CHAPTER 37
MEASURING AND MANAGING MARKET RISK

1. (C) **Value the portfolio based on the parameters identified in the scenario.**

Explanation

Scenario analysis involves fully repricing the asset based on the values of the risk factors in the identified scenario. Evaluating the effect on portfolio value due to changes in a single risk factor is done for sensitivity analysis and not scenario analysis.

(Module 37.3, LOS 37.h)

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Ryan Manning is a new hire at Luongo Asset Managers. As part of his training, he has been asked to compile a report on risk measurement and mechanisms to control risk.

Manning wants to give a simple illustration of VaR and has compiled the data for a two-asset portfolio as shown in Exhibit 1:

Exhibit 1:

Weighting	Asset	Daily standard deviation	Average daily return	Standard deviation of daily return
70%	Wszolek plc	0.0186	0.06%	1.54
30%	Sylla plc	0.0124	0.04%	
Current market value of portfolio £7,500,000				

Manning's colleague, Alex Smith, makes three comments about Manning's computation of VaR:

Comment 1:	"VaR is such a useful measure as it shows us the maximum potential loss on our portfolio position. Your data shows the maximum daily loss that could be incurred 5% of the days."
Comment 2:	"When using a parametric approach great care needs to be taken with the look-back period. The raw data should only really be used if the historic parameter estimates are similar to what we are expecting over the period for which we are estimating VaR."

Manning's report contains a discussion on the historical simulation method of estimating VaR. Manning states:

"The historical simulation approach to VaR is based on the actual periodic changes in risk factors over a look-back period. The daily change in value of the portfolio is calculated for each day over the look-back period. We then order the changes from most positive to most negative and look for the largest 5% of losses. The VaR is then the average of the 5% biggest losses. One advantage it has is that it doesn't use normal distributions and as a result can be used for portfolios containing options."

Manning's report contains three limitations of VaR:

Limitation 1:	If VaR is calculated under the assumption of normal distributions of asset returns, it will often underestimate the severity of losses. One cause of this is platykurtic return distributions.
Limitation 2:	During periods of financial distress asset correlations will often increase. This means that computing VaR based on historical correlations observed over a look-back period might well overestimate the benefits of diversification and as a result underestimate the magnitude of potential losses.
Limitation 3:	VaR computation does not account for the liquidity of assets in its calculate on. When asset prices fall dramatically, liquidity often dissipates significantly as was seen with asset-backed securities during the credit crunch of 2008-2009. This has means that VaR will underestimate the true losses of liquidating positions that are under extreme price pressure.

2. (C) £186,000.

Explanation

First, calculate the portfolios' average daily return and standard deviation: average return = (0.7 x 0.06%) + (0.3 x 0.04%) = 0.054%

σ = 1.54%

5% VaR = (-1)[0.054 – 1.65 x 1.54] = 2.48%

£ VaR = £7,500,000 x 0.0248 = £186,000

(Module 37.1, LOS 37.c)

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3. (B) Only comment 2 is correct.

Explanation

Comment 1 is incorrect. VaR is interpreted as the minimum loss that will be experienced X% of the time; losses estimated will be bigger.

Comment 2 is correct. Using historic parameters will only be of use if the future period is expected to be similar to the look-back period. For example, if the look-back period had an unusually low volatility then VaR based on this measure would underestimate losses.

(Module 37.1, LOS 37.c)

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4. (B) incorrect about VaR calculation.

Explanation

The VaR estimate under the historical simulation approach is the smallest of the largest 5% losses, not average. Great care should be taken that the historical period used to capture the data is not atypical in some respect (i.e., had a very low or high volatility). Relative to the parametric method, one big advantage of historical simulation is that it does not require any assumption about the distribution of returns. Since you are not making any assumptions about the shape of the distribution, derivative securities such as options with their asymmetric distributions of payoffs, do not present any problems.

(Module 37.1, LOS 37.c)

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5. (A) 1 limitation.

Explanation

Limitation 1 is incorrect. Platykurtic distributions have fewer extreme outliers than a normal distribution (thinner tails). A normal distribution would therefore overestimate the potential losses. A leptokurtic distribution would have fatter tails and therefore the normal distribution would underestimate potential losses.

Limitation 2 is correct. If the look back period is a period of relative normality, then the calculated correlations will often overestimate the benefits of diversification. Correlations will tend to spike during periods of financial distress resulting in larger losses than VaR based on look back period would estimate.

Limitation 3 is correct. During periods of financial distress, liquidity tends to drop in the market. VaR does not account for changes in liquidity and will therefore tend to underestimate the actual losses.

(Module 37.2, LOS 37.d)

Related Material

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6. (A) **Both are second order effects value arising from changes in underlying risk factors to the change in value of the asset.**

Explanation

Convexity is the second order effect of change in interest rate on bond prices while gamma is the second order effect of change in stock price on option prices.

(Module 37.2, LOS 37.g)

Related Material

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7. (C) **change in VaR due to change in probability.**

Explanation

Marginal Var, conceptually similar to incremental VaR, captures the change in VaR for very small changes in asset position.

(Module 37.2, LOS 37.e)

Related Material

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8. (C) **Liquidate the portfolio if the portfolio value falls below $100 million.**

Explanation

Stop loss limits specify liquidation of a portfolio or a reduction in its size if a loss of a specific magnitude occurs. Maximum daily VaR and tracking errors are examples of risk budgets.

(Module 37.5, LOS 37.j)

Related Material

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9. (C) **Active share.**

Explanation

Traditional active managers are concerned about underperforming against their benchmark and hence use active share as a relative measure of risk. Surplus at risk is used by pension plans and maximum drawdown is most commonly used by hedge funds.

(Module 37.4, LOS 37.l)

Related Material

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10. (A) Scenario analysis does not provide the probability of a specific scenario occurring.

Explanation

While scenario analysis can be used to measure the impact of a scenario, it can't provide the probability of the scenario actually occurring. Since scenario analysis does not assume a normal (or any other) distribution of asset returns, the question of fat tails does not arise. Assumption of static relationship between individual risk factors and portfolio value is a limitation of sensitivity analysis.

(Module 37.3, LOS 37.i)

Related Material

SchweserNotes - Book 5

11. (B) mean and standard deviation.

Explanation

If we assume that the returns distribution is normal, under the parametric method of estimation of VaR, we only need the mean and standard deviation of the distribution.

(Module 37.1, LOS 37.b)

Related Material

SchweserNotes - Book 5

12. (B) There is a 5% chance of loss in portfolio value of at least $2.5 million in a month.

Explanation

5% monthly VaR indicates the 5% likelihood of a minimum loss in a month.

(Module 37.1, LOS 37.a)

Related Material

SchweserNotes - Book 5

13. (A) capital needed to overcome severe losses in the business.

Explanation

Economic capital is the capital needed for a firm to survive if severe losses are experienced based on the risk the business is exposed to.

(Module 37.5, LOS 37.k)

Related Material

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14. (C) **The behavior of returns over the lookback period may not accurately capture the future behavior.**

Explanation

A drawback of the historical simulation method is that the past (i.e., the lookback period) may not be indicative of the future.

(Module 37.1, LOS 37.b)

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15 (C) **€435,000**

Explanation

Monthly return = 0.00116 x 21 = 0.02436.

Monthly standard deviation = $0.0038 \times (21)^{0.5} = 0.0174$

5% Monthly VaR = [Expected monthly return (1.65 x Monthly standard deviation)] x Portfolio value = [0.02436 – (1.65 x 0.0174)] x 100million

= €435,000

(Module 37.1, LOS 37.c)

Related Material

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16. (C) **€ 368,000**

Explanation

5% daily VaR = [0.00179 – (1.65 x 0.0022)] x 200millioin = € 368,000

(Module 37.1, LOS 37.c)

Related Material

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17. (A) **Maximum drawdown.**

Explanation

Maximum drawdown reflects the performance during the worst performing period (month or quarter) and is commonly used as a risk metric by hedge funds. Surplus at risk is used by pension plans. Glidepath is a tool used by pension plan to manage plan surplus/deficit and charts the planned move of the fund position from its current state to the target state.

(Module 37.4, LOS 37.l)

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18. (C) **Average VaR given that losses to the extent of VaR has occurred.**

Explanation

Conditional VaR is the average loss conditional on exceeding the VaR cutoff. It is the average Var in the left tail of the return distribution.

(Module 37.2, LOS 37.e)

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19. (A) **using sensitivity analysis.**

Explanation

Sensitivity analysis evaluates changes in portfolio value due to changes in underlying risk factors. Duration is a risk-factor for a fixed income portfolio capturing the interest rate risk of the portfolio. As such, impact of changing interest rates would be captured by duration of the portfolio and such an analysis is sensitivity analysis.

(Module 37.2, LOS 37.f)

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20. (C) **Incorporates only right tail risk.**

Explanation

VaR computations only incorporate left tail risk (and ignores the returns in the right tail). VaR computed using too low of estimates of volatility will be too low and underestimates the downside risk based on true estimates of volatility. In downward trending markets, consistent negative returns may not breach daily or weekly VaR but nonetheless can lead to significant accumulation of losses.

(Module 37.2, LOS 37.d)

Related Material

SchweserNotes - Book 5