

Question #1 of 119

Question ID: 464464

Martz & Withers Enterprises has a beta of 1.6. We can *most likely* assume that:

- ✓ **A) the future beta will be less than 1.6 but greater than 1.0.**
- ✗ **B) calculating an adjusted beta will ease the downward pressure on the forecasted beta.**
- ✗ **C) the standard error on the future beta forecast is positive.**

Explanation

The standard error is always expected to be zero, and the beta has nothing to do with that estimate. In the case of Martz & Withers, adjusted beta will almost certainly be lower than the current beta. Most adjusted beta calculations are as follows: $\text{adjusted beta} = 1/3 + (2/3 \times \text{historical beta})$. In this case, adjusted beta is 1.4. Not everyone will use the two-thirds/one-third relationship, but any adjusted-beta equation will result in a value between 1.0 and 1.6.

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Question ID: 464414

Which of the following statements about using the capital asset pricing model (CAPM) to value stocks is *least* accurate?

- ✗ **A) The model reflects how market forces restore investment prices to equilibrium levels.**
- ✓ **B) The CAPM reflects unsystematic risk using standard deviation.**
- ✗ **C) If the CAPM expected return is too low, then the asset's price is too high.**

Explanation

The capital asset pricing model assumes all investors hold the market portfolio, and as such unsystematic risk, or risk not related to the market, does not matter. Thus, the CAPM does not reflect unsystematic risk and does not rely on standard deviation as the measure of risk but instead uses beta as the measure of risk. The remaining statements are accurate.

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Question ID: 464484

Identify the *most* accurate statement regarding multifactor models from among the following.

- ✓ **A) Macrofactor models include explanatory variables such as the business cycle, interest rates, and inflation, and fundamental factor models include explanatory variables such as firm size and the price-to-earnings ratio.**
- ✗ **B) Macrofactor models include explanatory variables such as firm size and the price-to-earnings ratio and fundamental factor models include explanatory variables such as real GDP growth and unexpected inflation.**

- ☒ C) Macrofactor models include explanatory variables such as real GDP growth and the price-to-earnings ratio and fundamental factor models include explanatory variables such as firm size and unexpected inflation.

Explanation

Macrofactor models include multiple risk factors such as the business cycle, interest rates, and inflation. Fundamental factor models include specific characteristics of the securities themselves such as firm size and the price-to-earnings ratio.

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Question ID: 464494

Carla Vole has developed the following macroeconomic models:

- Return of Stock A = $6.5\% + (9.6 \times \text{productivity}) + (5.4 \times \text{growth in number of businesses})$
- Return of Stock B = $18.7\% + (2.5 \times \text{productivity}) + (3.7 \times \text{growth in number of businesses})$

Assuming a portfolio contains 60% Stock A and 40% Stock B, the portfolio's sensitivity to productivity is *closest* to:

- ☒ A) 4.72.
- ☒ B) 5.34.
- ☒ C) 6.76.

Explanation

To calculate the portfolio's factor sensitivity, we need the weighted average of the factor sensitivity of each stock: $(9.6 \times 60\%) + (2.5 \times 40\%) = 6.76$.

Questions #5-10 of 119

Assume you are considering forming a common stock portfolio consisting of 25% Stonebrook Corporation (Stone) and 75% Rockway Corporation (Rock). As expressed in the two-factor returns models presented below, both of these stocks' returns are affected by two common factors: surprises in interest rates and surprises in the unemployment rate.

$$R_{\text{Stone}} = 0.11 + 1.0F_{\text{Int}} + 1.2F_{\text{Un}} + \epsilon_{\text{Stone}}$$

$$R_{\text{Rock}} = 0.13 + 0.8F_{\text{Int}} + 3.5F_{\text{Un}} + \epsilon_{\text{Rock}}$$

Assume that at the beginning of the year, interest rates were expected to be 5.1% and unemployment was expected to be 6.8%. Further, assume that at the end of the year, interest rates were actually 5.3%, the actual unemployment rate was 7.2%, and there were no company-specific surprises in returns. This information is summarized in Table 1 below:

Table 1: Expected versus Actual Interest Rates and Unemployment Rates

	Actual	Expected	Company-specific returns surprises
Interest Rate	0.053	0.051	0.0
Unemployment Rate	0.072	0.068	0.0

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What is the expected return for Stonebrook?

- ☐ A) 13.0%.
- ☒ B) 11.0%.
- ☐ C) 13.2%.

Explanation

The expected return for Stonebrook is simply the intercept return (a_i) of 0.11, or = 11.0%. (Study Session 18, LOS 66.j, k)

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Question ID: 464474

What is the expected return for Rockway?

- ☒ A) 13.0%.
- ☐ B) 17.3%.
- ☐ C) 11.0%.

Explanation

The expected return for Rockway is simply the intercept term (a_i) of 0.13, or 13%. (Study Session 18, LOS 66.j, k)

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Question ID: 464475

What is the portfolio's sensitivity to interest rate surprises?

- ☒ A) 0.85.
- ☐ B) 0.95.
- ☐ C) 0.25.

Explanation

The portfolio composition is 25% Stonebrook and 75% Rockway. The interest rate sensitivities for Stonebrook and Rockway are 1.0 and 0.8, respectively. Thus, the portfolio's sensitivity to interest rate surprises is: $(0.25)(1.0) + (0.75)(0.8) = 0.85$. (Study Session 18, LOS 66.k)

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Question ID: 464476

What is the portfolio's sensitivity to unemployment rate surprises?

- ☐ A) 2.625.
- ☐ B) 1.775.
- ☒ C) 2.925.

Explanation

The portfolio composition is 25% Stonebrook and 75% Rockway. The unemployment rate sensitivities for Stonebrook and Rockway are 1.2 and 3.5, respectively. Thus, the portfolio's sensitivity to unemployment rate surprises is: $(0.25)(1.2) + (0.75)(3.5) = 2.925$. (Study Session 18, LOS 66.k)

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Question ID: 464477

What is the expected return of the portfolio?

- ✓ A) 12.5%.
- x B) 11.5%.
- x C) 2.75%.

Explanation

The portfolio composition is 25% Stonebrook and 75% Rockway. The expected returns for Stonebrook and Rockway are 11% and 13%, respectively. Thus, the portfolio's expected return is $(0.25)(0.11) + (0.75)(0.13) = 12.5\%$. (Study Session 18, LOS 66.k)

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Question ID: 464478

What is the predicted return for Stonebrook?

- x A) 11.00%.
- x B) 0.40%.
- ✓ C) 11.68%.

Explanation

The predicted return uses the unemployment and interest rate surprises as follows:

The returns for a stock that are correlated with surprises in interest rates and unemployment rates can be expressed using a two-factor model as:

$$R_i = a_i + b_{i,1}F_{\text{Int}} + b_{i,2}F_{\text{Un}} + \varepsilon_i$$

where:

R_i = the return on stock i

a_i = the expected return on stock i

$b_{i,1}$ = the factor sensitivity of stock i to unexpected changes in interest rates

F_{Int} = unexpected changes in interest rates (the interest factor) = $.053 - .051 = .002$

$b_{i,2}$ = the factor sensitivity of stock i to unexpected changes in the unemployment rate

F_{Un} = unexpected changes in the unemployment rate (the unemployment rate factor) = $.072 - .068 = .004$

ε_i = a mean-zero error term that represents the part of asset i 's return not explained by the two factors.

Thus the predicted return is: $0.11 + (1.0)(0.002) + (1.2)(0.004) = 0.1168$ or 11.68% (Study Session 18, LOS 66.j)

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Question ID: 464463

Analysts attempting to compensate for instability in the minimum-variance frontier will find which of the following strategies *least* effective?

- x A) Reducing the frequency of portfolio rebalancing.
- ✓ B) Gathering more accurate historical data.

☒ C) Eliminating short sales.

Explanation

Constraining portfolio weights through the elimination of short sales and avoiding rebalancing until significant changes occur in the efficient frontier can be effective strategies for limiting instability. However, even the best historical data is often of limited use in forecasting future values. Gathering more accurate historical data would help, compensate for instability, but not as much as the other two options.

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Question ID: 464415

The covariance of the market returns with the stock's returns is 0.005 and the standard deviation of the market's returns is 0.05. What is the stock's beta?

☒ A) 0.1.

☒ B) 1.0.

☒ C) 2.0.

Explanation

$$\text{Beta}_{\text{stock}} = \text{Cov}(\text{stock}, \text{market}) \div (\sigma_{\text{MKT}})^2 = 0.005 \div (0.05)^2 = 2.0$$

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Question ID: 464442

The single-factor market model predicts that the systematic portion of the variance of an asset's return is equal to the:

☒ A) square of the asset's beta times the variance of the market portfolio.

☒ B) covariance between the asset's returns and the market returns.

☒ C) asset's beta.

Explanation

One of the predictions of the single-factor market model is that $\text{Var}(R_i) = \beta_i^2 \sigma_M^2 + \sigma_{ei}^2$. In other words, there are two components to the variance of the returns on asset i: a systematic component related to the asset's beta ($\beta_i^2 \sigma_M^2$) and an unsystematic component related to firm-specific surprises (σ_{ei}^2).

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Question ID: 464350

Which of the following statements regarding the capital market line (CML) is *least* accurate? The CML:

☒ A) implies that all portfolios on the CML are perfectly positively correlated.

☒ B) dominates everything below the line on the original efficient frontier.

☒ C) slope is equal to the expected return of the market portfolio minus the risk-free rate.

Explanation

The slope of the CML = (the expected return of the market – the risk-free rate) / (the standard deviation of returns on the market portfolio)

Because the CML is a straight line, it implies that all the portfolios on the CML are perfectly positively correlated.

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Question ID: 464399

According to the capital asset pricing model (CAPM), if the expected return on an asset is too *high* given its beta, investors will:

- ☐ A) sell the stock until the price falls to the point where the expected return is again equal to that predicted by the security market line.
- ☐ B) buy the stock until the price falls to the point where the expected return is again equal to that predicted by the security market line.
- ☒ C) buy the stock until the price rises to the point where the expected return is again equal to that predicted by the security market line.

Explanation

The CAPM is an equilibrium model: its predictions result from market forces acting to return the market to equilibrium. If the expected return on an asset is temporarily too high given its beta according to the SML (which means the market price is too low), investors will buy the stock until the price rises to the point where the expected return is again equal to that predicted by the SML.

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Question ID: 464562

Which of the following statements regarding the arbitrage pricing theory (APT) and the capital asset pricing model (CAPM) is *least* accurate? APT:

- ☒ A) and CAPM assume all investors hold the market portfolio.
- ☐ B) does not identify its risk factors.
- ☐ C) requires fewer assumptions than CAPM.

Explanation

CAPM assumes that all investors hold the market portfolio, APT does not make this assumption.

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Question ID: 464507

Which of the following does NOT describe the arbitrage pricing theory (APT)?

- ☐ A) It is an equilibrium-pricing model like the CAPM.
- ☐ B) It requires a weaker set of assumptions than the CAPM to derive.

- ✓ **C)** There are assumed to be at least five factors that explain asset returns.

Explanation

APT is a k-factor model, in which the number of factors, k, is assumed to be a lot smaller than the number of assets; no specific number of factors is assumed. Depending on the data used to fit the model, there may be as few as two or as many as seven factors.

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Question ID: 464497

The factor risk premium on factor j in the arbitrage pricing theory (APT) can be interpreted as the:

- ✓ **A) expected risk premium investors require on a factor portfolio for factor j.**
- x **B)** sensitivity of the market portfolio to factor j.
- x **C)** expected return investors require on a factor portfolio for factor j.

Explanation

We can interpret the APT factor risk premiums similar to the way we interpret the market risk premium in the CAPM. Each factor price is the expected risk premium (extra expected return minus the risk-free rate) investors require for a portfolio with a sensitivity of one ($\beta_{p,j} = 1$) to that factor and a sensitivity of zero to all the other factors (a factor portfolio).

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Question ID: 464419

Which of the following statements regarding beta is *least* accurate?

- x **A) Beta is a measure of systematic risk.**
- x **B)** The market portfolio has a beta of 1.
- ✓ **C)** A stock with a beta of zero will tend to move with the market.

Explanation

A stock with a beta of 1 will tend to move with the market. A stock with a beta of 0 will tend to move independently of the market.

Questions #20-25 of 119

Jose Morales has been investing for years, mostly using index funds. But because he is not satisfied with his returns, he decides to meet with Bill Smale, a financial adviser with Big Gains Asset Management.

Morales lays out his concerns about active management:

- "Mutual funds average returns below their benchmarks."
- "All the buying and selling makes for less-efficient markets."
- "Expenses are higher with active management."
- "Analyst forecasts are often wrong."

In an effort to win Morales' business, Smale explains the benefits of active management, starting with the fact that market efficiency is a prime concern of active managers because efficient markets make active management possible. He then explains that active management allows for better protection against systematic risk, and that Big Gains uses multifactor models to adjust investment strategies to account for economic changes. Lastly, Smale tells Morales how Big Gains Asset Management has pledged never to reveal clients' personal information to third parties.

Morales seems willing to listen, so Smale explains Big Gains' management strategy, which involves a modified version of the Capital Asset Pricing Model (CAPM) using the Dow Jones Total Market Index. He raves about this valuation model, citing its ability to project future alphas, determine true market betas of individual stocks, create an accurate picture of the market portfolio, and provide an alternative for calculated covariances in the charting of the Markowitz Efficient Frontier.

After an hour of verbal sparring with Smale, Morales is not yet convinced of the wisdom of active management. He turns to Tobin Capital, calling Susan Worthan, a college friend who works as an analyst in the equity department. Tobin Capital uses the arbitrage pricing theory (APT) to value stocks. Worthan explains that APT offers several benefits relative to the CAPM, most notably its dependence on fewer and less restrictive assumptions.

After listening to Worthan's explanation of the APT, Morales asked her how the theory dealt with mispriced stocks, drawing a table with the following data to illustrate his question:

Stock	Current Price	Est. Price in 1 Year	Correlation with S&P 500	Standard Deviation of Returns	Beta
Xavier Flocking	\$45	\$51	0.57	17%	1.68
Yaris Yarn	\$6	\$6.75	0.40	7%	1.21
Zimmer Autos	\$167	\$181	0.89	10.5%	0.34

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Question ID: 464543

After seeing Morales' stock example, Worthan tells him that he still does not understand APT and tries to explain how the theory deals with mispriced stocks. Which of the following statements is *most* accurate? Under APT:

- ☐ A) the calculation of unsystematic risk is so accurate that mispricings are rare.
- ☐ B) mispricings cannot occur, and there is no arbitrage opportunity.
- ☒ C) any mispricings will be immediately rectified.

Explanation

Arbitrage pricing theory holds that any arbitrage opportunities will be exploited immediately, making the mispricing disappear. (Study Session 18, LOS 57.I)

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Question ID: 464544

Which of the following is *least likely* an assumption of the market model?

- ☐ A) The expected value of the error term is zero.
- ☐ B) The firm-specific surprises are uncorrelated across assets.
- ☒ C) Unsystematic risk can be diversified away.

Explanation

The assumption that unsystematic risk can be diversified away is an assumption of the arbitrage pricing theory. (Study Session 18, LOS 57.g)

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Question ID: 464545

Smale *best* makes his point about the superiority of active management with his mention of:

- ☐ A) systematic risk.
- ☒ B) multifactor models.
- ☐ C) market efficiency.

Explanation

Systematic risk cannot be diversified away, and there is no dependable evidence that active management can help control it. Active managers attempt to capitalize on inefficiencies in the market, and a truly efficient market would eliminate the need for active management. However, multifactor models are a useful tool for active managers, and a high-quality model may indeed represent a competitive advantage over a passive manager. (Study Session 18, LOS 57.j)

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Question ID: 464546

Which assumption is required by both the CAPM and the APT?

- ☒ A) Asset prices are not discounted for unsystematic risk.
- ☐ B) All investors have the same return expectations.
- ☐ C) There are no transaction costs.

Explanation

The assumptions that all investors have the same expectations and that there are no transaction costs are specific to CAPM, not APT. However, both models assume that unsystematic risk can be diversified away, and has a risk premium of zero. (Study Session 18, LOS 57.n)

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Question ID: 464547

Which of Morales' arguments against active management is *least* accurate?

- ☐ A) "Expenses are higher with active management."
- ☒ B) "All the buying and selling makes for less-efficient markets."
- ☐ C) "Mutual funds average returns below their benchmarks."

Explanation

When little money is actively managed, asset prices begin to deviate from fair values. Active management exploits inefficiencies and drives prices back toward equilibrium. Both remaining arguments are valid. (Study Session 18, LOS 57.m)

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Question ID: 464548

Assuming Morales' numbers are correct, portfolio allocation of 65% of one stock and 35% of a second would allow arbitrage profits to be *closest* to:

- ☐ A) 0.29%.

✓ **B) 0.90%.**

✗ **C) 0%.**

Explanation

A portfolio containing 65% Xavier Flocking and 35% Zimmer Auto would have a weighted average beta of $(65\% \times 1.68) + (35\% \times 0.34) = 1.21$, which is the same as the beta of Yaris Yarn. The weighted average return of the combined portfolio is 11.6%, versus a 12.5% return for Yaris Yarn. Buying Yaris Yarn and selling the Xavier/Zimmer portfolio would earn an estimated 0.9% without investing any capital or taking on any systematic risk. (Study Session 18, LOS 57.n)

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Question ID: 464446

The single-factor market model assumes there are how many sources of risk in asset returns?

✗ **A) One.**

✗ **B) Three.**

✓ **C) Two.**

Explanation

The market model assumes that there are two sources of risk in asset returns, unanticipated macroeconomic events and firm-specific events.

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Question ID: 464462

Conner Cans shares have a beta of 0.8. Assuming α_1 is 40%, Conner's adjusted beta is *closest* to:

✓ **A) 0.92.**

✗ **B) 0.88.**

✗ **C) 1.12.**

Explanation

Adjusted beta = $\alpha_0 + \alpha_1 \times \text{beta}$ where α_0 and α_1 must sum to 1, so $\alpha_0 = 60\%$.

Adjusted beta = $60\% + 40\% \times 0.8 = 0.92$.

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Question ID: 464481

The factor models for the returns on Omni, Inc., (OM) and Garbo Manufacturing (GAR) are:

$ROM = 20.0\% - 1.0(FCONF) + 1.4(FTIME) + \varepsilon_{OM}$

$RGAR = 15.0\% - 0.5(FCONF) + 0.8(FTIME) + \varepsilon_{GAR}$

What is the factor sensitivity to the time-horizon factor (TIME) of a portfolio invested 20% in Omni and 80% in Garbo?

✗ **A) 0.16.**

✓ **B)** 0.92.

✗ **C)** -0.60.

Explanation

The factor model for the portfolio is:

$$RP = [(0.2)(20.0\%) + (0.8)(15.0\%)]$$

$$+ [(0.2)(-1.0) + (0.8)(-0.5)] (FCONF)$$

$$+ [(0.2)(1.4) + (0.8)(0.8)] (FTIME)$$

$$+ [(0.2) \varepsilon_{OM} + (0.8) \varepsilon_{GAR}]$$

$$= 16.0\% - 0.60(FCONF) + 0.92(FTIME) + (0.2)\varepsilon_{OM} + (0.8)\varepsilon_{GAR}$$

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Question ID: 464496

Mary Carruthers has created the following macroeconomic model for stock in Magma Metro Systems and Clampett Pharmaceuticals:

- $R_{\text{Magma}} = 12\% + (6.3 \times \text{GDP growth}) + (0.056 \times \text{population growth}) + \text{error}.$
- $R_{\text{Clampett}} = 18\% + (1.2 \times \text{GDP growth}) - (0.231 \times \text{population growth}) + \text{error}.$

The expected return for a portfolio containing 65% Magma Metro Systems and 35% Clampett Pharmaceuticals is *closest* to:

✗ **A)** 13%.

✗ **B)** 16%.

✓ **C)** 14%.

Explanation

Given no information about GDP and population growth, we cannot calculate returns using the detailed model. As such, we fall back on the traditional assumption that the factors and random error in a macroeconomic model are expected to equal zero. As such, the expected return for the portfolio is the weighted average of the intercepts: $65\% \times 12\% = 7.8\%$ and $35\% \times 18\% = 6.3\%$ thus $7.8\% + 6.3\% = 14.1\%$.

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Question ID: 464486

A multi-factor model that identifies the portfolios that best explain the historical cross-sectional returns or covariances among assets is called a:

✗ **A)** covariance factor model.

✗ **B)** fundamental factor model.

✓ **C)** statistical factor model.

Explanation

A statistical factor model identifies the portfolios that best explain the historical cross-sectional returns or covariances among assets. The returns on these portfolios represent the factors. In fundamental factor models, the factors are characteristics of the stock or the company

that have been shown to affect asset returns, such as book-to-market or price-to-earnings ratios.

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Question ID: 464479

In a multi-factor macroeconomic model the mean-zero error term represents:

- ☐ A) sampling error in estimating factor sensitivities.
- ☒ B) the portion of the individual asset's return that is not explained by the systematic factors.
- ☐ C) the no-arbitrage condition imposed in multi-factor models.

Explanation

The mean-zero error term represents the unsystematic, firm-specific, diversifiable risks that are not explained by the systematic factors.

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Question ID: 464391

What is the beta of Franklin stock if the current risk-free rate is 6%, the expected risk premium on the market portfolio is 9%, and the expected rate of return on Franklin is 17.7%?

- ☒ A) 1.3.
- ☐ B) 2.5.
- ☐ C) 3.9.

Explanation

Using the Capital Asset Pricing Model:

$$6\% + \text{beta} (9\%) = 17.7\%$$

$$\text{beta} = 1.3$$

Questions #33-38 of 119

Allen Marko, CFA, is analyzing the diversification benefits available from investing in three equity funds. He is basing his analysis on monthly returns for the three funds and an appropriate market index over the past twenty years. He feels that there is no reason that the past performance should not carry forward into the future. Treasury bills currently pay 5%.

Table 1: Expected Returns, Variances, and Covariance for Funds A, B, & C

	Equity Fund A	Equity Fund B	Equity Fund C
Average Return	12%	9%	8%
Variance	0.0256	0.0196	0.0172

Correlation of A & B is 0.50

Correlation of A & C is 0.38

Correlation of B & C is 0.85

Marko has also obtained information about a fourth fund, Fund D. He does not have any information regarding the covariance of Fund D with Funds A, B, and C. The average return and variance for fund D are 10% and 0.018, respectively. The beta of Fund D is 0.714.

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Question ID: 464298

Based on this data, what is the expected return of a portfolio that is made up of 60% of Fund A, 30% of Fund B, and 10% of Fund C?

- ☐ A) 10.2%.
- ☒ B) 10.7%.
- ☐ C) 11.4%.

Explanation

Expected return for the portfolio = $(0.6)(0.12) + (0.3)(0.09) + (0.1)(0.08) = 0.107$ or 10.7%. (Study Session 18, LOS 57.a)

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Question ID: 464299

Which of the following is *closest* to the standard deviation of a portfolio that is made up of 60% of Fund A, 30% of Fund B, and 10% of Fund C?

- ☐ A) 14.840%.
- ☒ B) 13.062%.
- ☐ C) 2.205%.

Explanation

Standard deviation of a three asset portfolio:

$$\sigma_P^2 = w_1^2 \sigma_1^2 + w_2^2 \sigma_2^2 + w_3^2 \sigma_3^2 + 2w_1w_2 \text{cov}(1,2) + 2w_1w_3 \text{cov}(1,3) + 2w_2w_3 \text{cov}(2,3)$$

$$\sigma_P^2 = w_1^2 \sigma_1^2 + w_2^2 \sigma_2^2 + w_3^2 \sigma_3^2 + 2w_1w_2\rho_{12}\sigma_1\sigma_2 + 2w_1w_3\rho_{13}\sigma_1\sigma_3 + 2w_2w_3\rho_{23}\sigma_2\sigma_3$$

$$\sigma_P = \sqrt{\sigma_P^2}$$

$$\sigma_{\text{portfolio}}^2 = [(0.6)^2(0.0256) + (0.3)^2(0.0196) + (0.1)^2(0.0172) + 2(0.60)(0.30)(0.50)(0.16)(0.14) + 2(0.60)(0.10)(0.38)(0.16)(0.13) + 2(0.3)(0.1)(0.85)(0.14)(0.13)]^{0.5}$$

$$= [0.017062]^{1/2} = 0.13062 \text{ or } 13.062\%.$$

(Study Session 18, LOS 57.a)

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Question ID: 464300

With respect to the relative efficiencies of the Funds, which of the following is *most* accurate?

- ☐ A) Fund B and D are both inefficient.
- ☒ B) Fund B is inefficient relative to Fund D.
- ☐ C) No determination is possible.

Explanation

To be inefficient, the return must be lower while the variance is higher. The only case where that relationship exists is with respect to Fund B and D. (Study Session 18, LOS 57.b)

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Question ID: 464301

If Marko had to choose to form a portfolio using only T-bills and one of the four funds, which should he choose?

- ✓ **A) Fund A.**
- x **B) Fund D.**
- x **C) Fund B.**

Explanation

The easiest way to approach this question is to calculate the Sharpe ratio for each fund and choose the one with the highest ratio. The highest Sharpe ratio reflects the highest excess return for a given level of risk.

The Sharpe ratios are as follows:

$$\text{Fund A} = (12 - 5) / 16.00 = 0.44$$

$$\text{Fund B} = (9 - 5) / 14.00 = 0.29$$

$$\text{Fund D} = (10 - 5) / 13.42 = 0.37$$

Fund A has the highest Sharpe ratio and therefore would be the best one to combine with T-bills.

An alternative way to answer the question can be seen by combining Fund A with T-bills in a portfolio to get an average/expected return equal to each of the other portfolios and computing the variance for each of those portfolios. Then compare the variance of the portfolio composed of A and the T-bills to the corresponding variance of the other asset.

To find the appropriate weights for the portfolio to earn the return of Fund B, solve for W in the following equation: $9\% = W \times 12\% + (1 - W) \times 5\%$. The solution is $W = 0.5714$.

0.5714 in Fund A and 0.429 in T-bills has a variance equal to $(0.5714)(0.5714)(0.0256) = 0.00836$.

Applying the same procedure to Fund D gives $W = 0.80$

0.80 in Fund D and 0.20 in T-bills has a variance equal to $(0.80)(0.80)(0.018) = 0.01152$.

Thus, a CAL formed with Fund A can dominate the CAL of each of the other three portfolios. (Study Session 18, LOS 57.d)

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Question ID: 464302

Which of the following statements regarding the graph of return vs. risk for all possible portfolio combinations consisting of Funds A, B, and C is *least* accurate?

- x **A) If the objective of the portfolio manager is to maximize return the optimal portfolio must lie on the curved line above the minimum-variance portfolio.**
- x **B) Combinations of Fund A, B, and C will dominate all other combinations of portfolios that have a lower return for the same level of risk.**
- ✓ **C) If the objective of the portfolio manager is to minimize risk the optimal portfolio must lie on the curved line below the minimum-variance portfolio.**

Explanation

The curved line below the minimum-variance portfolio represents all portfolio combinations that are dominated by other portfolio combinations. Based on the efficient frontier created by these two funds higher returns at the same level of risk can be achieved above the minimum-variance portfolio. (Study Session 18, LOS 57.b)

Question #38 of 119

Question ID: 464303

The beta of Fund A is 1.2, the expected return of T-bills is 5% and the standard deviation for the market is 13%. What is the covariance between the market portfolio and Fund A?

- ☐ A) 0.081.
- ☐ B) 0.156.
- ☒ C) 0.020.

Explanation

The beta for fund A is equal to the covariance of fund A and the market divided by the variance of the market. Therefore, $1.2 = \text{COV}(A, \text{Market}) / (0.13)^2$

Solving for $\text{COV}(A, \text{Market}) = (1.2)(0.13)^2 = 0.0203$. (Study Session 18, LOS 57.a)

Questions #39-44 of 119

Jennifer Watkins, CFA, is a portfolio manager at Q-Metrics. She has derived a 2-factor arbitrage pricing theory (APT) model of expected returns she intends to use in her portfolio management strategies. The two-factor APT equation, in which the two factors are confidence risk and industrial production, is:

$$E(R_P) = R_{T\text{-bill}} + 0.06\beta_{p,\text{CONF}} + 0.09\beta_{p,\text{PROD}}$$

Watkins determines the sensitivity to each of the two factors for three diversified portfolios as well as for her benchmark, the Wilshire 5000. The results of her analysis are shown in the table below.

Portfolio	Sensitivity to Conf. Risk Factor	Sensitivity to Indust. Prod. Factor
J	1.50	1.00
K	0.80	1.20
L	1.00	2.00
Wilshire 5000	1.00	1.50

$\beta_{p,\text{CONF}}$: a market confidence factor

$\beta_{p,\text{PROD}}$: industrial production factor

$R_{T\text{-bill}}$: the Treasury bill rate of return, assumed equal to 4.0%.

Watkins compares her data and results to that of a colleague who uses the Capital Asset Pricing Model (CAPM) to analyze the same portfolios. She determines that her analysis is more appropriate for the given portfolios.

Question #39 of 119

Question ID: 464536

What is the expected return on Portfolio K according to the APT equation?

- ☐ A) 22.0%.

☒ B) 15.6%.

☐ C) 19.6%.

Explanation

The β 's in the APT equation are the factor sensitivities. The expected return on portfolio K is $E(R_K) = 0.04 + 0.06(0.80) + 0.09(1.20) = 19.6\%$. (LOS 57.I)

Question #40 of 119

Question ID: 464537

Which of the following would be a valid reason for concluding that the APT analysis of Watkins is more appropriate than the CAPM analysis of her colleague?

☒ A) Investors have quadratic utility functions.

☐ B) The APT model is less restrictive than the CAPM.

☒ C) Investors can borrow and lend at the risk-free rate.

Explanation

The true market portfolio contains all securities. The CAPM is a more restrictive model and requires that such a portfolio be mean/variance efficient while the APT does not. The Wilshire 5000 is a very diversified portfolio, but it does not contain all securities. (LOS 57.I)

Question #41 of 119

Question ID: 464538

Which of the following is *least likely* one of the three equations needed to solve for the Industrial Production factor portfolio combination of J, K and L?

☒ A) $1.50w_J + 0.80w_K + 1.00w_L = 0$.

☐ B) $1.50w_J + 1.20w_K + 2.00w_L = 0$.

☒ C) $w_J + w_K + w_L = 1$.

Explanation

A factor portfolio has a sensitivity of one to one factor and a sensitivity of zero for all other factors (in this case, a pure bet on industrial production). We need to create a factor portfolio (a combination of portfolios J, K and L) that has a factor sensitivity of zero to the confidence risk factor and a sensitivity of one to the industrial production factor. The three simultaneous equations to solve are:

Equation 1: $w_J + w_K + w_L = 1$ (portfolio weights sum to 1)

Equation 2: $1.50w_J + 0.80w_K + 1.00w_L = 0$ (confidence risk portfolio sensitivity equals 0)

Equation 3: $1.00w_J + 1.20w_K + 2.00w_L = 1$ (production portfolio sensitivity equals 1) (LOS 57.I)

Question #42 of 119

Question ID: 464539

Which of the following statements *least accurately* represents one of the assumptions of the Arbitrage Pricing Theory?

☐ A) Arbitrage opportunities exist even among well-diversified portfolios.

☒ B) A factor model describes asset returns

☒ C) There are many assets, so investors can form well-diversified portfolios that eliminate asset-specific risk

Explanation

Arbitrage pricing theory assumes that well-diversified portfolios present no arbitrage opportunities. The other two statements are accurate assumptions of the APT. (LOS 57.I)

Question #43 of 119

Question ID: 464540

Imagine that Watkins holds \$1 million worth of Portfolio J. Watkins wants to use Portfolio L to hedge her exposure to the Industrial Production factor, by combining J and L to reduce its Industrial Production exposure to 0. Assume that portfolios J and L are well diversified, so Watkins can ignore the risk of individual assets and assume that the only source of uncertainty in the portfolio is the surprises in the two factors.

In order to achieve this goal, for every \$1 invested on Portfolio J Watkins should short Portfolio L in the amount of:

- ✓ **A) \$0.50**
- x B) \$2.00
- x C) \$0.67

Explanation

We need to combine Portfolios J and L in such a way that sensitivity to the Industrial Production factor is zero. The returns to the two portfolios are:

$$R_J = 0.04 + 1.5F_{\text{CONF}} + 1.0F_{\text{INDUSTPROD}}$$

$$R_L = 0.04 + 1.0F_{\text{CONF}} + 2.0F_{\text{INDUSTPROD}}$$

The Industrial Production sensitivities of Portfolios J and L are 1.0 and 2.0 respectively. With w the weight of Portfolio L, we have:

$$0 = 1.0(1 - w) + 2.0w$$

$$0 = 1.0 - 1.0w + 2.0w$$

$$0 = 1.0 + 1.0w$$

$$w = -1.0$$

The weight on Portfolio L in the new portfolio is -1.0 , and the weight on Portfolio J is $1 - (-1) = 2$. For every \$2 invested on Portfolio J, the institution shorts \$1 of Portfolio L. So for every \$1 invested on Portfolio J, Watkins should short Portfolio L in the amount of \$0.50. (LOS 57.I)

Question #44 of 119

Question ID: 464541

Imagine that Watkins determines that portfolio K offers an expected return of 21%. Based on the two-factor APT equation, Watkins should:

- x **A) Short Portfolio K.**
- ✓ **B) Go long Portfolio K.**
- x C) Take no action as there is no arbitrage opportunity.

Explanation

Based on the two-factor APT equation, $E(R_K) = R_{T\text{-bill}} + 0.06 \cdot \beta_{K,\text{CONF}} + 0.09 \cdot \beta_{K,\text{PROD}} = (0.04) + 0.06 \cdot (0.80) + 0.09 \cdot (1.20) = 19.6\%$. Since Watkins has determined that Portfolio K has an expected rate of return of 21%, Portfolio K offers too high an expected rate of return given its factor sensitivity. According to the APT model given, an arbitrage opportunity exists unless the expected return on D is 19.6 percent. Since we are told that the expected return on K is 21 percent, Portfolio K is undervalued relative to its factor risk. We will buy K (go long)

Question #45 of 119

Question ID: 464551

A portfolio with a factor sensitivity of one to a particular factor in a multi-factor model and zero to all other factors is called a(n):

- ☐ A) tracking portfolio.
- ☒ B) factor portfolio.
- ☐ C) arbitrage portfolio.

Explanation

A factor portfolio is a portfolio with a factor sensitivity of one to a particular factor and zero to all other factors. An arbitrage portfolio is a portfolio with factor sensitivities of zero to all factors, positive expected net cash flow, and an initial investment of zero. A tracking portfolio is a portfolio with a specific set of factor sensitivities designed to replicate the factor exposures of a benchmark index.

Questions #46-51 of 119

Colonial Capital leans heavily on the capital asset pricing model (CAPM) in its investment-making decisions, but the company's analysts find it difficult to use. In an effort to make the calculations easier, Colonial has modified the CAPM to use the S&P 1500 SuperComposite Index as a benchmark.

Colonial recently hired high-powered money manager Marjorie Kemp away from a rival company in an effort to boost its lagging returns. Kemp understands the appeal of the CAPM but likes to use multiple valuation methods for the purposes of comparison.

In her first act as chief investment officer of Colonial, Kemp sent a memo to all portfolio managers instructing them to start using alternative methods for valuing assets. She opened by touting the benefits of other forms of asset valuation.

- "The CAPM requires a lot of unrealistic assumptions. Arbitrage Pricing Theory's (APT) assumptions are far less restrictive."
- "A major benefit of multifactor models relative to the CAPM is their ability to be effectively tested using real-life data."
- "Under APT, risk is easier to calculate than is the case with the CAPM, for which beta must be estimated based on unobservable returns."
- "Neither multifactor models nor APT require an estimation of the market risk premium."

Kemp then called a meeting of Colonial's analysts to discuss asset-valuation strategies. The debate grew quite spirited.

A longtime Colonial analyst named Smathers said the company had experimented with multifactor models years earlier and could not come up with a model that satisfied everyone. He then proposed creating a number of multifactor models for different sectors. The responses were as follows:

- Florio said he didn't like APT because it did not indicate what the risk factors were.
- Garcia said he liked APT because it acknowledged that arbitrage opportunities occasionally exist.
- Inge said he disliked APT because it did not allow analysts to consider the market portfolio.

After about 30 minutes, Kemp realized nothing productive would occur, so she set everyone to work analyzing a valuation model. She wrote the following equation on a blackboard:

$$\text{Expected stock return} = \text{expected S\&P 1500 Index return} / 2 + \text{capacity utilization} / 15 + 1.5 \times \text{GDP growth} - 2 \times \text{inflation}$$

Question #46 of 119

Question ID: 464529

Which factors, taken in combination, would create the *best* multifactor model for utility stocks?

- ☐ A) Projected winter low temperature, projected change in energy prices, projected change in inflation, projected market return.
- ☐ B) Projected change in energy prices, interest rate term structure, estimated GDP growth, projected market return.
- ☒ C) Projected winter low temperature, interest rate term structure, housing starts, price/earnings factor.

Explanation

Without knowing the accuracy of the factor sensitivities or actually looking at the numbers generated by the equation, we can only assess the value of a multifactor model by considering whether the individual factors are relevant. Winter low temperatures and energy prices are particularly relevant to utilities, the first on the revenue side, and the second on the cost side. Because utilities tend to be heavily leveraged, interest rates affect them. Inflation rates are relevant for most companies, as are price/earnings ratios. Housing starts are relevant for utilities, as houses are larger than apartments and more expensive to heat and cool. However, utilities are considered diversifiers, and their returns are less correlated to those of the broader market than are the returns of stocks in other sectors. The sector is also less correlated to economic growth than most. As such, models that consider GDP growth or market returns are probably of less value than the one model that considers neither. (LOS 57.j)

Question #47 of 119

Question ID: 464530

Which statement represents Kemp's *weakest* argument?

- ☐ A) "Neither multifactor models nor APT require an estimation of the market risk premium."
- ☒ B) "Under APT, risk is easier to calculate than is the case with the CAPM, for which beta must be estimated based on unobservable returns."
- ☐ C) "The CAPM requires a lot of unrealistic assumptions. APT's assumptions are far less restrictive."

Explanation

It is debatable whether risk is easier to calculate under APT. True, the beta of the unobservable market portfolio is not needed, but the risk factors required for the APT equation are not provided. The analyst must select them. As such, the statement about the ease of calculating risk is open for interpretation. Both remaining statements are factually accurate, with no interpretation required. (LOS 57.l)

Question #48 of 119

Question ID: 464531

Kemp's equation is *closest* to:

- ☒ A) a macroeconomic multifactor model.
- ☐ B) arbitrage pricing theory.
- ☐ C) a microeconomic multifactor model.

Explanation

The arbitrage pricing theory and the capital asset pricing model equations use the risk-free return, so Kemp's equation is not an APT. That

leaves factor models. The market return is technically neither a macroeconomic or microeconomic variable, but it can be used with multifactor models. Since the other three variables represent macro factors, the equation is closest to a macroeconomic multifactor model. (LOS 57.j)

Question #49 of 119

Question ID: 464532

Which analyst made the *most* sense?

- ✓ **A) Florio.**
- x B) Inge.
- x C) Garcia.

Explanation

Florio's statement about risk factors is correct, and reflects a weakness in APT. Garcia's statement is incorrect, because one of the assumptions inherent in the APT is that arbitrage opportunities do not exist. Inge is mistaken because, while APT does not require the use of the market portfolio, an analyst can certainly use the market portfolio as a factor if desired. (LOS 57.i)

Question #50 of 119

Question ID: 464533

Which of the following is *least likely* to represent a major assumption of the Arbitrage Pricing Theory?

- x **A) Assets are priced so that there are no arbitrage opportunities.**
- ✓ B) Asset-specific risk is the major source of the variance of portfolio returns.
- x C) Asset returns are described by a factor model.

Explanation

Under the Arbitrage Pricing Theory, we assume that there are many assets, so asset-specific risk can be eliminated. When a portfolio contains many securities, the nonsystematic risk of individual assets makes almost no contribution to the variance of portfolio returns. (LOS 57.i)

Question #51 of 119

Question ID: 464534

Which of the following statements regarding the Arbitrage Pricing Theory is *least accurate*? Arbitrage Pricing Theory:

- ✓ **A) explains factor j's risk premium to be the expected return on a pure factor portfolio for factor j.**
- x B) describes the expected return on an asset as a function of the risk from a set of factors.
- x C) makes less restrictive assumptions than the CAPM.

Explanation

APT explains factor j's risk premium to be the expected return in *excess of the risk-free rate* on a pure factor portfolio for factor j. Like the CAPM, the APT describes a financial market equilibrium, but the APT makes less restrictive assumptions than the CAPM. APT describes the expected return on an asset as a linear function of the risk of the asset with respect to a set of factors. (LOS 57.i)

Question #52 of 119

Question ID: 464354

The equation of the capital market line (CML) says that the expected return on any portfolio equals the:

- ✓ **A) risk-free rate plus the product of the market price of risk and the portfolio's standard deviation.**
- ✗ **B) risk-free rate plus the product of the market risk premium and the market's portfolio standard deviation.**
- ✗ **C) risk-free rate plus the product of the market price of risk and the market's portfolio standard deviation.**

Explanation

The CML is the capital allocation line with the market portfolio as the tangency portfolio. The equation of the CML is:

$$E(R_P) = R_F + [(E(R_M) - R_F)/\sigma_M] \sigma_P$$

where:

$E(R_M)$ = the expected return on the market portfolio, M

σ_M = the standard deviation of the market portfolio, M

R_F = the risk-free return

The intercept is the risk-free rate, R_F . The slope is equal to $[(E(R_T) - R_F) / \sigma_T]$, where $[E(R_T) - R_F]$ is the expected risk premium on the tangency portfolio.

Question #53 of 119

Question ID: 464469

Responses to instability in the minimum variance frontier are *least likely* to include:

- ✓ **A) reducing the skew of the probability distribution of the sample mean.**
- ✗ **B) improving the statistical quality of inputs.**
- ✗ **C) adding constraints against short sales.**

Explanation

Improving the statistical quality of inputs and adding constraints against short sales are valid methods for reducing instability in the minimum variance frontier.

Question #54 of 119

Question ID: 464336

The portfolio on the minimum-variance frontier that has the *smallest* standard deviation is the:

- ✗ **A) optimal efficient portfolio.**
- ✓ **B) global minimum-variance portfolio.**
- ✗ **C) market portfolio.**

Explanation

The global minimum-variance portfolio is the portfolio on the minimum-variance frontier that has the smallest standard deviation (or

variance). It is the portfolio at the tip of the bullet. The market portfolio, in which each asset is held in proportion to its market value, cannot have the smallest standard deviation of the portfolios on the minimum variance frontier.

Question #55 of 119

Question ID: 464554

A portfolio with a specific set of factor sensitivities designed to replicate the factor exposures of a benchmark index is called a:

- ☐ A) factor portfolio.
- ☒ B) tracking portfolio.
- ☐ C) arbitrage portfolio.

Explanation

A tracking portfolio is a portfolio with a specific set of factor sensitivities designed to replicate the factor exposures of a benchmark index. A factor portfolio is a portfolio with a factor sensitivity of one to a particular factor and zero to all other factors. An arbitrage portfolio is a portfolio with factor sensitivities of zero to all factors, positive expected net cash flow, and an initial investment of zero.

Question #56 of 119

Question ID: 464347

The capital asset pricing model (CAPM) assumes that investors can borrow at the risk-free rate and short sell, and also, that the market portfolio is efficient. With respect to the risk-free rate and selling short, the market portfolio may NOT be efficient:

- ☒ A) if either borrowing at the risk-free rate or short-selling is not possible.
- ☐ B) if both borrowing at the risk-free rate and short-selling are not possible.
- ☐ C) under no circumstances, the market portfolio is efficient by definition.

Explanation

The capital market line (CML) relies on the assumption that the market portfolio is efficient. That is, the market portfolio lies on the efficient frontier and offers the highest possible level of return for its level of risk. If investors are not allowed or able to short sell or borrow at the risk-free rate, however, the market portfolio may not be efficient.

Question #57 of 119

Question ID: 464466

Which of the following is not an assumption of the arbitrage pricing theory (APT)?

- ☐ A) The market contains enough stocks so that unsystematic risk can be diversified away.
- ☐ B) Returns on assets can be described by a multi-factor process.
- ☒ C) Security returns are normally distributed.

Explanation

APT does not require that security returns be normally distributed.

Question #58 of 119

Question ID: 464426

The capital market line:

- ✓ **A) helps determine asset allocation.**
- x B) has a slope equal to the market risk premium.
- x C) uses nondiversifiable risk.

Explanation

The purpose of the CML is to determine the percentages allocated to the market portfolio and the risk-free asset. Both remaining answers reflect characteristics of the security market line.

Question #59 of 119

Question ID: 464566

Which of the following models is NOT consistent with the concept that investors can earn an additional risk premium for holding dimensions of risk unrelated to market movements?

- ✓ **A) The capital asset pricing model (CAPM).**
- x B) The arbitrage pricing theory.
- x C) Macroeconomic multi-factor models.

Explanation

The CAPM suggests that security returns can be captured in a one-factor (market) model. Multifactor models allow us to capture other dimensions of risk besides overall market risk. Investors with unique circumstances that differ from the average investor may want to hold portfolios tilted away from the market portfolio in order to hedge or speculate on factors like recession risk, interest rate risk or inflation risk. In doing so they are able to earn a substantial premium for holding dimensions of risk unrelated to market movements.

Question #60 of 119

Question ID: 464499

Given a three-factor arbitrage pricing theory APT model, what is the expected return on the Freedom Fund?

- The factor risk premiums to factors 1, 2, and 3 are 10%, 7% and 6%, respectively.
 - The Freedom Fund has sensitivities to the factors 1, 2, and 3 of 1.0, 2.0 and 0.0, respectively.
 - The risk-free rate is 6.0%.
-
- ✓ **A) 30.0%.**
 - x B) 24.0%.
 - x C) 33.0%.

Explanation

The expected return on the Freedom Fund is $6\% + (10.0\%)(1.0) + (7.0\%)(2.0) + (6.0\%)(0.0) = 30.0\%$.

Question #61 of 119

Question ID: 464421

What is the expected rate of return for a stock that has a beta of 1.0 if the expected return on the market is 15%?

- ✓ A) 15%.
- x B) More than 15%.
- x C) Cannot be determined without the risk-free rate.

Explanation

The expected return of a stock with a beta of 1.0 must, on average, be the same as the expected return of the market which also has a beta of 1.0.

Question #62 of 119

Question ID: 464325

What are the expected return and expected standard deviation for the two-asset portfolio described as:

<i>Expected Return/Correlation</i>	<i>Variance</i>	<i>Weight</i>
$E(R_1) = 10\%$	$\text{Var}(1) = 9\%$	$w_1 = 30\%$
$E(R_2) = 15\%$	$\text{Var}(2) = 25\%$	$w_2 = 70\%$
$r_{1,2} = 0.4$		

$E(R_{\text{port}})$ σ_{port}

- x A) 10.5% 15.58%
- ✓ B) 13.5% 39.47%
- x C) 11.5% 3.95%

Explanation

$$E(R_{\text{port}}) = w_1E(R_1) + w_2E(R_2) = (0.3)(10.0) + (0.7)(15.0) = 13.5\%$$

$$\begin{aligned}\sigma_{\text{port}} &= [(w_1)^2(\sigma_1)^2 + (w_2)^2(\sigma_2)^2 + 2w_1w_2\sigma_1\sigma_2\rho_{1,2}]^{1/2} \\ &= [(0.3)^2(0.09) + (0.7)^2(0.25) + 2(0.3)(0.7)(0.3)(0.5)(0.4)]^{1/2} = 39.47\%\end{aligned}$$

Question #63 of 119

Question ID: 464561

Sidney Peterson is starting a new fund that is designed to have the same factor exposures as the Dow Jones Industrial Average, but seeks to outperform the index by at least 2% annually through superior stock selection. To achieve this, the fund would *most likely* use a:

- ✓ A) tracking portfolio.
- x B) bottom-up strategy.

x C) pure factor portfolio.

Explanation

Tracking portfolios are typically used for active asset selection. A pure factor portfolio would be used to increase or decrease exposure to one specific factor, such as GNP. A bottom-up strategy is unsuitable because it solely focuses on a firm's characteristics and fails to properly invest in the same industries as the index.

Questions #64-69 of 119

Andy Green, CFA, and Sue Hutchinson, CFA, are considering adding alternative investments to the portfolio they manage for a private client. They have found that it is recommended that a large, well-diversified portfolio like the one that they manage should include a 5 to 10% allocation in alternative investments such as commodities, distressed companies, emerging markets, etc.. After much discussion, Green and Hutchinson have decided that they will not choose individual assets themselves. Instead of choosing individual alternative investments, they will add a hedge fund to the portfolio. They decide to divide up their research by having each of them take a different focus. In their research of hedge funds, Green focuses on hedge funds that have the highest returns. Hutchinson focuses on finding hedge funds that can allow the client's portfolio to lower risk while, with the use of leverage, maintain the same level of return.

After completing their research into finding appropriate hedge funds, Green proposes two hedge funds: the New Horizon Emerging Market Fund, which takes long-term positions in emerging markets, and the Hi Rise Real Estate Fund, which holds a highly leveraged real estate portfolio. Hutchinson proposes two hedge funds: the Quality Commodity Fund, which takes conservative long-term positions in commodities, and the Beta Naught Fund, which manages an equity long/short portfolio that has the goal of targeting the portfolio's market risk to zero. The Beta Naught Fund engages in short-term pair trading to capture additional returns while keeping the beta of the fund equal to zero. The table below lists the statistics for the client's portfolio without any alternative investments and for the four hedge funds based upon recent data. The expected return, standard deviation and beta of the client portfolio and the hedge funds are expected to have the same values in the near future. Green uses the market model to estimate covariances between portfolios with their respective betas and the variance of the market return. The variance of the market return is $324(\%^2)$.

	Current Client Portfolio	New Horizon	Hi Rise Real Estate	Quality Commodity	Beta Naught
Average	10%	20%	10%	6%	4%
Std. Dev.	16%	50%	16%	16%	25%
Beta	0.8	0.9	0.4	-0.2	0

Green and Hutchinson have decided to sell off 10% of the current client portfolio and replace it with one of the four hedge funds. They have agreed to select the hedge fund that will provide the highest Sharpe Ratio when 10% of the client's portfolio is allocated to that hedge fund.

As an alternative to investing 10% in one hedge fund, Green and Hutchinson have discussed investing 5% in the Beta Naught Fund and 5% in one of the other three hedge funds. This new 50/50 hedge fund portfolio would then serve as the 10% allocation in alternative investments for the client's portfolio.

Question #64 of 119

Question ID: 464327

Green and Hutchinson divided up their research into return enhancement and diversification benefits. Based upon the stated goals of their research, which of the two approaches is more likely to lead to an appropriate choice? The focus of:

- ✓ **A) Hutchinson's research.**
- ✗ **B) neither manager is appropriate and will not achieve a meaningful result.**
- ✗ **C) Green's research.**

Explanation

Simply increasing return may not be appropriate if the risk level increases more than the return increases. Focusing on assets that help diversify the existing portfolio is more appropriate because any reduction in return can be offset by an increase in leverage. (Study Session 16, LOS 51.a, b)

Question #65 of 119

Question ID: 464328

Of the proposed hedge funds, which is *most likely* to introduce active risk into the client's portfolio?

- ✗ **A) New Horizon Emerging Market Fund.**
- ✓ **B) The Beta Naught Fund.**
- ✗ **C) Hi Rise Real Estate Fund.**

Explanation

The Beta Naught Fund is the only one that takes short-term positions. (Study Session 16, LOS 51.a)

Question #66 of 119

Question ID: 464329

Which of the following is *closest* to the expected return of the client's portfolio if 10% of the portfolio is invested in the New Horizon Emerging Market Fund?

- ✗ **A) 10.2%.**
- ✓ **B) 11.0%.**
- ✗ **C) 11.8%.**

Explanation

$11\% = (0.9 \times 10\%) + (0.1 \times 20\%)$ (Study Session 16, LOS 51.a)

Question #67 of 119

Question ID: 472715

Which of the following is *closest* to the expected standard deviation of the client's portfolio if 10% of the portfolio is invested in the Quality Commodity Fund?

- ✗ **A) 9.6%.**
- ✗ **B) 11.7%.**
- ✓ **C) 14.2%.**

Explanation

The market model offers a simple way to estimate the covariance between two assets, using the beta of each asset and the variance of the market return. Here, covariance is $-51.84 = 0.8 \times (-0.2) \times 324$. The variance of the new client portfolio is $200.59 = (0.9 \times 0.9 \times 16 \times 16) + (0.1 \times 0.1 \times 16 \times 16) + (2 \times 0.9 \times 0.1 \times (-51.84))$. The square root of the variance of the new client portfolio is approximately 14.2%. (Study Session 16, LOS 51.a,g)

Question #68 of 119

Question ID: 464331

Which of the following is *closest* to the expected return of a portfolio that consists of 90% of the original client's portfolio, 5% of the Hi Rise Real Estate Fund and 5% in the Beta Naught Fund?

- ☐ A) 10.4%.
- ☐ B) 9.0%.
- ☒ C) 9.7%.

Explanation

$9.7\% = (0.9 \times 10\%) + (0.05 \times 10\%) + (0.05 \times 4\%)$ (Study Session 16, LOS 51.a)

Question #69 of 119

Question ID: 464332

There was a discussion of allocating 5% each in Beta Naught and one of the other funds. When combined with Beta Naught in a 50/50 portfolio, which of the other three funds will produce a portfolio that has the lowest standard deviation?

- ☐ A) New Horizon only.
- ☐ B) Quality Commodity only.
- ☒ C) Either Hi Rise or Quality Commodity.

Explanation

Since the beta of Beta Naught is zero, its covariance with any of the other funds is zero. Thus, the lowest standard deviation will be achieved with the fund with the lowest standard deviation. Since Hi Rise and Quality Commodity have the same standard deviation, which is less than New Horizon, either of them would produce the same result. (Study Session 16, LOS 51.a)

Question #70 of 119

Question ID: 464359

The best possible risk-return trade-off attainable, given the investor's expectations of expected returns, variances, and covariances, is represented by the:

- ☒ A) slope of the capital allocation line (CAL).
- ☐ B) standard deviation of the market portfolio.
- ☐ C) the slope of the minimum-variance frontier at the global minimum-variance portfolio.

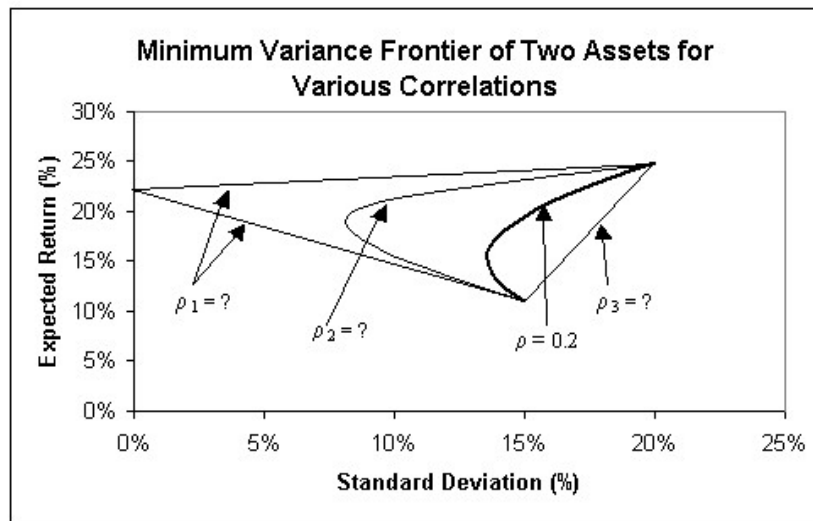
Explanation

We can interpret the slope coefficient $[(E(R_T) - R_F) / \sigma_T]$ of the CAL the same way we do the slope of any straight line (it's the change in $E(R_T)$ for a one unit change in σ_T). Thus, it represents the risk-return trade from moving along the CAL and how much additional expected return do we get for a one-unit increase in risk. Because the tangency portfolio T is the best portfolio, the slope of the CAL line represents the best possible risk-return trade-off attainable, given the investor's expectations of expected returns, variances, and covariances.

Question #71 of 119

Question ID: 464342

It can be determined from the figure below that ρ_2 is:



☐ A) between 0.2 and 1.0.

☒ B) between -1.0 and 0.2.

☐ C) between 0.0 and 0.2.

Explanation

The diversification benefits are greater if the correlation between the returns of the assets in the portfolio is lower. If the correlation equals +1, the minimum variance frontier is a straight line and there is no benefit to diversification (ρ_3). If the correlation equals -1, the minimum variance frontier is two line segments (ρ_1). Therefore ρ_2 must be less than 0.2 and greater than -1.0. It could be equal to zero, but we can't tell for sure given the information in the problem.

Question #72 of 119

Question ID: 464343

An investor holds a single stock, Amgen, in her portfolio. She would like to add one additional stock to her portfolio. Which stock should she add to achieve the most diversification benefits?

Correlation Matrix				
Fund	Amgen	WW	XX	ZZ
Amgen	1.0			
WW	0.5	1.0		
XX	0.1	-0.2	1.0	
YY	0.3	0.4	0.8	
ZZ	0.0	0.8	0.9	1.0

☐ A) Stock WW.

☒ B) Stock ZZ.

☐ C) Stock XX.

Explanation

As the correlation between assets decreases, the benefits of diversification increase. Of the three stocks, ZZ has the lowest correlation with Amgen.

Question #73 of 119

Question ID: 464357

If an investors' portfolio lies on the capital market line (CML) at the point where the CML touches the efficient frontier then this implies the investor has:

- ☒ A) less than 100% of their money invested in the market portfolio.
- ☒ B) a larger percentage of their money invested in the market portfolio and have loaned the remaining amount at the risk-free rate.
- ☒ C) 100% of their funds invested in the market portfolio.

Explanation

Portfolios that are on the CML where the CML touches the efficient frontier implies that 100% of investors funds should be invested in the market portfolio to achieve greatest utility.

Questions #74-79 of 119

Carl Dursham recently earned the CFA designation and has just been hired by Quad Cities Consultants, which is a money management firm for private, high net worth clients. Quad Cities Consultants has just assigned Dursham his first client. The client's name is Sally Litner. Litner has just received a multi-million dollar inheritance consisting of certificates of deposit that are about to mature. She is only 30 years old and recognizes that she should probably invest in assets like stocks that have a higher risk and return. Litner is a high school mathematics teacher and has an aptitude for formulas and equations, but she has never applied it to investments. Litner feels that Dursham will probably do a good job for her, but she wants him to explain to her how he will approach creating her portfolio.

When Dursham and Litner first meet, Litner says that she has heard of a stock that has done very well and is expected to continue to experience dramatic increases in the future. The name of the stock is IntMarket Corporation, which is a company that facilitates commerce on the Internet, and its recent return and standard deviation are 24% and 60% respectively. She asks Dursham if he thinks she should invest 100% of her portfolio in IntMarket Corporation. Dursham looks up the beta of IntMarket and finds that it is 1.6. He says that IntMarket Corporation might be a good first position, and he says that a good second position might be Granite Bank. The return and standard deviation of the bank stock is 12% and 30% respectively. Its beta is 0.9. The covariance of the bank stock with IntMarket Corporation is 576.

Dursham explains how diversification can lower risk and computes the statistics for portfolios that have various weights in IntMarket and Granite Bank. Litner is intrigued by Dursham's demonstration concerning the effects of diversification. She asks about the effect of adding a third asset to the portfolio. To help illustrate the benefits of diversification further, Dursham chooses Capital Commodities Mutual fund, which invests in assets related to the production of raw materials and other commodities. The recent return and standard deviation of Capital Commodities has been 8% and 18% respectfully. The correlation of Capital Commodities with the other two stocks is effectively zero. Dursham computes the return and standard deviation of a portfolio consisting of 50% IntMarket, 30% Granite Bank, and 20% Capital Commodities.

Dursham takes time to explain the principle and assumptions behind mean-variance analysis and why it is important. He says the four underlying principals are i) investors are risk averse, ii) necessary statistics of returns can be calculated, iii) the returns have a normal distribution, and iv) the tax rate is fixed at some positive rate like 28%. During the discussion, Litner says she thinks the three stocks IntMarket Corporation, Granite Bank, and Capital Commodities may be all she needs in her portfolio. She asks Dursham to choose the weights for those three stocks that will minimize the variance and let that be her portfolio. If they desire a higher return, she adds using terms she has just learned, they can just leverage up that portfolio.

Question #74 of 119

Question ID: 479736

If the recent return of the market was 14%, and the risk-free rate is 3%, using the market model what was the alpha of IntMarket Corporation?

- ☐ A) +1.4%.
- ☒ B) +1.6%.
- ☐ C) +4.4%.

Explanation

When using the market model, alpha is the difference between the realized return and that predicted by the product of the beta and the market return. The risk-free rate is not a part of the computation. The recent return of IntMarket was 24%. The predicted return based upon a beta equal to 1.6 and a market return of 14% is the product of these values: 22.4%. Thus the alpha is $24\% - 22.4\% = 1.6\%$. (Study Session 18, LOS 53.g)

Question #75 of 119

Question ID: 479737

Of Dursham's list of the assumptions underlying mean-variance analysis, which of the following is the *least likely* to be one of the generally accepted assumptions?

- ☒ A) The tax rate is fixed at some positive rate like 28%.
- ☐ B) Necessary statistics of returns can be calculated.
- ☐ C) The returns have a normal distribution.

Explanation

The assumption should be that there are no taxes and that there are no transactions costs. (Study Session 18, LOS 53.g)

Question #76 of 119

Question ID: 479738

A portfolio invested 50% in IntMarket and 50% in Granite Bank would have an expected return:

- ☐ A) lower than that of Granite Bank and a higher standard deviation than that of Granite Bank.
- ☒ B) greater than that of Granite Bank and a higher standard deviation than that of Granite Bank.
- ☐ C) greater than that of Granite Bank and a lower standard deviation than that of Granite Bank.

Explanation

The average will obviously be higher than that of Granite Bank. The average is $18\% = (0.5 \times 24\%) + (0.5 \times 12\%)$. The variance of the 50/50 portfolio is $1413 = (0.5 \times 0.5 \times 60 \times 60) + (0.5 \times 0.5 \times 30 \times 30) + (2 \times 0.5 \times 0.5 \times 576)$; the standard deviation is about 37.6%, which is greater than the 30% standard deviation of Granite Bank. (Study Session 18, LOS 53.a)

Question #77 of 119

Question ID: 479739

The portfolio that Dursham recommends using the two stocks and the mutual fund would have a standard deviation that is closest in value to:

- ☐ A) 36.7%.
- ☒ B) 34.2%.
- ☐ C) 36.0%.

Explanation

Since the return of Capital Commodities is uncorrelated with the returns of the two stocks, the variance of the portfolio is $1166.8 = (0.5 \times 0.5 \times 60 \times 60) + (0.3 \times 0.3 \times 30 \times 30) + (0.2 \times 0.2 \times 18 \times 18) + (2 \times 0.5 \times 0.3 \times 576)$ The standard deviation is $\sqrt{34.2\%}$. (Study Session 18, LOS 53.a)

Question #78 of 119

Question ID: 479740

When compared to all other possible portfolios, the portfolio that has the smallest variance, which Litner requests, would have a Sharpe ratio that:

- ☐ A) may or may not be the highest of all possible portfolios; there is no general rule.
- ☒ B) could not be the highest of all possible portfolios.
- ☐ C) is the highest of all possible portfolios.

Explanation

Minimizing the variance does not produce the portfolio with the highest Sharpe ratio. A point along the efficient frontier above the minimum variance portfolio will have both a higher return and standard deviation, but it will have a higher Sharpe ratio. (Study Session 18, LOS 53.b)

Question #79 of 119

Question ID: 479741

The portfolio that Litner requests, the one that has the smallest variance of all possible portfolios, would *best* be described as the:

- ☒ A) global minimum variance portfolio.
- ☐ B) efficient variance portfolio.
- ☐ C) market portfolio.

Explanation

This is the definition of the global minimum variance portfolio. (Study Session 18, LOS 53.b)

Questions #80-85 of 119

Jan Janikowski has compiled the following information on 3 stocks and a stock index:

	<i>Topper</i>	<i>Base</i>	<i>Kent</i>	
<i>Investments</i>	<i>Manufacturing</i>	<i>Construction</i>	<i>Publishing</i>	<i>Stock</i>
	<i>(TM)</i>	<i>(BC)</i>	<i>(KP)</i>	<i>Index</i>
Expected Return	12.5%	11.0%	6.16%	9.5%

Standard Deviation	40.0%	27.5%	8.0%	15.0%
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The information is based on long-term historical data.

	<i>Topper Manufacturing (TM)</i>	<i>Base Construction (BC)</i>	<i>Kent Publishing (KP)</i>	<i>Stock Index</i>
Correlation Matrix				
TM	1.000			
BC	0.220	1.000		
KP	0.450	0.530	1.000	
Stock Index	0.563	0.682	0.833	1.000

Beta of Base Construction = 1.25.

Question #80 of 119

Question ID: 464318

The expected return for a portfolio that holds 75% of net asset value in Topper Manufacturing (TM) and 25% in Base Construction (BC) is *closest to*:

- ☐ A) 11.4%.
- ☒ B) 12.1%.
- ☐ C) 11.8%.

Explanation

Expected return is computed by multiplying the portfolio weight of each stock by its expected return, and summing across all stocks. The portfolio expected return is thus: $((0.75 \times 0.125) + (0.25 \times 0.110)) = 0.12125$. (LOS 57.a)

Question #81 of 119

Question ID: 464319

The standard deviation of the portfolio that consists of 75% TM and 25% BC is *closest to*:

- ☒ A) 32.2%
- ☐ B) 24.8%
- ☐ C) 10.4%

Explanation

The variance of return of a two-asset portfolio can be calculated as $\sigma_p^2 = w_1^2\sigma_1^2 + w_2^2\sigma_2^2 + 2w_1w_2\rho_{1,2}\sigma_1\sigma_2$. The standard deviation of the two-stock portfolio is thus the square root of $[((0.75)^2 \times (0.40)^2) + ((0.25)^2 \times (0.275)^2) + (2 \times (0.75) \times (0.25) \times (0.22) \times (0.40) \times (0.275))]$, which equals 0.3222. (LOS 57.a)

Question #82 of 119

Question ID: 464320

The beta of TM is *closest to*:

- ☐ A) 2.67
- ☐ B) 1.78
- ☒ C) 1.50

Explanation

Beta can be calculated by $\beta_i = \rho_{i,M} \left(\frac{\sigma_i}{\sigma_M} \right) = 0.563 \times (0.40 / 0.15) = 1.50$. (LOS 57.d)

Question #83 of 119

Question ID: 464321

Based on the Capital Market Line, the lowest possible standard deviation of a portfolio that achieves 14.0% expected return is *closest to*:

- ✓ **A) 26.3%**
- ✗ **B) 18.8%**
- ✗ **C) 35.0%**

Explanation

The capital market line shows all combinations of the risk-free and market portfolios, and the resulting levels of expected return and standard deviation. To answer this question, a risk-free rate first needs to be determined. Using CAPM and knowing that the beta of Base Construction is 1.25 and its expected return is 11.0%, then the $E(R_i) = R_f + \beta(R_m - R_f)$ so $0.11 = R_f + 1.25(0.095 - R_f)$. The risk-free rate can be solved to be 3.50%.

The expected return is equal to: $E(R_p) = R_f + \{[E(R_m) - R_f] \times (\sigma_p / \sigma_M)\}$ or $0.14 = 0.035 + (0.095 - 0.035) \times (\sigma_p / 0.15)$. The standard deviation can be solved to be 26.25%. (LOS 57.d)

Question #84 of 119

Question ID: 464322

If the beta of Base Construction is adjusted according to the method that practitioners commonly use to adjust historical betas, Base Construction's expected return is *most likely* to be:

- ✓ **A) greater than 9.5% but less than 11.0%.**
- ✗ **B) less than 9.5%.**
- ✗ **C) greater than 11.0%.**

Explanation

Betas are, on average, mean reverting, so we should use adjusted, rather than historical, betas. One common method that practitioners use to adjust historical beta is to adjust beta towards 1, as the mean-reverting level of beta is 1. Any betas greater than 1.00 will fall toward 1.00 and any betas less than 1.00 will rise toward 1.00. The beta for Base Construction is 1.25, so the adjusted beta will be less than 1.25 but greater than 1.00. This new expected return will fall below the current expected return of 11.0% but will still be greater than the expected market return of 9.5%. (LOS 57.h)

Question #85 of 119

Question ID: 464323

If the current portfolio is the market portfolio, the best decision to further diversify the market portfolio is to:

- ✗ **A) add Topper Manufacturing (TM).**
- ✓ **B) not add any stocks listed.**
- ✗ **C) add Kent Products (KP).**

Explanation

Adding the new asset to your portfolio is optimal if the Sharpe ratio of the new investment is larger than the product of the Sharpe ratio of our existing portfolio and the correlation of the new investment's returns with the returns of our current portfolio. The Sharpe ratio for the

market portfolio is $(0.095 - 0.035)/0.15 = 0.40$. The three stocks' Sharpe ratios can be calculated as follows:

	<i>Topper</i> <i>Manufacturing (TM)</i>	<i>Base</i> <i>Construction (BC)</i>	<i>Kent Publishing(KP)</i>
Expected return	12.5%	11.0%	6.16%
Risk-free	3.5%	3.5%	3.5%
Standard deviation	40%	27.5%	8.0%
Sharpe ratio	0.225	0.273	0.333

None of the Sharpe ratios of the potential additions exceed the Sharpe ratio of the existing portfolio adjusted for correlation. Adding these additional stocks does not provide any diversification benefits. (LOS 57.d)

Question #86 of 119

Question ID: 464360

The intercept of the capital market line is the:

- ☒ A) expected market return.
- ☒ B) expected return on the tangency portfolio.
- ☒ C) risk-free rate.

Explanation

The capital market line (CML) is the capital allocation line with the market portfolio as the tangency portfolio. The equation of the CML is:

$$E(R_P) = R_F + [(E(R_M) - R_F)/\sigma_M] \sigma_P$$

where:

$E(R_M)$ = the expected return on the market portfolio, M

σ_M = the standard deviation of the market portfolio, M

R_F = the risk-free return

The intercept is the risk-free rate, R_F . The slope is equal to $[(E(R_T) - R_F)/\sigma_T]$, where $[E(R_T) - R_F]$ is the expected risk premium on the tangency portfolio.

Question #87 of 119

Question ID: 464515

One of the assumptions of the arbitrage pricing theory (APT) is that there are no arbitrage opportunities available. An arbitrage opportunity is:

- ☒ A) an investment that has an expected positive net cash flow but requires no initial investment.
- ☒ B) a factor portfolio with a positive expected risk premium.
- ☒ C) a portfolio with factor exposures that sum to one.

Explanation

One of the three assumptions of the APT is that there are no arbitrage opportunities available to investors among these well-diversified portfolios. An arbitrage opportunity is an investment that has an expected positive net cash flow but requires no initial investment.

All factor portfolios will have positive risk premiums equal to the factor price for that factor. An arbitrage opportunity does not necessarily require a return equal to the risk-free rate, and the factor exposures for an arbitrage portfolio are all equal to zero.

Question #88 of 119

Question ID: 464495

The Adams portfolio contains 35% Khallin Equipment stock and 65% Giant Semiconductor stock. Analyst Joe Karroll estimates that 40% of Khallin's return variance is determined by cost trends and 60% is determined by purchasing trends.

$$\text{Return}_{\text{Khallin}} = E(R_{\text{Khallin}}) + (0.4 \times \text{Cost Factor}) + (0.6 \times \text{Purchasing Factor})$$

Karroll also estimates that Giant's return variance is 75% determined by cost trends and 25 percent determined by purchasing trends.

$$\text{Return}_{\text{Giant}} = E(R_{\text{Giant}}) + (0.75 \times \text{Cost Factor}) + (0.25 \times \text{Purchasing Factor})$$

With an estimated return of 7% for Khallin and 16% for Giant, and given a cost factor of -0.07 and a purchasing factor of 0.0325, the Adams portfolio's expected return is *closest* to:

- ☒ A) 11.3%.
- ☒ B) 9.7%.
- ☒ C) 12.9%.

Explanation

To calculate expected portfolio returns using the macroeconomic models, we simply use the weighted average of the models. Here are the models:

$$\text{Return-Khallin} = 0.07 + (0.4 \times -0.07) + (0.6 \times 0.0325) = 0.0615$$

$$\text{Return-Giant} = 0.16 + (0.75 \times -0.07) + (0.25 \times 0.0325) = 0.1156$$

With a 35% weighting for Khallin stock and a 65% weighting for Giant, the portfolio return = $(0.35 \times 0.0615) + (0.65 \times 0.1156) = 0.0967$.

Question #89 of 119

Question ID: 464467

An analyst is constructing a portfolio for a new client. During an optimization procedure, it becomes apparent that small changes in input assumptions lead to broad changes in the efficient frontier. This is *most likely* a result of instability:

- ☒ A) in the minimum variance frontier.
- ☒ B) of the point estimates of the covariances.
- ☒ C) of the point estimate of the sample mean.

Explanation

When small changes in input assumptions lead to broad changes in the efficient frontier, instability in the minimum variance frontier and the efficient frontier is indicated.

Question #90 of 119

Question ID: 464358

Investment Management Inc. (IMI) uses the capital market line to make asset allocation recommendations. IMI derives the following forecasts:

- Expected return on the market portfolio: 12%
- Standard deviation on the market portfolio: 20%
- Risk-free rate: 5%

Samuel Johnson seeks IMI's advice for a portfolio asset allocation. Johnson informs IMI that he wants the standard deviation of the portfolio to equal one half of the standard deviation for the market portfolio. Using the capital market line, the expected return that IMI can provide subject to Johnson's risk constraint is *closest to*:

- ☐ A) 6.0%.
- ☐ B) 7.5%.
- ☒ C) 8.5%.

Explanation

The equation for the capital market line is:

$$E(R_p) = R_F + \frac{E(R_m) - R_F}{\sigma_m} \sigma_p$$

Johnson requests the portfolio standard deviation to equal one half of the market portfolio standard deviation. The market portfolio standard deviation equals 20%. Therefore, Johnson's portfolio should have a standard deviation equal to 10%. The intercept of the capital market line equals the risk free rate (5%), and the slope of the capital market line equals the Sharpe ratio for the market portfolio (35%). Therefore, using the capital market line, the expected return on Johnson's portfolio will equal:

$$E(R_p) = R_F + \frac{E(R_m) - R_F}{\sigma_m} \sigma_p = 0.05 + 0.35(0.10) = 0.085 = 8.5\%$$

Question #91 of 119

Question ID: 464394

What is the expected rate of return for a stock that has a beta of 1.2 if the risk-free rate is 6% and the expected return on the market is 12%?

- ☐ A) 12.0%.
- ☒ B) 13.2%.
- ☐ C) 7.2%.

Explanation

$$ER_{\text{stock}} = 0.06 + 1.2(0.12 - 0.06) = 13.2\%$$

Questions #92-97 of 119

Kurt Kim, an analyst for U.S.-based Grant Investments, has gathered historical data on three equities indices: (1) the "US" Index for domestic equities, (2) the "DM" Index for developed market equities excluding the United States and (3) the "EM" Index for emerging markets.

Portfolios A, B, C and D, comprised of different combinations of the US Index and the DM Index, produced the following results:

<i>Portfolio</i>	<i>Weight US (%)</i>	<i>Weight DM (%)</i>	<i>Port σ (%)</i>	<i>$E(R_p)$ (%)</i>
A	100.0	0.0	10.0	10.0
B	70.0	30.0	9.3	
C	30.0	70.0	11.7	
D	0.0	100.0	15.0	20.0

The Emerging Markets Index (EM) had an expected return of 25.0% and a standard deviation of 25.0% over the time period Kim reviewed. US T-bills yielded 4.0% over that same period.

The correlation of these indices was as follows:

<i>Correlation Matrix</i>	<i>US</i>	<i>DM</i>	<i>EM</i>
US	1.00		
DM	0.28	1.00	
EM	0.16	0.45	1.00

Lily Gunderson and Jose Ricardo are two of Kim's analyst colleagues at Grant Investments. The analysts gather to discuss the data, and make the following comments:

Kim: I'm worried about using historical data as the basis of an optimization.

Gunderson: Small changes in the inputs seem to change the findings significantly.

Ricardo: We should really use adjusted betas for better results.

Question #92 of 119

Question ID: 464379

Which portfolio *most accurately* represents the minimum variance portfolio among the different combinations of the US Index and the DM Index?

☒ A) Portfolio A.

☒ B) Portfolio B.

☒ C) Portfolio C.

Explanation

The minimum variance portfolio among the portfolio choices presented is portfolio B (70% U.S., 30% Developed Market). (LOS 57.b)

Question #93 of 119

Question ID: 464380

For a U.S. investor with extreme risk aversion, is there a benefit to international diversification?

- ☒ A) Yes, since a 100% weighting in international stocks results in a doubling of the expected return with only a 50% increase in risk.
- ☒ B) Yes, since a 70% weighting in the DM index results in a much higher expected return with a minimal increase in portfolio standard deviation than 100% investment in the S&P index.
- ☒ C) Yes, since a 30% weighting in the DM index results in an increased return and decreased standard deviation than 100% investment in the US index.

Explanation

To answer this question, it is necessary to complete the table.

$$ER_{\text{portB}} = (0.70)(0.10) + (0.30)(0.20) = 0.13$$

$$ER_{\text{portC}} = (0.30)(0.10) + (0.70)(0.20) = 0.17$$

Portfolio	Weight US (%)	Weight DM (%)	Port σ (%)	$E(R_p)$ (%)
A	100.0	0.0	10.0	10.0
B	70.0	30.0	9.3	13.0
C	30.0	70.0	11.7	17.0
D	0.0	100.0	15.0	20.0

For portfolio B, the addition of DM is return enhancing and risk reducing, so even in the presence of extreme risk aversion there is a benefit. By choosing portfolio B, $E(r)$ increases to 13.0% and portfolio risk decreases to 9.3%. For portfolios C and D, returns are increasing but so is the risk level. Both of these risk-return trade-offs may have some merit for an investor, but we cannot be sure in the presence of extreme risk aversion. (LOS 57.c)

Question #94 of 119

Question ID: 464381

Using Sharpe ratio as the criteria, the *most* desirable portfolio among portfolios B,C and D is:

- ☒ A) Portfolio B.
- ☒ B) Portfolio D.
- ☒ C) Portfolio C.

Explanation

The Sharpe ratio is the ratio of: mean return in excess of the risk-free rate, divided by standard deviation of return.

$$\text{Sharpe ratio of Portfolio B} = (0.130 - 0.040) / 0.093 = 0.97$$

$$\text{Sharpe ratio of Portfolio C} = (0.170 - 0.040) / 0.117 = 1.11$$

$$\text{Sharpe ratio of Portfolio D} = (0.200 - 0.040) / 0.150 = 1.07$$

(LOS 57.d)

Question #95 of 119

Question ID: 464382

Kim is asked to consider including the EM (emerging market) index in portfolios, in addition to US and DM indexes. It would be most appropriate for Kim to conclude that the EM index should:

- ✓ **A) be included, because the Sharpe ratio for the EM Index is greater than the Sharpe ratio of the US Index multiplied by the correlation between the two.**
- ✗ **B) not be included, because the correlation between the EM Index and the US Index is not low enough.**
- ✗ **C) be included, because the correlation between the EM Index and the US Index is low, which ensures superior risk-adjusted return.**

Explanation

Sharpe ratio of US Index = $(0.10 - 0.04) / 0.10 = 0.60$

Sharpe ratio of EM Index = $(0.25 - 0.04) / 0.25 = 0.84$

We should add the new asset if: $\frac{E(R_{new}) - R_f}{\sigma_{new}} > \left[\frac{E(R_p) - R_f}{\sigma_p} \right] \times \text{Corr}(R_{new}, R_p)$

The Sharpe ratio for the EM Index is 0.84, which is far greater than the Sharpe ratio for US index multiplied by the correlation coefficient, which equals $0.60 \times 0.16 = 0.096$. Low correlation is desirable but is not sufficient in isolation to justify the inclusion of additional assets. In this case, adding the emerging markets index to US stocks will result in a superior efficient frontier of risky investments. (LOS 57.d)

Question #96 of 119

Question ID: 464383

Kim compared the 70%/30% mix of US/DM to the 70%/20%/10% mix of US/DM/EM. The 70%/30% mix will have a lower expected return:

- ✓ **A) higher standard deviation, and lower Sharpe ratio.**
- ✗ **B) lower standard deviation, and lower Sharpe ratio.**
- ✗ **C) lower standard deviation, and higher Sharpe ratio.**

Explanation

Expected return for 70/30 = $(0.70)(0.10) + (0.30)(0.20) = 0.13$

Expected return for 70/20/10 = $(0.70)(0.10) + (0.20)(0.20) + (0.10)(0.25) = 0.135$

Standard deviation for 70/30 (given) = 0.093

Standard deviation for 70/20/10 = $\{(0.70)^2(0.10)^2 + (0.20)^2(0.15)^2 + (0.10)^2(0.25)^2 + [2(0.70)(0.20)(0.10)(0.15)(0.28)] + [2(0.70)(0.10)(0.10)(0.25)(0.16)] + [2(0.20)(0.10)(0.15)(0.25)(0.45)]\}^{1/2} = 8.72\%$.

A combination of lower expected return and higher standard deviation results in a lower Sharpe ratio for the 70%/30% mix portfolio. (LOS 57.d)

Question #97 of 119

Question ID: 464384

Which analyst's statement regarding instability in the minimum-variance frontier is *least* appropriate?

- ✗ **A) Gunderson's.**
- ✗ **B) Kim's.**
- ✓ **C) Ricardo's.**

Explanation

Both Kim's and Gunderson's statements are relevant to the instability in the minimum-variance frontier issue. Using historical data can lead to results that are misleading, as historical data can have random variations that may seem significant but that may not occur in a different time period. Because mean variance optimization is very sensitivity to the inputs, small differences among the assets will greatly impact the results.

Ricardo's statement is more closely related to forecasting techniques for practitioners rather than to instability in the minimum-variance frontier. (LOS 57.i)

Question #98 of 119

Question ID: 464355

Which of the following does NOT describe the capital allocation line (CAL)?

- ☐ A) The CAL is tangent to the minimum-variance frontier.
- ☐ B) It is the efficient frontier when a risk-free asset is available.
- ☒ C) It runs through the global minimum-variance portfolio.

Explanation

If a risk-free investment is part of the investment opportunity set, then the efficient frontier is a straight line called the capital allocation line (CAL). The CAL is tangent to the minimum-variance frontier of risky assets; therefore, it cannot run through the global minimum-variance portfolio.

Question #99 of 119

Question ID: 464549

Janice Barefoot, CFA, has been managing a portfolio for a client who has asked Barefoot to use the Dow Jones Industrial Average (DJIA) as a benchmark. In her first year Barefoot managed the portfolio by choosing 29 of the 30 DJIA stocks. She selected a non-DJIA stock in the same industry as the omitted stock to replace that stock. Compared to the DJIA, Barefoot has placed a higher weight on the financial stocks and a lower weight on the other stocks still in the portfolio. Over that year, the non-DJIA stock in the portfolio had a negative return while the omitted DJIA stock had a positive return. The portfolio managed by Barefoot outperformed the DJIA. Based on this we can say that the return from factor tilts and asset selection were:

- ☐ A) both positive.
- ☐ B) negative and positive respectively.
- ☒ C) positive and negative respectively.

Explanation

Since the replacement of the asset obviously had a negative effect, the tilting towards financial stocks must have been positive to not only compensate for the loss but produce a portfolio return greater than the DJIA.

Question #100 of 119

Question ID: 464386

Which of the following is NOT an assumption necessary to derive the capital asset pricing model (CAPM)?

- ☒ A) Transactions costs are small for large investors.

- ☐ **B)** Investors only need to know expected returns, variances, and covariances in order create optimal portfolios.
- ☐ **C)** Investors are price takers whose buy and sell decisions don't affect asset prices.

Explanation

The derivation of the CAPM requires the assumption that transactions costs, and taxes are zero for all investors. Both remaining choices are necessary assumptions.

Question #101 of 119

Question ID: 464444

Joseph Capital Management is considering implementing a mean-variance optimization model as part of their portfolio management process, however, the firm's investment committee is unsure whether the model should use historical estimates or market model estimates for the inputs to the model. Joseph's Senior Portfolio Manager, Travis Palmer, puts together a memo to the committee contrasting the two methods of calculating inputs. The memo includes the following points:

- Point 1: Using the historical estimate is far simpler and involves fewer computations than the market model method.
- Point 2: The use of market model estimates implicitly assumes that the market itself is mean-variance efficient.
- Point 3: Both the use of market model estimates and historical estimates rely on historical data to some degree.
- Point 4: One of the problems with using market model estimates for estimating returns is that the market model implicitly assumes the market index is representative of the entire market.

After reviewing Palmer's memo, Joseph's investment committee would be CORRECT to:

- ☐ **A)** agree with Point 3, but disagree with Points 2 and 4.
- ☒ **B)** agree with Points 2 and 3, but disagree with Point 1.
- ☐ **C)** agree with Points 1 and 4, but disagree with Point 3.

Explanation

The committee should disagree with Point 1. The use of historical estimates involves computing the covariance of between each stock in a portfolio with every other stock in the portfolio, while the use of the market model only relies on computing the covariance of each stock with the market index, resulting in fewer computations.

The committee should agree with Points 2, 3, and 4. The market model regresses historical returns of a stock/portfolio with the corresponding returns of a market index and implicitly assumes that historical relationships are reflective of future relationships. The market model also implicitly assumes that the market itself is mean-variance efficient and that the index used for market returns is representative of the entire market.

Questions #102-107 of 119

Jim Williams, CFA, manages individual investors' portfolios for Clarence Farlow Associates. Clarence Farlow Jr., CEO of the firm, is looking for some new investment ideas. Farlow has assigned Williams to assess the investment merit of several securities. Williams collects the following data for the three possible investments as follows.

Stock	Price Today	Forecasted Price*	Dividend	Beta
Alpha	\$45.00	\$50.00	\$4	1.40
Omega	\$125.00	\$138.00	\$1.20	1.20
Lambda	\$10.00	\$10.80	\$0	0.50
*Forecast Price = expected price one year from today.				

Williams plans to value the three securities using the security market line (SML), and has assembled the following information for use in his valuation:

- Securities markets are in equilibrium.
- The prime interest rate is expected to rise by about 2.0% in the year ahead.
- Inflation is expected to be 1.0% over the upcoming year.
- The expected return on the market is 12.0% and the risk-free rate is 4.0%.
- The market portfolio's standard deviation is 25.0%.

Williams eventually decides to construct a portfolio consisting of 10,000 shares of Alpha, 2,000 shares of Omega, and 30,000 shares of Lambda. The correlation between these securities is shown in the following table.

Correlation	Alpha	Omega	Lambda	Market
Alpha	1.000			
Omega	0.622	1.000		
Lambda	0.486	0.031	1.000	
Market	0.778	0.800	0.625	1.000

Williams continues his research and finds 22 additional stocks that meet the firm's selection criteria. The new portfolio Williams assembles is an equally weight portfolio of the 25 stocks.

Additional information for 25 stocks	
Average standard deviation	32.5%
Average correlation	0.70
Expected return	12.5%

Question #102 of 119

Question ID: 464364

Based on valuation via the SML, which of the following statements is *most* accurate?

- ☒ A) Neither Alpha nor Lambda is correctly priced.
- ☐ B) Both Alpha and Omega are overpriced.
- ☒ C) Williams should buy Alpha but not Omega.

Explanation

The security market line (SML) is a graph of the capital asset pricing model. In the CAPM model, expected excess returns are related only to market risk, represented by beta.

SML valuation hinges on the relationship between the forecasted return (FR) and expected return (ER).

$FR = (\text{ending price} - \text{beginning price} + \text{dividends}) / \text{beginning price}.$

$ER = RFR + \beta (R_{Mkt} - RFR).$

- For Alpha: $FR = (50.00 - 45.00 + 4.00) / 45.00 = 19.8\%$, $ER = 0.04 + 1.40(0.12 - 0.04) = 15.2\%$. Since the forecasted return is greater than the CAPM expected return ($FR > ER$), the stock is underpriced.
- For Omega: $FR = (138.00 - 125.00 + 2.00) / 125.00 = 12.0\%$, $ER = 0.04 + 1.2(0.12 - 0.04) = 13.6\%$. Since $FR < ER$, the stock is overpriced.
- For Lambda: $FR = (10.80 - 10.00 + 0) / 10.00 = 8.0\%$, $ER = 0.04 + 0.5(0.12 - 0.04) = 8.0\%$. Since $FR = ER$, this stock is correctly priced according to the CAPM model. (LOS 57.f)

Question #103 of 119

Question ID: 464365

The covariance of Omega with the market portfolio is *closest* to:

- ☐ A) 0.030.
- ☐ B) 0.063.
- ☒ C) 0.075.

Explanation

Beta = $Cov_{i,M} / \text{market portfolio variance}$, so $Cov_{i,M} = 1.20 \times (0.25)^2 = 0.075$. (LOS 57.d)

Question #104 of 119

Question ID: 464366

The expected return of Williams's three-stock portfolio is *closest* to:

- ☐ A) 8.6%.
- ☐ B) 12.3%
- ☒ C) 12.6%.

Explanation

The beta of the portfolio is the weighted average of the three stocks' betas

Stock	Price	Shares	Value	% of Portfolio	Beta
Alpha	\$45.00	10,000	\$450,000.00	45.0%	1.40
Omega	\$125.00	2,000	\$250,000.00	25.0%	1.20
Lambda	\$10.00	30,000	\$300,000.00	30.0%	0.50

The beta of the overall portfolio is thus: $(0.45 \times 1.4) + (0.25 \times 1.2) + (0.30 \times 0.5) = 1.08$.

The expected return is then: $0.04 + 1.08(0.12 - 0.04) = 12.64\%$ (LOS 57.a)

Question #105 of 119

Question ID: 464367

Williams wishes to calculate the required return for Omega. According to the capital asset pricing model (CAPM) the required return is *closest* to:

- ☐ A) 12.0%.
- ☐ B) 5.7%.
- ☒ C) 13.6%.

Explanation

The required return (RR) uses the equation of the SML: risk-free rate + Beta × (expected market rate – risk-free rate). For Omega, RR = $0.04 + 1.20 \times (0.12 - 0.04) = 13.6\%$. The expected return of 5.7% need not be the same as the required return under CAPM. (LOS 57.f)

Question #106 of 119

Question ID: 464368

The variance of the unsystematic or firm specific risk for Lambda is *closest* to:

- ✓ A) 0.024375.
- x B) 0.0400.
- x C) 0.0156.

Explanation

To calculate variance of firm specific risk, we can use the relationship $Cov(i, M) = \beta_i \sigma_M^2$ to find the covariance. The beta is 0.5 and the market standard deviation is 0.25. The covariance is equal to $0.5 \times (0.25)^2 = 0.03125$.

To find the standard deviation of lambda, $Cov(i, M) = \rho_{i, M} \sigma_i \sigma_M$ so $0.03125 = 0.625 \times \sigma_i \times 0.25$; and thus $\sigma_i = 0.20$. The variance of lambda is then $(0.20)^2 = 0.0400$.

To find the variance of the firm specific risk, $Variance_{\text{Lambda}} = \beta_i^2 \sigma_M^2 + \sigma_\epsilon^2$ so $0.0400 = (0.5)^2 \times (0.25)^2 + \text{variance of the firm specific risk}$, so variance of the firm-specific risk = $0.0400 - 0.015625 = 0.024375$. (LOS 57.d)

Question #107 of 119

Question ID: 464369

Relative to the capital market line (CML), the equally weighted portfolio of 25 stocks will plot:

- ✓ A) below the CML.
- x B) above the CML.
- x C) on the CML.

Explanation

The slope of the capital market line is the Sharpe ratio. The Sharpe ratio for the market is $(0.12 - 0.04)/0.25 = 0.32$.

For the equally-weighted portfolio of 25 stocks,

Average variance = $0.325^2 = 0.106$

Average COV = Avg. correlation × avg variance = $0.70 \times 0.106 = 0.0742$

$$\sigma_p^2 = \frac{1-n}{n} \sigma_i^2 + \frac{n-1}{n} \text{Cov} = \frac{1}{25} (0.106) + \frac{24}{25} (0.0742) = 0.075$$

Portfolio standard deviation = 27.47%.

Portfolio Sharpe ratio = $(0.125 - 0.04)/0.2747 = 0.30$ (lower than market's sharpe ratio). (LOS 57.d)

Question #108 of 119

Question ID: 464498

Which of the following assumptions is NOT necessary to derive the APT?

- ✓ **A) The factor portfolios are efficient.**
- x **B) A factor model describes asset returns.**
- x **C) Investors can create diversified portfolios with no firm-specific risk.**

Explanation

The APT is an equilibrium model that assumes that investors can create diversified portfolios and that a factor model describes asset returns. It does NOT require that factor portfolios (nor, as in the capital asset pricing model [CAPM], the market portfolio) be efficient. In effect, the APT assumes investors simply like more money to less, while the CAPM assumes they care about expected return and standard deviation and invest in efficient portfolios. The APT makes no reference to mean-variance analysis or assumptions about efficient portfolios. This weaker set of assumptions is an advantage of the APT over the CAPM.

Question #109 of 119

Question ID: 464514

Which of the following is an equilibrium-pricing model?

- x **A) Macroeconomic factor model.**
- ✓ **B) The arbitrage pricing theory (APT).**
- x **C) Fundamental factor model.**

Explanation

The APT is an equilibrium-pricing model; multi-factor models are "ad-hoc," meaning the factors in these models are not derived directly from an equilibrium theory. Rather they are identified empirically by looking for macroeconomic variables that best fit the data.

Question #110 of 119

Question ID: 464556

A tracking portfolio is a portfolio with:

- x **A) factor sensitivities of zero to all factors, positive expected net cash flow, and an initial investment of zero.**
- ✓ **B) a specific set of factor sensitivities designed to replicate the factor exposures of a benchmark index.**
- x **C) a factor sensitivity of one to a particular factor in a multi-factor model and zero to all other factors.**

Explanation

A tracking portfolio is a portfolio with a specific set of factor sensitivities designed to replicate the factor exposures of a benchmark index. A factor portfolio is a portfolio with a factor sensitivity of one to a particular factor and zero to all other factors. An arbitrage portfolio is a portfolio with factor sensitivities of zero to all factors, positive expected net cash flow, and an initial investment of zero.

Question #111 of 119

Question ID: 464500

Which of the following is NOT an assumption necessary to derive the arbitrage pricing theory (APT)?

- ☒ A) Asset returns are described by a k-factor model.
- ☒ B) A large number of assets are available to investors.
- ☒ C) The priced factors risks can be hedged without taking short positions in any portfolios.

Explanation

Derivation of the APT requires three assumptions:

1. Asset returns are described by a factor model.
2. A large number of assets are available, which means investors can create diversified portfolios in which firm-specific risk is eliminated.
3. There are no arbitrage opportunities available to investors among these well-diversified portfolios. An arbitrage opportunity is an investment that has an expected positive net cash flow but requires no initial investment.

Questions #112-117 of 119

Answer the following questions based on the information in the table shown below for the risk-free security, market portfolio, and stocks A, B, and C. Their respective betas and forecasted returns based on fundamental analysis of the economy, industry, and specific company analysis are also provided.

Stock	Beta	$F(R)$
A	0.5	0.065
B	1.0	0.095
C	1.5	0.115
Risk-free	0.0	0.030
Market	1.0	0.090

Question #112 of 119

Question ID: 464428

Based on the information in the above table, the expected returns for stocks A, B, and C are:

A B C

- ☒ A) 6.5% 9.5% 11.5%
- ☒ B) 4.5% 9.0% 13.5%
- ☒ C) 6.0% 9.0% 12.0%

Explanation

The expected rate of return for any individual security or portfolio can be calculated using the capital asset pricing model (CAPM):

$$E(R) = r_f + B_i(R_M - r_f)$$

Expected rate of return for A = $0.03 + 0.5(0.09 - 0.03) = 0.03 + 0.03 = 0.06$ or 6.0%.

Expected rate of return for B = $0.03 + 1.0(0.09 - 0.03) = 0.03 + 0.06 = 0.09$ or 9.0%.

Expected rate of return for C = $0.03 + 1.5(0.09 - 0.03) = 0.03 + 0.09 = 0.12$ or 12.0%.

(LOS 57.e)

Question #113 of 119

Question ID: 464429

Based on the forecasted returns in the above table, which of the stocks should be held long in a well-diversified portfolio?

- ☒ A) A, B, and C.
- ☐ B) A only.
- ☒ C) Both A and B.

Explanation

The first step is to calculate the expected rate of return for each security using the capital asset pricing model (CAPM):

$$E(R) = r_f + B_i(R_M - r_f)$$

Expected rate of return for A = $0.03 + 0.5(0.09 - 0.03) = 0.03 + 0.03 = 0.06$ or 6.0%.

Expected rate of return for B = $0.03 + 1.0(0.09 - 0.03) = 0.03 + 0.06 = 0.09$ or 9.0%.

Expected rate of return for C = $0.03 + 1.5(0.09 - 0.03) = 0.03 + 0.09 = 0.12$ or 12.0%.

The next step is to compare the forecasted return (FR) for each security with the expected return.

- If the forecasted return is greater than the expected return, then the stock is under-priced and should be included in the portfolio.
- If the FR is less than the expected return, then the security is over-priced and should not be included in the portfolio.

The forecasted returns for stocks A and B are greater than their expected returns. Therefore, both A and B should be included in the portfolio and not stock C. (LOS 57.f)

Question #114 of 119

Question ID: 464430

Based on the information in the above table, which stocks are currently in equilibrium?

- ☒ A) None of the stocks are in equilibrium.
- ☐ B) All of the stocks are in equilibrium.
- ☐ C) Stocks A and B are in equilibrium.

Explanation

Stocks in equilibrium are properly priced and will lie on the security market line. The forecasted return for the individual security will equal the expected return based on the CAPM. The first step is to calculate the expected rate of return for each security using the CAPM:

$$E(R) = r_f + B_i(R_M - r_f)$$

Expected rate of return for A = $0.03 + 0.5(0.09 - 0.03) = 0.03 + 0.03 = 0.06$ or 6.0%.

Expected rate of return for B = $0.03 + 1.0(0.09 - 0.03) = 0.03 + 0.06 = 0.09$ or 9.0%.

Expected rate of return for C = $0.03 + 1.5(0.09 - 0.03) = 0.03 + 0.09 = 0.12$ or 12.0%.

Based on the expected returns given in Table 1 and the calculated required returns for stocks A, B, and C, none of the stocks are in equilibrium. (LOS 57.f)

Question #115 of 119

Question ID: 464431

The CAPM implies that the expected excess rate of return on an asset is directly proportional to that asset's:

- ☐ A) active exposure to macroeconomic factors.
- ☒ B) covariance with the market return.
- ☐ C) return standard deviation.

Explanation

The CAPM implies that the expected excess rate of return on an asset is directly proportional to its covariance with the market return. (LOS 57.f)

Question #116 of 119

Question ID: 464432

Imagine that a portfolio is assembled that contains equal quantities of stocks A, B and C. The expected return of this portfolio:

- ☒ A) is 9%.
- ☐ B) cannot be calculated without the standard deviation of the assets.
- ☐ C) cannot be calculated without the covariance between the assets.

Explanation

The expected return of a portfolio is simply the sum of individual asset weights multiplied by the expected return of those assets. The portfolio's return based on CAPM is thus $(6\% + 9\% + 12\%)/3 = 9\%$. The covariance between the assets and the standard deviation of the assets is not required for this calculation. (LOS 57.f)

Question #117 of 119

Question ID: 464433

Imagine that an investor with \$2 million to invest wants to achieve a 12 percent rate of return on a portfolio combining the risk-free asset and the market portfolio of risky assets described in the chart above. How much would this investor need to borrow at the risk-free rate in order to achieve this target expected return?

- ☐ A) 2,000,000.
- ☒ B) 1,000,000.
- ☐ C) 1,666,666.

Explanation

The risk-free rate R_F is 3 percent and the expected return R_M on the market portfolio of risky assets is 9 percent.

$$E(R_P) = w \times E(R_M) + (1 - w) \times R_F$$

$$12 = 9 \times w + 3 \times (1 - w) = 6w + 3$$

$$9 = 6w$$

$$w = 1.5$$

Thus $1 - 1.5 = -0.5 = -50\%$ of initial wealth goes into the risk-free asset. The negative sign indicates borrowing: $-0.5 \times (\$2 \text{ million}) = -\$1,000,000$ so the investor borrows \$1,000,000. (LOS 57.f)

Question #118 of 119

Question ID: 464316

Which of the following statements is *least* accurate regarding modern portfolio theory?

- ☒ A) The capital market line is developed under the assumption that investors can borrow or lend at the risk-free rate.
- ☒ B) For a portfolio made up of the risk-free asset and a risky asset, the standard deviation is the weighted proportion of the standard deviation of the risky asset.
- ☒ C) All portfolios on the capital allocation line are perfectly negatively correlated.

Explanation

All portfolios on the capital allocation line are perfectly positively correlated. Both remaining statements are each true.

Question #119 of 119

Question ID: 464338

What set of portfolios are being determined by the following procedure? *For each level of expected return the single portfolio with the smallest variance is determined, subject to the constraint that the portfolio weights sum to one.* Assume there is no risk-free asset.

- ☒ A) Capital allocation line.
- ☒ B) Efficient frontier.
- ☒ C) Minimum-variance frontier.

Explanation

The procedure determines the minimum-variance frontier, the expected return-standard deviation of the set of portfolios that have the minimum variance for every given level of expected return.

The efficient frontier consists of (efficient) portfolios that have the maximum expected return for any given standard deviation; it's the top half of the minimum-variance frontier. The capital allocation line results from the addition of a risk-free asset to the opportunity set. It runs through the risk-free asset and is tangent to the efficient frontier.