Question 1 of 22

Which of the following best explains why the U.S. equity premium is puzzling to most economists?

- **A.** Because it is highly time-varying and often negative during recessions.
- **B.** Because it is historically far too low.
- **C.** Because it is unlikely to persist in the future.
- ✓ **D.** Because it implies that investors are extremely risk averse.

EXPLANATION • Learning Objective 2.9.2 **ID:** L1-2.9.2-021

The equity premium puzzle refers to the fact that U.S. stocks have outperformed risk-free assets significantly and the outperformance is too high to be a result of investor risk aversion (in other words, the premium should be lower). Therefore, the equity premium can be explained only by assuming an unrealistically high level of investor risk aversion.

Other response: The equity premium (i.e., the equity market's expected return over the risk-free rate) is always positive.

Question 2 of 22

Which of the following solutions is best suited to deal with the problem of beta expansion of hedge fund returns?

- **A.** Betas should be estimated using a period that includes rising markets, since beta expansion typically occurs during rising markets.
- **B.** Betas should be estimated using at least 5 years of monthly data.
- **C.** Betas should be estimated using a period that excludes declining markets, since beta expansion typically occurs during declining markets.
- ✓ **D.** Betas should be estimated using a range of market conditions that include rising and falling markets.

EXPLANATION • Learning Objective 2.9.4 **ID:** L1-2.9.4-020

Beta expansion and other issues related to the non-stationarity of beta may be mitigated by assessing hedge fund performance using a full market cycle that includes rising and declining markets.

Other responses –

- 5 years of monthly data (i.e., 60 data points) are generally too short for performance evaluation.
- Beta expansion typically occurs in down markets, as systematic risk increases when markets decline. Therefore, data from declining markets should be included in the analysis.

Question 3 of 22

A hypothesis test with a 5% significance level carried out on a hedge fund's returns using a well-specified model identifies a statistically significant positive alpha. Which of the following is the most accurate interpretation of this result?

- **A.** There is a 95% chance that the fund manager generated skill-based positive alpha.
- **B.** There is a 95% chance that the fund is incorrectly estimated as having non-zero alpha if it has zero alpha.
- ✓ **C.** There is a 5% chance that the fund is incorrectly estimated as having non-zero alpha if it has zero alpha.
- **D.** There is a 5% chance that the fund manager generated skill-based positive alpha.

EXPLANATION • Learning Objective 2.9.5 **ID:** L1-2.9.5-020

The significance level is the probability that the null is rejected when it is true. So, the correct interpretation here is that if the fund has zero alpha (i.e., the null is true), there is a 5% chance that it is incorrectly estimated as having non-zero alpha (e.g., positive alpha).

Question 4 of 22

A mutual fund has historically invested in a broadly diversified portfolio of stocks, bonds, and cash. It has earned a small positive absolute return over the market in each of the past five years. The correlation coefficient of the fund with the S&P 500 is equal to 0.99. Which of the following best characterizes this fund?

- **A.** product innovator
- ✓ **B.** beta driver
- **C.** alpha driver

EXPLANATION • Learning Objective 2.9.2 **ID:** L1-2.9.2-033

The high correlation of the mutual fund with the market makes it a beta driver.

Other responses -

- Alpha drivers aim to outperform the market. The mutual fund's positive absolute return has not been adjusted for risk; therefore, it is not clear whether the alpha has been positive or significant. Even if the alpha has been positive over five years, it may have only been a result of luck rather than manager skill.
- Product innovators are alpha drivers.

Question 5 of 22

A researcher is reviewing the performance of a set of global macro hedge funds. Which of the following most likely result in unreliable alpha estimates for these hedge funds?

- **A.** not randomly selected funds, outliers, and causality
- **B.** spurious correlation, normal returns, and outliers
- **C.** skewed returns, biased testing, and chumming
- ✓ **D.** outliers, non-normal returns, and data dredging

EXPLANATION • Learning Objective 2.9.5 **ID:** L1-2.9.5-019

Key issues with estimating reliable alpha -

1. Non-normal returns
2. Outliers
3. Biased testing - i.e.,
   i. The fund being analyzed is not selected at random.
   ii. Test procedures are not fully specified before results are analyzed (which can result in data dredging).

Other responses -

- Spurious correlation and causality are issues with estimating reliable beta.
- Chumming refers to making various predictions, hoping that some of them will end up being true.

Question 6 of 22

Use the information below to answer the question that follows.

Carla Munoz is an investment adviser who uses a single-factor market model to estimate the expected alpha of the DEF fund. She estimates that the expected return of the DEF fund is 12.5%, the expected return of the market portfolio is 13%, and the fund's beta is 0.8. The risk-free rate is 3%.
Carla Munoz is an investment adviser who uses a single-factor market model to estimate the expected alpha of the DEF fund. She estimates that the expected return of the DEF fund is 12.5%, the expected return of the market portfolio is 13%, and the fund's beta is 0.8. The risk-free rate is 3%.

In 2019, the return on the market portfolio was 10%, the risk-free rate was 3%, and the return of the DEF fund was 15%. Which of the following comes closest to the realized alpha of the DEF Fund in 2019?

- **A.** 1.4%
- **B.** 2.7%
- **C.** 5.0%
- **D.** 6.4% ✓

EXPLANATION • Learning Objective 2.9.4 **ID:** L1-2.9.4-026

Realized alpha is ε in the ex-post single-factor market model.

$$R_{fund,\,t} = R_f + \beta(R_{market,\,t} - R_f) + \varepsilon_t$$
$$15\% = 3\% + 0.8(10\% - 3\%) + \varepsilon_t$$
$$15\% = 8.6\% + \varepsilon_t \quad \Rightarrow \quad \varepsilon_t = 6.4\%$$

Question 7 of 22

A true data-generating process specifies that a fund's returns depend on four risk factors: market, size, value, and momentum. The compensation for bearing each of these types of risk is positive, and the fund has zero alpha and positive betas on all four risk factors. An analyst estimates the fund's alpha using a two-factor model with the market and size factors. Which of the following most accurately represents the measure of the fund's alpha?

- **A.** statistically less than 0
- **B.** statistically greater than 0
- **C.** statistically equal to 0

EXPLANATION • Learning Objective 2.9.4 **ID:** L1-2.9.4-009

The omitted risk factors will show up in the estimated alpha (and thus inflate it). Since the fund has zero alpha and the betas and risk premia for both factors are positive, the estimated alpha will be positive (i.e, it will be greater than zero, since it will be inflated).

Question 8 of 22

The covariance between the return on asset A and the return on the market portfolio is 0.045 and the variance of the return on the market portfolio is 0.063. Which of the following comes closest to the value of the systematic risk of asset A, as measured by its beta?

- **A.** 0.0036
- **B.** 0.0525
- **C.** 0.7143
- **D.** 1.0851

EXPLANATION • Learning Objective 2.9.1 **ID:** L1-2.9.1-027

$$\beta_A = \frac{Cov(r_M, r_A)}{\sigma_M^2} = \frac{0.045}{0.063} = 0.7143$$

Question 9 of 22

Which of the following most accurately describes how an underestimated beta coefficient of a regression model affects the results of the model?

- **A.** The intercept of the regression model will be overstated.
- **B.** The intercept of the regression model will be understated.
- **C.** The intercept and slope coefficients of the regression model will be biased.

EXPLANATION • Learning Objective 2.9.4 **ID:** L1-2.9.4-084

In general, the regression model's estimated intercept captures returns associated with an underestimated or omitted relevant beta coefficient (i.e., systematic risk factor). Therefore, since systematic risks have positive expected returns, underestimating or omitting a relevant risk factor will attribute the beta return to the regression's alpha (i.e., the model's intercept) and thus inflate the alpha.

Note: This bias only occurs if the underestimated/omitted variable is uncorrelated with the included risk factors (although this is not mentioned in the original reference text).

Question 10 of 22

In 2022, a mutual fund underperformed the market by 4%. The fund's expected return was 18%, its beta was 1.2, and the market's expected return was 16.3%. If the risk-free rate was 1.4%, which of the following comes closest to the fund's return in 2022 that was attributable to bad luck?

- **A.** –5.52%
- **B.** –2.72%
- **C.** –2.25%
- **D.** –1.45%

EXPLANATION • Learning Objective 2.9.4 **ID:** L1-2.9.4-092

Return attributable to luck = Ex-post alpha – Ex-ante alpha

The mutual fund underperformed the market by 4%, which means that its realized alpha = –4%.
Therefore, we need the forecasted alpha (i.e., return attributable to skill).

$$\begin{aligned}\text{Forecasted } \alpha &= \text{Expected return} - \text{Required return} \\ &= E(R_{fund}) - (R_f + \beta[E(R_m) - R_f]) \\ &= 18\% - (1.4\% + 1.2[16.3\% - 1.4\%]) \\ &= 18\% - (1.4\% + 17.88\%) = -1.28\%\end{aligned}$$

=> Return attributable to luck = Realized alpha – Forecasted alpha
= –4% – (–1.28%) = –2.72%
The return is attributable to bad luck, since it is negative.

Note: the fund's –1.28% forecasted alpha (i.e., expected loss based on skill) may be due to fees.

Question 11 of 22

Which of the following hedge funds is most likely to be riskier than the broad market?

- **A.** A fund with a standard deviation of 14.8%.
- **B.** A fund with a monthly drawdown of 8%.
- **C.** A fund with a beta of 1.34.
- **D.** A fund with an average return of 25.9%.

EXPLANATION • Learning Objective 2.9.1 **ID:** L1-2.9.1-082

Beta measures the systematic risk of an investment relative to the overall market. Investments with betas of one have the same level of systematic risk as the market portfolio. Those with betas larger than one are riskier than the overall market. Therefore, a fund with a beta of 1.34 is riskier than the market.

Other response: Standard deviation is a measure of total risk (i.e., systematic and idiosyncratic risks).

Question 12 of 22

A systematic risk factor that should be included in a regression model is not included. Given that the risk factor has a positive expected return, the resulting omitted factor bias is most likely to result in which of the following?

- **A.** underestimated beta factors
- **B.** underestimated intercept
- ✓ **C.** inflated intercept
- **D.** inflated beta factors

EXPLANATION • Learning Objective 2.9.4 **ID:** L1-2.9.4-041

An omitted risk factor with a positive expected return will result in an inflated intercept estimate (i.e., alpha), which measures the manager's skill. This is because the estimated intercept will capture the systematic return associated with the omitted factor (rather than only reflecting idiosyncratic returns). In other words, the omission of a significant risk factor attributes beta return to alpha, thus inflating alpha (i.e., the manager's skill).

Question 13 of 22

A portfolio has 50% allocated to equity and 50% allocated to debt. The allocation to equity may be broken down into which of the following subclasses?

- ✓ **A.** Beta drivers consisting of equity-based exchange-traded funds and alpha drivers consisting of private equity and equity-based hedge funds.
- **B.** Beta drivers consisting of private equity and alpha drivers consisting of equity-based hedge funds.
- **C.** Beta drivers consisting of mutual funds indexed to the S&P 500 Index and alpha drivers consisting of distressed debt hedge funds.
- **D.** Beta drivers consisting of market-neutral hedge funds and alpha drivers consisting of absolute return funds.

EXPLANATION • Learning Objective 2.9.2 **ID:** L1-2.9.2-034

Beta drivers are investments designed to be sensitive to moves in the overall market and to capture market risk premiums by bearing systematic risk. Examples include exchange-traded funds.
Alpha drivers are investments designed to capture excess returns independent of the market. Examples include most alternative investments (e.g., private equity and equity-based hedge funds).

Other responses -
- Market-neutral hedge funds are alpha drivers.
- Distressed debt hedge funds are not equity-based investments.

Question 14 of 22

Shawn Washington is an analyst who has estimated realized alphas over the periods 2011-2016 and 2017-2022. Which of the following levels of correlation between the alphas of the two time periods is indicative of abnormal return persistence?

- **A.** positive correlation
- **B.** zero correlation
- **C.** negative correlation

EXPLANATION • Learning Objective 2.9.3 **ID:** L1-2.9.3-007

If abnormally good or bad returns persist over time, then the alphas of the two time periods will exhibit a positive correlation.

Question 15 of 22

Beta most accurately measures which of the following risks?

- **A.** total risk
- **B.** unsystematic risk
- **C.** idiosyncratic risk
- **D.** non-diversifiable risk

EXPLANATION • Learning Objective 2.9.1 **ID:** L1-2.9.1-028

Beta is a measure of systematic risk, also referred to non-diversifiable risk.

Question 16 of 22

An analyst has run a linear regression of her fund's monthly returns against the returns on the S&P index over a five-year period, and finds that the beta coefficient of the regression model is statistically equal to zero. Which of the following is the most accurate interpretation of this result?

- **A.** The analyst's fund returns have a perfect relationship with the S&P index's returns.
- **B.** The analyst's fund returns have no relationship with the S&P index's returns.
- **C.** The analyst's fund returns have no linear relationship with the S&P index's returns.

EXPLANATION • Learning Objective 2.9.5 **ID:** L1-2.9.5-021

A zero beta coefficient in a simple (one-factor) regression model indicates no linear relationship between the two variables. The variables may have a non-linear relationship.

Question 17 of 22

The fund manager of the Inflow fund has experienced a large increase in assets under management over the past couple of years. To keep his fund's level of expected returns constant, he changes his portfolio holdings to increase the fund's exposure to systematic risk. Which of the following terms best describes the resulting effect on the fund's beta?

- **A.** beta loss
- **B.** beta creep
- **C.** beta expansion
- **D.** beta crawl

EXPLANATION • Learning Objective 2.9.4 **ID:** L1-2.9.4-008

Beta creep refers to an increase in systematic risk by changing asset holdings to increase exposure to beta in order to maintain a level of expected returns in a competitive market.

Other response: Beta expansion refers to the tendency of a fund's exposure to systematic risks to increase as a result of changes in general economic conditions; i.e., not due to changes in asset holdings.

Question 18 of 22

An asset's exposure to systematic risk increases when general economic conditions change. Which of the following terms is used to describe this characteristic?

- **A.** beta enhancement
- **B.** beta expansion
- **C.** beta creep
- **D.** beta crawl

EXPLANATION • Learning Objective 2.9.4 **ID:** L1-2.9.4-090

Beta expansion refers to the tendency of an asset's systematic risk exposure to increase as a result of changes in general economic conditions.

Other response: Beta creep refers to an increase in systematic risk resulting from changes in asset holdings.

Question 19 of 22

A fund has an expected return of 16.7% and a beta of 0.88.The market has an expected return of 14%, and the risk-free rate is 1.9%. If, during the next year, the fund earns 15.1% and the market earns 13.5%, which of the following come closest to the fund's forecasted alpha and realized alpha, respectively?

- **A.** 2.99%; 6.05%
- **B.** 2.99%; 6.24%
- **C.** 4.15%; 2.06%
- **D.** 4.15%; 2.99%

EXPLANATION • Learning Objective 2.9.4 **ID:** L1-2.9.4-091

Forecasted ante α = Expected return − Required return

$$= E(R_{fund}) - (R_f + \beta[E(R_m) - R_f])$$
$$= 16.7\% - (1.9\% + 0.88[14\% - 1.9\%])$$
$$= 16.7\% - (1.9\% + 10.648\%) = 4.15\%$$

Realized post α is the ε in the ex post asset pricing model.

$$\varepsilon = (R_{fund} - R_f) - \beta(R_m - R_f)$$
$$= (15.1\% - 1.9\%) - 0.88(13.5\% - 1.9\%) = 2.992\%$$

Question 20 of 22

The Superalpha fund has an ex-ante alpha of 0.7%. In 2018, the fund had an estimated beta of 1.6 and an excess return of 8%, and the market had an excess return of 5%. Which of the following comes closest to the portion of the fund's ex-post alpha that can be attributable to luck?

- **A.** –0.7%
- **B.** 0%
- **C.** 0.7%
- **D.** 3%

EXPLANATION • Learning Objective 2.9.4 **ID:** L1-2.9.4-017

Ex-post alpha (ε) = Ex-ante alpha + Luck component
=> Luck component = ε – Ex-ante alpha = ε – 0.7%

Ex-post alpha ε can be calculated using:

$$R_{fund} - R_f = \beta(R_{market} - R_f) + \varepsilon.$$

Solve this equation for ε.

$$\varepsilon = (R_{fund} - R_f) - \beta(R_{market} - R_f) = 8\% - 1.6(5\%) = 0$$

=> Luck component = ε – 0.7% = 0% – 0.7% = –0.7%
Since this component is negative, the return is attributable to bad luck.

Question 21 of 22

Florence Hill is an investment consultant for wealthy individuals and seeks to invest approximately 15% of her clients' portfolios in product innovators. In which of the following products is she LEAST likely to invest this fraction of her clients' assets?

- **A.** private real estate funds
- **B.** exchange-traded funds
- **C.** private equity funds
- **D.** market-neutral hedge funds

EXPLANATION • Learning Objective 2.9.2 **ID:** L1-2.9.2-013

Product innovators are alpha drivers; they pursue investment strategies to earn high risk-adjusted returns. Examples include alternative investments such as hedge funds and private equity funds.
Exchange-traded funds (ETFs) are process drivers that deliver beta. Therefore, Florence is not likely to invest in ETFs when looking for product innovators.

Question 22 of 22

An analyst performs a hypothesis test on the relationship between the points scored by the Chicago Bears football team on a Sunday and the return of German bond futures on the following Monday. The test sets a level of significance at 1% and, using data on the past 30 football seasons, generates a p-value of 0.0004. The analyst concludes that there is a statistically significant relationship between the points scored by the Chicago Bears and the return of German bond futures on the following day. Which of the following mistakes is the analyst most likely making?

- **A.** failing to set a correct level of significance
- **B.** incorrectly interpreting the p-value
- **C.** using too little data
- **D.** finding a spurious correlation

EXPLANATION • Learning Objective 2.9.5 **ID:** L1-2.9.5-018

Spurious correlation refers to a false indication that there is a true underlying relationship between two variables when the association is purely due to chance. Common sense suggests that the relationship between a sports score and a foreign bond market is purely random.

Other responses –

- 30 years of data is typically a sufficient amount. Also, spurious correlations are also identified when using large datasets.
- 1% or 5% are commonly used significance levels.
- The p-value of 0.0004 is below the significance level of 1% and, thus, indicates statistical significance.

Answer Key

Question #	Question ID	Correct Response
1	L1-2.9.2-021	D
2	L1-2.9.4-020	D
3	L1-2.9.5-020	C
4	L1-2.9.2-033	B
5	L1-2.9.5-019	D
6	L1-2.9.4-026	D
7	L1-2.9.4-009	B
8	L1-2.9.1-027	C
9	L1-2.9.4-084	A
10	L1-2.9.4-092	B
11	L1-2.9.1-082	C
12	L1-2.9.4-041	C
13	L1-2.9.2-034	A
14	L1-2.9.3-007	A
15	L1-2.9.1-028	D
16	L1-2.9.5-021	C
17	L1-2.9.4-008	B
18	L1-2.9.4-090	B
19	L1-2.9.4-091	D
20	L1-2.9.4-017	A
21	L1-2.9.2-013	B
22	L1-2.9.5-018	D