Topic 50 to 51

Test ID: 8451113

Question #1 of 23

Question ID: 439286

Given a set of risky assets, a Markowitz efficient frontier:

✗ **A) cannot be generated unless one of the assets has a beta of zero.**

✗ **B)** includes all portfolios that reduce the risk level compared to holding a single asset.

✓ **C)** consists of the portfolios that provide the lowest risk for every level of expected return.

✗ **D)** can be calculated from the assets' expected returns and the correlations of returns for each pair of assets.

Explanation

The Markowitz efficient frontier is the set of possible portfolios that provide the highest return for each level of risk, or the lowest risk for each level of return. To generate an efficient frontier we need to know the expected returns and standard deviations for each asset, as well as the returns correlations for each pair of assets.

Question #2 of 23

Question ID: 439289

Which of the following are properties of a Coherent risk metric?

✗ **A) Sub-additivity.**

✗ **B)** Positive homogeneous.

✗ **C)** Monotonicity.

✓ **D)** All of these.

Explanation

All of these are properties of a Coherent risk metric.

Question #3 of 23

Question ID: 439290

Which of the following is a property of a coherent risk metric?

✓ **A) Sub-Additive.**

✗ **B)** Sub-Monotonic.

✗ **C)** Positive Heterogeneous.

✗ **D)** All of these.

Explanation

Only Sub-Additive is a coherent risk metric.

Question #4 of 23

Question ID: 439284

Which one of the following portfolios does not lie on the efficient frontier?

Portfolio	*Expected Return*	*Standard Deviation*
A	7	5
B	9	12
C	11	10
D	15	15

✗ **A) D.**

✗ **B)** C.

✗ **C)** A.

✓ **D)** B.

Explanation

Portfolio B has a lower expected return than Portfolio C with a *higher* standard deviation.

Question #5 of 23

Question ID: 439282

An investor is evaluating the following possible portfolios. Which of the following portfolios would *least likely* lie on the efficient frontier?

Portfolio	*Expected Return*	*Standard Deviation*
A	26%	28%
B	23%	34%
C	14%	23%
D	18%	14%
E	11%	8%
F	18%	16%

✗ **A) A, E, and F.**

✓ **B)** B, C, and F.

✗ **C)** A, B, and C.

✗ **D)** C, D, and E.

Explanation

Portfolio B cannot lie on the frontier because its risk is higher than that of Portfolio A's with lower return. Portfolio C cannot lie on the frontier because it has higher risk than Portfolio D with lower return. Portfolio F cannot lie on the frontier cannot lie on the frontier because its risk is higher than Portfolio D.

Question #6 of 23

Question ID: 439372

Which of the following statements *most* accurately describe an appropriate step in the structured Monte Carlo (SMC) approach for measuring risk?

I. Simulate thousands of valuation outcomes for the underlying assets.
II. Measure the value-at-risk (VAR) for the portfolio of derivatives based on the simulated outcomes.

✓ **A) Both I and II.**
✗ **B)** Neither I nor II.
✗ **C)** I only.
✗ **D)** II only.

Explanation

Steps in using the SMC approach include:

- Simulate thousands of valuation outcomes for the underlying assets based on the assumption of normality.
- The VAR for the portfolio of derivatives is then calculated from the simulated outcomes.

Question #7 of 23

Question ID: 439373

A risk manager simulates the Worst Case Scenario (WCS) data in the following table using 10,000 random vectors for time horizons, *H*, of 50 and 100.

Time Horizon = *H*	*H* = 50	*H* = 100
Expected number of Z < -2.33	1.00	2.00
Expected number of Z < -1.65	2.00	6.00
Expected WCS	-2.02	-2.88
WCS 1 percentile	-3.55	-4.02
WCS 5 percentile	-2.43	-3.37

Which of the following statements is (are) CORRECT?

I. The one percent value-at-risk (VAR) is -2.33.
II. The one percent WCS for a holding period of 100 is -2.33.
III. One percent VAR is expected to be exceeded twice over 100 trading periods.

✓ **A) I and III.**
✗ **B)** I only.
✗ **C)** II only.
✗ **D)** I, II and III.

Explanation

The one percent VAR assuming normality corresponds to -2.33 and over the next 100 trading periods a return worse than -2.33 is expected to occur two times.

Question #8 of 23

Question ID: 439367

Consider the delta-normal and full-revaluation approaches to estimating the VAR of non-linear derivative instruments. Which of

the following is **NOT** a requirement for either the delta-normal or full-revaluation approach?

✗ **A) The VAR(1%) of the derivative is calculated by revaluing the derivative at the price corresponding to a VAR(1%) decline in the value of the underlying asset.**

✓ **B)** The VAR(1%) of the asset underlying the derivative is based on an assumed normal distribution.

✗ **C)** The VAR(1%) of the underlying asset is adjusted by a factor reflecting the price sensitivity of the derivative price to changes in the underlying asset price.

✗ **D)** A second order adjustment is made to the underlying asset VAR(1%) to account for the non-linear relationship between the derivative and the underlying asset.

Explanation

The delta-normal approach to estimating the VAR of a non-linear derivative adjusts the VAR of the underlying asset for the delta (slope) and gamma (curvature) of the relationship between the derivative and the underlying. The VAR of the underlying asset can be calculated using parametric methods (assuming a normal distribution) or using historical methods (which does not assume a normal distribution).

Question #9 of 23

Question ID: 439370

Consider the primary methods of assessing the risk of a portfolio position through stress testing. Which of the following does not accurately describe an advantage or disadvantage related to a stress testing method?

✗ **A) An advantage of the historical crisis approach is that it requires no assumptions regarding the underlying distribution of portfolio returns.**

✓ **B)** An advantage to the stress scenario analysis method is that it accounts for asset-class-specific risk factors.

✗ **C)** A disadvantage to the stress scenario analysis method is that it can produce misleading risk measures.

✗ **D)** A disadvantage to the historical simulation approach is that it is limited to historical data which may be inappropriate in future periods.

Explanation

The stress scenario analysis method analyzes varying predetermined stress scenario to determine the effect on the current portfolio. The advantage of this approach is that it is not limited to historical events. Disadvantages include its inability to account for asset-class-specific risk factors and its tendency to produce deceptive risk measures.

Question #10 of 23

Question ID: 439366

In which of the following cases will the Taylor Series be a *least likely* approximation? When the underlying asset is a:

I. polynomial of order three or more.
II. callable bond.
III. mortgage-backed security (MBS).
IV. twenty-year treasury.

✗ **A) I, II, III and IV.**

✗ **B)** II, III and IV.

✓ **C)** I, II and III.

✗ **D)** I and II.

Explanation

The Taylor Series approximation is not useful when the underlying asset is a callable bond or MBS. The Taylor Series approximation only works well for a "well-behaved" quadratic function that can be approximated by a polynomial of order two.

Question #11 of 23

Question ID: 439285

On a graph of risk, measured by standard deviation, and expected return, the *efficient frontier* represents:

✓ **A) the set of portfolios that dominate all others as to risk and return.**

✗ **B)** all portfolios plotted in the northeast quadrant that maximize return.

✗ **C)** all portfolios plotted to the left of the graph that maximize either risk or return.

✗ **D)** the group of portfolios that have extreme values and therefore are "efficient" in their allocation.

Explanation

The efficient set is the set of portfolios that dominate all other portfolios as to risk and return. That is, they have highest expected return at each level of risk.

Question #12 of 23

Question ID: 439365

Consider a portfolio of derivatives on fixed income securities and interest rates. If a Taylor Series approximation is used to estimate the delta normal value at risk for the individual derivatives in the portfolio, which of the following positions will have a substantially improved estimate of value at risk?

I. Interest rate cap on 3-month LIBOR
II. Forward rate agreement on 6-month LIBOR
III. 6-month call option on Treasury bonds

✗ **A) III only.**

✓ **B)** I and III.

✗ **C)** I and II.

✗ **D)** II only.

Explanation

The Taylor Series approximation adds a second order term (i.e., the second derivative of the value function) to the slope (i.e., the first derivative of the value function) to estimate the rate of change in the value of the non-linear derivative. Doing so improves the estimated value change for large changes in the underlying asset value. The slope by itself only provides a reasonable estimate of price sensitivity for small changes but when combined with the rate of change, the convexity of the value function for the non-linear derivative is accounted for. Applying this methodology in the context of a VAR calculation improves the estimate of potential value loss. For linear derivatives, such as forwards and futures, the linear approximation and Taylor Series approximation should be equivalent.

Question #13 of 23

Question ID: 439369

An analyst at Burns Holdings, Inc. is considering using simulation analysis to calculate the VAR of the firm's assets. The analyst has read the following comments from a colleague about the structured Monte Carlo (SMC) approach. Which of the statements regarding the SMC approach are true?

I. An advantage to the SMC approach is that inaccurate future volatility forecast can be improved by running more simulations.
II. SMC approach cannot predict extreme values from correlation breakdowns if the underlying covariance matrix relies on normal market volatility.
III. A disadvantage of the SMC approach is that it can only be used to estimate VAR for portfolios with long only positions.
IV. SMC estimates the underlying asset prices and returns through the following stochastic process: $s_{t+1,i} = s_t e^{\mu + \sigma \times z}$
V. An advantage to the SMC approach is that multiple risk factors can be incorporated into VAR estimate by incorporating correlation estimates.

✗ **A) I, II, III, and V.**
✗ **B)** I, III, and V.
✗ **C)** II and IV.
✓ **D)** II, IV, and V.

Explanation

The structure Monte Carlo (SMC) approach to estimating VAR simulates portfolio or asset returns using a stochastic process: $s_{t+1,i} = s_t e^{\mu + \sigma \times z}$.

Z in the formula is a random draw from a normal distribution. An advantage to the SMC approach is that multiple risk factors can be modeled by assuming an underlying distribution and incorporating correlations among assets. A disadvantage is that inaccurate future volatility forecasts may occur.These inaccurate forecasts cannot be improved by running a greater number of simulations. Also, if the covariance matrix used to model the returns is drawn during normal times, then the SMC approach will not accurately predict a scenario involving a correlation breakdown (sudden increase in volatility coupled with a sudden increase in correlations). Increasing the number of simulations does not help solve the correlation breakdown problem either.

Question #14 of 23

Question ID: 439279

Stock A has a standard deviation of 0.5 and Stock B has a standard deviation of 0.3. Stock A and Stock B are perfectly positively correlated. According to Markowitz portfolio theory how much should be invested in each stock to minimize the portfolio's standard deviation?

✗ **A) 50% in Stock A and 50% in Stock B.**
✗ **B)** 30% in Stock A and 70% in Stock B.
✗ **C)** 100% in Stock A.
✓ **D)** 100% in Stock B.

Explanation

Since the stocks, are perfectly correlated, there is no benefit from diversification. So, invest in the stock with the lowest risk.

Question #15 of 23

Question ID: 439288

Which of the following is **NOT** a correct description of a coherent risk measure property?

I. Homogeneity - the size of a portfolio will impact the size of its risk.
II. Monotonicity - a portfolio with greater future returns will likely have less risk.
III. Subadditivity - the risk of a portfolio is always more than the risk of the assets within the portfolio.
IV. Translation invariance - the risk of a portfolio is independent of the assets within the portfolio.

✓ **A) III and IV.**

✗ **B)** II and III.

✗ **C)** I and III.

✗ **D)** I and II.

Explanation

The descriptions for subadditivity and translation invariance are both incorrect. With subadditivity, the risk of a portfolio is at most equal to the risk of the assets within the portfolio. With translation invariance, the risk of a portfolio is dependent on the assets within the portfolio.

Question #16 of 23

Question ID: 439363

Which of the following derivative instruments could be classified as linear or approximately linear?

I. Swaption
II. Forward on commodity
III. Interest rate cap
IV. Futures on equity index
V. Currency swap

✗ **A) I and III.**

✗ **B)** II and IV.

✓ **C)** II, IV, and V.

✗ **D)** II, III, and IV.

Explanation

The value of a linear derivative has a constant linear relationship with the underlying asset. The relationship does not need to be one-to-one but it must be constant (or approximately constant) and linear. Forwards, futures, and swaps are generally linear. The value of a nonlinear derivative is a function of the change in the underlying asset and depends on the state of the underlying asset. Options generally are nonlinear.

Question #17 of 23

Question ID: 439283

Which of the following portfolios falls below the Markowitz efficient frontier?

Portfolio	*Expected Return*	*Expected Standard Deviation*
A	12.1%	8.5%
B	14.2%	8.7%
C	15.1%	8.7%

D	16.2%	9.4%

✗ **A) Portfolio D.**

✗ **B)** Portfolio A.

✓ **C)** Portfolio B.

✗ **D)** Portfolio C.

Explanation

Portfolio B is inefficient (falls below the efficient frontier) because for the same risk level (8.7%), you could have portfolio C with a higher expected return (15.1% versus 14.2%).

Question #18 of 23

Question ID: 439368

Which of the following statements regarding the structured Monte Carlo approach is CORRECT?

I. The general equation assumes the underlying asset has normally distributed returns with a mean of μ and a standard deviation of σ.

II. The structured Monte Carlo (SMC) approach can address multiple assets with multiple risk exposures by generating correlated scenarios based on a statistical distribution.

III. In some cases where it does not produce an accurate forecast of future volatility, increasing the number of simulations can improve the forecast.

✓ **A) I and II.**

✗ **B)** II and III.

✗ **C)** I and III.

✗ **D)** I, II and III.

Explanation

The general equation assumes the underlying asset is normally distributed returns with a mean of μ and a standard deviation of σ. The simulation equation is as follows:

$$st_{+1\,j} = st \times e^{\mu + \sigma \times z}$$

An *advantage* of the SMC approach is that it is able to address multiple risk factors by generating correlated scenarios based on a statistical distribution. A *disadvantage* of the SMC approach is that in some cases it may not produce an accurate forecast of future volatility, and increasing the number of simulations will not improve the forecast.

Question #19 of 23

Question ID: 439280

There are benefits to diversification as long as:

✓ **A) the correlation coefficient between the assets is less than 1.**

✗ **B)** the correlation coefficient between the assets is 1.

✗ **C)** there is perfect positive correlation between the assets.

✗ **D)** there must be perfect negative correlation between the assets.

Explanation

There are benefits to diversification as long as the correlation coefficient between the assets is less than 1.

Question #20 of 23

Question ID: 439281

Adding a stock to a portfolio will reduce the risk of the portfolio if the correlation coefficient is *less* than which of the following?

✓ **A) +1.00.**

✗ **B)** +0.50.

✗ **C)** 0.00.

✗ **D)** +0.30.

Explanation

Adding any stock that is not perfectly correlated with the portfolio (+1) will reduce the risk of the portfolio.

Question #21 of 23

Question ID: 439364

An analyst at Bergman International Bank has been asked to explain the calulation of VAR for linear derivatives to the newly hired junior analysts. Which of the fallowing statements *best* describes the calculation of VAR for a linear derivative on the S&P 500 Index?

✗ **A) For a futures contract, divide the VAR of the S&P 500 Index by a sensitivity factor reflecting the absolute change in the value futures contract per absolute change in the index value.**

✗ **B)** For a options contract, divide the VAR of the S&P 500 Index by a sensitivity factor reflecting the percent change in the value futures contract for a one percent change in the index value.

✗ **C)** For an options contract, multiply the VAR of the S&P 500 Index by a sensitivity factor reflecting the percent change in the value futures contract for a one percent change in the index value.

✓ **D)** For a futures contract, multiply the VAR of the S&P 500 Index by a sensitivity factor reflecting the percent change in the value futures contract for a one percent change in the index value.

Explanation

The following formula is used to calculate the VAR for a linear derivative: $VAR_P = \Delta VAR_f$

The delta in the formula is a sensitivity factor that reflects the change in value of the derivatives contract for a given change in the value of the underlying. The delta adjustment to the VAR of the underlying asset accounts for the fact that the relative changes in value between the underlying and the derivatives may not be one for one but nevertheless are linear in nature. Note that options are non-linear.

Question #22 of 23

Question ID: 439371

Which of the following stress testing approaches have the disadvantage of historical data limitations?

I. Use of historical events approach.
II. Historical simulation approach.
III. Stress scenarios approach.

✗ **A) I only.**

✗ **B)** II only.

✓ **C)** I and II.

✗ **D)** I, II and III.

Explanation

The biggest disadvantage of using historical events or historical simulations for stress testing is that it is limited to only evaluating events that have actually occurred. The stress scenario approach has the advantage of not being limited to analyzing only events that actually have occurred.

Question #23 of 23

Question ID: 439287

A portfolio manager is concerned about the downside risk of his portfolios that contain financial products with option-like payoffs. The manager has been using the delta-normal VAR method to assess the portfolio's downside risk. Which of the following statements most accurately describes the characteristics of the delta-normal VAR method?

I. Assumes a normal distribution.
II. Adjusts for non-normal distributions.
III. Adjusts for option-like payoffs.
IV. Adjusts for fat-tail distributions.

✗ **A) I and II.**

✓ **B)** I only.

✗ **C)** II, III, and IV.

✗ **D)** II and III.

Explanation

Only Statement I is correct. The delta-normal VAR model assumes a normal distribution. Statements II, III, and IV are all disadvantages of the delta-normal VAR model.