FACTORS*

*Type: CONCEPTS*

18. The single factor APT model that resembles the market model uses \_\_\_\_\_ as the single factor.

- A. arbitrage fees
- B. GNP
- C. the inflation rate
- D.** the market return
- E. the risk-free return

*Difficulty level: Easy*

*Topic: SINGLE FACTOR APT*

*Type: CONCEPTS*

19. For a diversified portfolio including a large number of stocks, the:

- A. weighted average expected return goes to zero.
- B. weighted average of the betas goes to zero.
- C.** weighted average of the unsystematic risk goes to zero.
- D. return of the portfolio goes to zero.
- E. return on the portfolio equals the risk-free rate.

*Difficulty level: Easy*

*Topic: UNSYSTEMATIC RISK AND DIVERSIFICATION*

*Type: CONCEPTS*

20. Which of the following statements is true?

- A. A well-diversified portfolio has negligible systematic risk.
- B.** A well-diversified portfolio has negligible unsystematic risk.
- C. An individual security has negligible systematic risk.
- D. An individual security has negligible unsystematic risk.
- E. Both A and D.

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21. Assuming that the single factor APT model applies, the beta for the market portfolio is:

- A. zero.
- B. one.**
- C. the average of the risk free beta and the beta for the highest risk security.
- D. impossible to calculate without collecting sample data.
- E. None of the above.

*Difficulty level: Easy*  
*Topic: SINGLE FACTOR APT*  
*Type: CONCEPTS*

22. In normal market conditions if a security has a negative beta:

- A. the security always has a positive return.
- B. the security has an expected return above the risk-free return.
- C. the security has an expected return less than the risk-free rate.**
- D. the security has an expected return equal to the market portfolio.
- E. Both A and B.

*Difficulty level: Medium*  
*Topic: NEGATIVE BETA*  
*Type: CONCEPTS*

23. A criticism of the CAPM is that it:

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- B. ignores the risk-free return.
- C. requires a single measure of systematic risk.**
- D. utilizes too many factors.
- E. None of the above.

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*Topic: CAPM*  
*Type: CONCEPTS*

24. To estimate the cost of equity capital for a firm using the CAPM, it is necessary to have:
- A. company financial leverage, beta, and the market risk premium.
  - B. company financial leverage, beta, and the risk-free rate.
  - C. beta, company financial leverage, and the industry beta.
  - D. beta, company financial leverage, and the market risk premium.
  - E.** beta, the risk-free rate, and the market risk premium.

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*Topic: CAPM*

*Type: CONCEPTS*

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  - D.** Both A and B.
  - E. All of the above.

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*Topic: APT AND CAPM*

*Type: CONCEPTS*

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  - E. None of the above

*Difficulty level: Challenge*

*Topic: EMPIRICAL MODELING*

*Type: CONCEPTS*

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- E. None of the above.

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*Topic: PORTFOLIOS*  
*Type: CONCEPTS*

28. Style portfolios are characterized by:

- A. their stock attributes; P/Es less than the market P/E are value funds.
- B. their systematic factors, higher systematic factors are benchmark portfolios.
- C. their stock attributes; higher stock attribute factors are benchmark portfolios.
- D. their systematic factors, P/Es greater than the market are value portfolios.
- E. There is no difference between systematic factors and stock attributes.

*Difficulty level: Medium*  
*Topic: STYLE PORTFOLIOS*  
*Type: CONCEPTS*

29. The most realistic APT model would likely include:

- A. multiple factors.
- B. only one factor.
- C. a factor to measure inflation.
- D. Both A and C.
- E. Both B and C.

*Difficulty level: Medium*  
*Topic: APT*  
*Type: CONCEPTS*

30. Which of the following statements is/are true?

- A. Both APT and CAPM argue that expected excess return must be proportional to the beta(s).
- B. APT and CAPM are the only approaches to measure expected returns in risky assets.
- C. Both CAPM and APT are risk-based models.
- D. Both A and B.
- E.** Both A and C.

*Difficulty level: Medium*  
*Topic: APT AND CAPM*  
*Type: CONCEPTS*

31. Three factors likely to occur in the APT model are:

- A. unemployment, inflation, and current rates.
- B.** inflation, GNP, and interest rates.
- C. current rates, inflation and change in housing prices.
- D. unemployment, college tuition, and GNP.
- E. This cannot be determined or even estimated.

*Difficulty level: Medium*  
*Topic: APT FACTORS*  
*Type: CONCEPTS*

32. Both the APT and the CAPM imply a positive relationship between expected return and risk. The APT views risk:

- A. very similarly to the CAPM via the beta of the security.
- B. in terms of individual intersecurity correlation versus the beta of the CAPM.
- C.** via the industry wide or marketwide factors creating correlation between securities.
- D. as the standardized deviation of the covariance.
- E. None of the above.

*Difficulty level: Easy*  
*Topic: ARBITRAGE PRICING THEORY*  
*Type: CONCEPTS*



$$r = R_f + \beta_3 (R_m - R_f) + b_S \cdot SMB + b_V \cdot HML + \alpha$$

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33. The Fama-French three factor model includes the following factors:

- A. beta, expected return on the market, risk free rate of interest, a size factor, and a value factor.
- B. the market risk premium, a volume factor, and a size factor.
- C. beta, expected return on the market, risk free rate of interest, a volume factor, and a value factor.
- D. the yield on corporate bonds, a size factor, and a market factor.
- E. None of the above.

Difficulty level: Medium

Topic: FAMA-FRENCH THREE FACTOR MODEL

Type: CONCEPTS

34. A value company is defined as one that:

- A. tends to have a lower average return than a growth company.
- B. tends to have higher average return than a growth company.
- C. has a high ratio of book equity to market equity.
- D. a and b.
- E. a and c.

Difficulty level: Medium

Topic: VALUE COMPANY

Type: CONCEPTS

35. The Fama-French three factor model predicts the expected return on a portfolio increases:

- A. linearly with its factor loading of the size factor.
- B. linearly with its factor loading of the volume.
- C. exponentially with its factor loading of the size factor.
- D. exponentially with its factor loading of the volume factor.
- E. None of the above.

Difficulty level: Medium

Topic: FAMA-FRENCH THREE FACTOR MODEL

Type: CONCEPTS

36. The systematic response coefficient for productivity,  $\beta_p$ , would produce an unexpected change in any security return of \_\_\_  $\beta_p$  if the expected rate of productivity was 1.5% and the actual rate was 2.25%.

- A. 0.75%
- B. -0.75%
- C. 2.25%
- D. -2.25%
- E. 1.5%

$$R_i = \beta_P F_P = \beta_P(2.25 - 1.5) = 0.75 \beta_P$$

*Difficulty level: Medium*  
*Topic: FACTORS AND RISK*  
*Type: PROBLEMS*

37. Assume that the single factor APT model applies and a portfolio exists such that 2/3 of the funds are invested in Security Q and the rest in the risk-free asset. Security Q has a beta of 1.5. The portfolio has a beta of:

- A. 0.00
- B. 0.50
- C. 0.75
- D. 1.00
- E. 1.50

$$2/3(1.5) + 1/3(0) = 1.0 + 0 = 1.0$$

*Difficulty level: Medium*  
*Topic: SINGLE FACTOR APT*  
*Type: PROBLEMS*

38. Suppose the JumpStart Corporation's common stock has a beta of 0.8. If the risk-free rate is 4% and the expected market return is 9%, the expected return for JumpStart's common stock is:

- A. 3.2%.
- B. 4.0%.
- C. 7.2%.
- D. 8.0%.**
- E. 9.0%.

$$4 + 0.8(9 - 4) = 8.0\%$$

*Difficulty level: Easy*

*Topic: CAPITAL ASSET PRICING MODEL*

*Type: PROBLEMS*

39. Suppose the MiniCD Corporation's common stock has a return of 12%. Assume the risk-free rate is 4%, the expected market return is 9%, and no unsystematic influence affected Mini's return. The beta for MiniCD is:

- A. 0.89.
- B. 1.60.**
- C. 2.40.
- D. 3.00.
- E. It is impossible to calculate beta without the inflation rate.

$$12 = 4 + \beta(9 - 4); 8 = 5\beta; \beta = 8/5 = 1.60$$

*Difficulty level: Medium*

*Topic: BETA*

*Type: PROBLEMS*

Suppose that we have identified three important systematic risk factors given by exports, inflation, and industrial production. In the beginning of the year, growth in these three factors is estimated at -1%, 2.5%, and 3.5% respectively. However, actual growth in these factors turns out to be 1%, -2%, and 2%. The factor betas are given by  $\beta_{EX} = 1.8$ ,  $\beta_I = 0.7$ , and  $\beta_{IP} = 1.0$ .

40. If the expected return on the stock is 6%, and no unexpected news concerning the stock surfaces, calculate the stock's total return.

- A. 2.95%
- B. 4.95%**
- C. 6.55%
- D. 7.40%
- E. 8.85%

$$R = 6\% + 1.8(.01 - -.01) + 0.7(-.02 - .025\%) + 1(.02 - .035\%) + 0 = .0495$$

*Difficulty level: Medium*

*Topic: ARBITRAGE PRICING THEORY*

*Type: PROBLEMS*

41. Calculate the stock's total return if the company announces that an important patent filing has been granted sooner than expected and will earn the company 5% more in return.

- A. 7.95%
- B. 9.95%**
- C. 11.55%
- D. 7.90%
- E. 9.35%

$$R = 4.95\% + 5\% = 9.95\%.$$

*Difficulty level: Medium*

*Topic: ARBITRAGE PRICING THEORY*

*Type: PROBLEMS*

42. Calculate the stock's total return if the company announces that they had an industrial accident and the operating facilities will close down for some time thus resulting in a loss by the company of 7% in return.

A. -4.05%

**B. -2.05%**

C. 4.55%

D. 0.40%

E. 1.85%

$$R = 4.95\% - 7\% = -2.05\%.$$

*Difficulty level: Medium*

*Topic: ARBITRAGE PRICING THEORY*

*Type: PROBLEMS*

43. What would the stock's total return be if the actual growth in each of the factors was equal to growth expected? Assume no unexpected news on the patent.

A. 4%

B. 5%

**C. 6%**

D. 7%

E. 8%

$$R = 6\%, \text{ or the expected return on the stock.}$$

*Difficulty level: Medium*

*Topic: ARBITRAGE PRICING THEORY*

*Type: PROBLEMS*

### Essay Questions

44. An investor is considering the three stocks given below:

<u>Stock</u>	<u>Expected Return</u>	<u>Beta</u>
A	6.0%	-0.10
B	13.3%	2.10
C	9.2%	0.75
Market Portfolio	10.0%	1.00
T-Bills	7.0%	0.00

Calculate the expected return and beta of a portfolio equally weighted between stocks B and C. Demonstrate that holding stock A actually reduces risk by comparing the risk of a portfolio equally weighted between stock B and T-Bills with a portfolio equally weighted between stocks B and A.

$$\text{Stock B and C: } R_p = .5(13.3\%) + .5(9.2\%) = 11.25\%$$

$$\text{Stock B and C: } \beta_p = .5(2.1) + .5(0.75) = 1.425$$

$$\text{Stock B and T-bills: } \beta_{B\&TBILL} = .5(2.1) + .5(0) = 1.05$$

$$\text{Stock's B and A: } \beta_{B\&A} = .5(2.1) + .5(-0.1) = 1.00$$

Topic: PORTFOLIO RISK

Type: ESSAYS

45. Explain the conceptual differences in the theoretical development of the CAPM and APT.

*CAPM depends on the efficient set and incorporate  $R_f$  to get the separation principle. The APT adds factors until there is no, or virtually no, correlation between unsystematic risks of securities. Both show unsystematic risk approaches zero and systematic risks remain.*

Topic: CAPM AND APT

Type: ESSAYS

46. You have a 3 factor model to explain returns. Explain what a factor represents in the context of the APT? Each factor is multiplied by a beta. What do these represent and how do they relate to the actual return?

*A factor is a variable that explains some of the return. It measures the unexpected change in some underlying "economic" data. A beta measures systematic risk of a security to a factor. It measures security response to a factor change and it explains how actual return varies from the expected return by the magnitude of  $\beta$  times the value of the factor.*

Topic: APT  
Type: ESSAYS

47. Discuss the Fama-French three factor model; both what it means and the factors of the model.

*The Fama-French (1993) three factor model predicts expected excess returns on a portfolio. The model is based on factor loadings on three factors in addition to the actual factors. The first factor is the excess return on the market multiplied by the beta, as in the CAPM. The second and third factors are aimed at the size and value effects. The size factor is the difference between returns of a portfolio of small stocks and a portfolio of large stocks and is multiplied by its factor loading. The third variable is the value factor, which is the difference between returns on a portfolio of high book-to-market stocks and a portfolio of low book-to-market stocks multiplied by its factor loading. The three factors together do a reasonable job at predicting excess portfolio return and are widely used in academic research and are becoming more widely used in practice.*

Topic: FAMA-FRENCH THREE FACTOR MODEL  
Type: ESSAYS