

Solutions

1. Fundamentals of Risk Management

Q-1. Solution: C

1. An insufficient training lead to misuse of order management system is an example of operational risk.
2. Widening of credit spreads represents an increase in market risk.
3. An option writer not honoring the obligation in a contract is a credit risk event.
4. When a contract is originated in multiple jurisdictions leading to problems with enforceability, there is legal risk.

Q-2. Solution: D

Diversification is a risk reduction technique.

Q-3. Solution: A

Decision trees depend on a successful outcome in one step before moving on to the next step. Sensitivity analysis involves changing one variable at a time. F estimates outcomes and values under several possible fixture scenarios. Simulation is a complex tool that looks at distributions of values.

Q-4. Solution: B

The Board of Directors is ultimately responsible for risk oversight. Effective risk governance simply requires clear accountability; authority; and methods of communication; it is not necessary to have multiple levels. The point of risk governance is to consider the methods in which risk-taking is permitted, optimized, and monitored; it is not necessarily to minimize the amount of risk taken. The real point of risk governance is to increase the value of the organization from the perspective of the shareholders and/or stakeholders.

Q-5. Solution: C

Deep out-of-the-money calls have no value unless the firm value increases substantially, so providing deep out-of-the-money calls as an incentive could cause managers to take substantially higher risks and perform, less hedging, With an at-the-money call, managers could still be incentivized to take greater risks but they would not have to aim for as large of a stock price increase to recognize significant value from their options, so the danger of mismanaging risk is less. A deep in-the-money call would have a similar investment profile as a long equity position and both of the latter choices would provide the least managerial incentive to reduce risk management.

Q-6. Solution: C

While it is accurate that the CRO is responsible for top-level risk management, he is also responsible for the analytical or systems capabilities for risk management.

Q-7. Solution: D

An effective ERM program should be integrated at several levels, across the company as a whole and integrated with the operational side of the company.

Q-8. Solution: C

Implementation of ERM requires integration. Appointing a CRO and establishing a centralized, integrated risk management team can better address the interdependencies among individual risks faced by the company and thus increase efficiency.

A is incorrect because ERM does not necessarily allow the company to determine and make use of a higher risk appetite.

B is incorrect because ERM suggests the opposite of a fragmented approach in risk management.

D is incorrect because ERM improves business performance by taking a portfolio view of all risks rather than on a standalone basis.

Q-9. Solution: B

Developing the organization's risk appetite statement is the responsibility of management. It is the Board's role to review and provide appropriate feedback on management's work with regard to the risk appetite statement. Determining if the risk appetite may cause risks in other areas of the organization is consistent with the Board's oversight role.

Q-10. Solution: A

Risk appetite directly impacts the allocation of resources. Risk tolerance is a measure of an organization's willingness to take risk.

Q-11. Solution: D

A risk appetite statement states a broad level of risk across the organization the firm is willing to accept in order to pursue value creation. The statement is typically broadly articulated and can be communicated across the organization, and helps to allocate resources to specific objectives at the firm.

Q-12. Solution: D

CAPM assumes investors seek to maximize the expected utility of their wealth at the end of the period, and that when choosing their portfolios, investors only consider the first two moments of return distribution: the expected return and the variance. Hence, investors are not concerned with the tails of the return distribution.

Q-13. Solution: A

Since the return to W is the nearest to Z (stocks), it is logical to assume that point W represents an allocation of 90% stocks/10% bonds. The return for W is lower than Z, but it also represents a reduction in risk.

Q-14. Solution: C

The efficient frontier consists of portfolios that have the maximum expected return for any given level of risk (standard deviation or variance). The efficient frontier starts at the global minimum-variance portfolio and continues above it. Any portfolio below the efficient frontier is dominated by a portfolio on the efficient frontier. This is because efficient portfolios have higher expected returns for the same level of risk.

Q-15. Solution: C

The CML is the line connecting T-bills and Portfolio P. The market price of risk is the slope of the CML. Had risk been measured on the graph with beta, the graph would represent the SML. The market price of risk would still be the slope of the line.

Q-16. Solution: A

The following equation is used to calculate beta:

$$\beta = \rho \times \frac{\sigma_P}{\sigma_B} = 0.8 \times \frac{0.05}{0.04} = 1.00$$

Q-17. Solution: B

The CAPM equation is: . Franklin forecasts the beta for CostSave as follows: beta forecast = 0.80 + 0.20 (historical beta) = 0.80 + 0.20(1.50) = 1.10

The CAPM required return for CostSave is: 0.05 + 1.1(0.08) = 13.8%

Note that the market premium, $E(R_M) - R_F$, is provided in the question (8%).

Franklin should decide that the stock is overvalued because she forecasts that the CostSave return will equal only 10%, whereas the required return (minimum acceptable return) is 13.8%.

Q-18. Solution: A

Within modern portfolio theory (MPT), the efficient frontier is a combination of assets that has the best possible expected level of return for its level of risk. The efficient frontier is the positively sloped portion of the opportunity set that offers the highest expected return for a given risk level. The efficient frontier is at the top of the feasible set of portfolio combinations. ii, iii and v are correct statements.

The capital market line connects the risk-free asset and the market portfolio. The efficient frontier does allow investors to have different risk aversions, but assumes that they all have the same forecast for asset returns.

Q-19. Solution: C

If the CAPM holds, then $R_i = R_f + \beta_i \times (R_m - R_f)$, which is maximized at the greatest possible beta value which implies a correlation of 1 between the fund's return and the index return. Since the volatility of the fund is twice that of the index, a correlation of 1 implies a maximum beta β_i of 2. Therefore: $R_i (\text{max}) = 2.5\% + 2 \times (12.3\% - 2.5\%) = 22.1\%$.

Q-20. Solution: C

Since the correlation or covariance between the Atlantis Fund and the S&P 500 is not known, CAPM

must be used to back out the beta: $\overline{R}_i = R_F + \beta_i \times (\overline{R}_M - R_F)$.

Therefore: $8.3\% = 2.0\% + \beta_i \times (7.6\% - 2.0\%)$; hence $\beta_i = \frac{8.3\% - 2.0\%}{7.6\% - 2.0\%} = 1.13$

Q-21. Solution: C

Systematic risk cannot be eliminated by diversification. Unsystematic risk can be reduced by

diversification. Diversification benefits will occur any time security returns have less than perfect positive correlations.

Q-22. Solution: D

The ability to borrowing or lend morphs the concave/convex efficient frontier into the linear CML; i.e., the leveraged portfolio is efficient with higher risk and higher return.

All portfolios on the CML have the same Sharpe ratio: the slope of the CML.

Q-23. Solution: A

Systematic risk of a portfolio is that risk which is inherent in the market and thus cannot be diversified away. In this situation you should seek a measure which ranks funds based on systematic risk only, which is reflected in the beta as defined below: $\beta_P = (\rho_{PM} * \sigma_P * \sigma_M) / \sigma_M^2$

where ρ_{PM} is the correlation coefficient between the portfolio and the market, σ_P represents the standard deviation of the portfolio and σ_M represents the standard deviation of the market.

In a well-diversified portfolio (where one is normally only concerned with systematic risk), it can be assumed that the correlation coefficient is close to 1, therefore beta can be approximated to an even simpler equation: $\beta_P = \sigma_P / \sigma_M$

In either case, beta explains the volatility of the portfolio compared to the volatility of the market, which captures only systematic risk.

The Treynor ratio is the correct ratio to use in this case. The formula is: $T_P = [E(R_P) - R_f] / \beta_P$

which describes the difference between the expected return of the portfolio, $E(R_P)$ and the risk free rate R_f divided by the portfolio beta β . Therefore, it plots excess return over systematic risk.

Q-24. Solution: B

The Treynor measure is most appropriate for comparing well-diversified portfolios. That is the Treynor measure is the best to compare the excess returns per unit of systematic risk earned by portfolio managers, provided all portfolios are well-diversified.

All three portfolios managed by Donaldson Capital Management are clearly less diversified than the market portfolio. Standard deviation of returns for each of the three portfolios is higher than the standard deviation of the market portfolio, reflecting a low level of diversification.

Jensen's alpha is the most appropriate measure for comparing portfolios that have the same beta. The Sharpe measure can be applied to all portfolios because it uses total risk and it is more widely used than the other two measures. Also, the Sharpe ratio evaluates the portfolio performance based on realized returns and diversification. A less-diversified portfolio will have higher total risk and vice versa.

Q-25. Solution: C

Relative risk measures risk relative to a benchmark index, and measures it in terms of tracking error or deviation from the index.

We need to calculate the standard deviation (square root of the variance) of the series:

$$\{0.08, 0.04, 0.02, 0.01, 0.005\}$$

Perform the calculation by computing the difference of each data point from the mean, square the result of each, take the average of those values, and then take the square root. This is equal to 3.04%.

Q-26. Solution: B

The information ratio may be calculated by either a comparison of the residual return to residual risk, or the excess return to tracking error. The higher the IR, the better 'informed' the manager is at picking assets to invest in. Since neither residual return nor risk is given, only the latter is an option.

$$IR = E(R_p - R_b) / \text{Tracking Error}$$

$$\text{For Fund I: } IR = 0.00073 / 0.00344 = 0.212$$

$$\text{For Fund II: } IR = 0.00053 / 0.00341 = 0.155$$

Q-27. Solution: A

The Jensen measure of a portfolio, or Jensen's alpha, is computed as follows:

$$\alpha_p = E(R_p) - R_F - \beta \times [E(R_M) - R_F] = 8\% - 5\% - 0.5 \times (10\% - 5\%) = 0.5\%$$

Q-28. Solution: C

The Sharpe ratio for the portfolio is $(6.6\% - 1.5\%) / 13.1\% = 0.389$.

Q-29. Solution: C

$$IR = \frac{E(R_p) - E(R_B)}{\sigma_{e_p}} = \frac{13.2\% - 12.3\%}{6.5\%} = 0.139$$

Q-30. Solution: B

$$\begin{aligned} E(R_i) - R_f &= \beta_i \times [E(R_m) - R_f] \\ \frac{E(R_i) - R_f}{\sigma_i} &= \frac{\beta_i \times [E(R_m) - R_f]}{\sigma_i} = \frac{\beta_i}{\sigma_i} \sigma_m \times \frac{[E(R_m) - R_f]}{\sigma_m} = \rho_i \times \frac{[E(R_m) - R_f]}{\sigma_m} = 0.7 \times 40\% = 28\% \end{aligned}$$

Q-31. Solution: D

$$\text{Excess Return on Portfolio} = 0.4936 \times \text{Excess Return on Market} + 3.7069$$

$$E(R_p) - R_F = 0.4936 \times [E(R_M) - R_F] + 3.7069$$

$$\begin{aligned} \text{Jensen's alpha} &= E(R_p) - \{R_F + \beta[E(R_M) - R_F]\} \\ &= E(R_p) - R_F - \beta[E(R_M) - R_F] \\ &= 3.7069 \end{aligned}$$

The Jensen's alpha is equal to the y-intercept, or the excess return of the portfolio when the excess market return is zero. Therefore it is 3.7069%.

Q-32. Solution: A

The mean-variance efficient market portfolio is essential to the capital asset pricing model, but is not required in multifactor models.

Q-33. Solution: C

$$R_{BBC} = E(R_{BBC}) + \beta_{BBC,GDP} F_{GDP} + \beta_{BBC,IR} F_{IR} + e_{BBC}$$

$$R_{BBC} = 0.10 + 1.5(-0.01) - 1(0.01) - 0.02 = 0.055 = 5.5\%$$

Q-34. Solution: D

An arbitrage situation exists if a risk-free, zero net investment can be created that produces a positive profit. The arbitrage return need not exceed the risk-free rate.

Q-35. Solution: A

A factor portfolio is a well-diversified portfolio that has a factor beta equal to one for a single risk factor, and factor betas equal to zero on the remaining factors. By shorting the hedge portfolio, the investor will offset the factor risks of the original portfolio. In this case, the 0.40 and 0.50 exposures to the two risk factors are offset by the short position in the hedge portfolio that also has 0.40 and 0.50 exposures to the two risk factors.

Q-36. Solution: B

The expected return for Stock A equals the expected return for the stock under the baseline scenario, plus the impact of "shocks", or excess returns of, both factors. Since the baseline scenario incorporates 3% industrial production growth and a 1.5% interest rate, the "shocks" are 1.2% for the GDP factor and 0.25% for the interest rate factor.

Therefore the expected return for the new scenario

$$\begin{aligned} &= \text{Baseline scenario expected return} + \beta_{\text{Industrial production}} \times \text{Industrial production shock} + \beta_{\text{Interest rate}} \times \text{Interest rate shock} \\ &= 5\% + (1.3 \times 1.2\%) + (-0.75 \times 0.25\%) = 6.37\% \end{aligned}$$

Q-37. Solution: D

A major contributing factor to the collapse of LTCM is that it did not account properly for the illiquidity of its largest positions in its risk calculations. LTCM received valuation reports from dealers who only knew a small portion of LTCM's total position in particular securities, therefore understating LTCM's true liquidity risk. When the markets became unsettled due to the Russian debt crisis in August 1998 and a separate firm decided to liquidate large positions which were similar to many at LTCM, the illiquidity of LTCM's positions forced it into a situation where it was reluctant to sell and create an even more dramatic adverse market impact even as its equity was rapidly deteriorating. To avert a full collapse, LTCM's creditors finally stepped in to provide \$3.65 billion in additional liquidity to allow LTCM to continue holding its positions through the turbulent

market conditions in the fall of 1998, However, as a result, investors and managers in LTCM other than the creditors themselves lost almost all their investment in the fund.

Q-38. Solution: A

Metallgesellschaft and Long Term Capital Management (LTCM) dealt in the derivatives market in huge quantities and both experienced a cash flow crisis due to the change in economic conditions. This led to huge mark-to-market losses and margin calls.

Q-39. Solution: A

Oil prices fell in the fall of 1993 because of OPEC's problems adhering to its production quotas, so the market changed into one of contango, so C and D are incorrect. In contango, the futures price is above the spot price and as a result Metallgesellschaft incurred losses on its short-dated long futures contracts, so B is incorrect and A is correct.

Q-40. Solution: A

Metallgesellschaft implemented a stack-and-roll hedge strategy, which uses short-term futures contracts to hedge long-term risk exposure. The stack-and-roll hedge strategy proved ineffective due to interim funding cash outflows created by margin calls, a shift in the market from backwardation to contango, and other factors. No offsetting interim cash inflows were available on their long-term customer contracts, creating a liquidity crisis that was exacerbated by their size of their futures positions in relation to the liquidity of the market. Central themes were not diversification, fraud, or operational controls.

Q-41. Solution: B

LTCM's models underestimated the extent to which securities prices would move together in times of economic crisis. The models also failed to anticipate that multiple economic shocks might occur in clusters through time (i.e., be positively auto-correlated) as economic history suggests. Poor management oversight and financial reporting standards are not issues in the LTCM case.

Q-42. Solution: C

The collapse of Barings Bank was not an instance of flawed hedging models, but one of poor operational control. Lesson had previously incurred huge trading losses that, if revealed, would have cost him his job. In an effort to recover those losses, he abandoned his hedging strategies and speculated to recoup these losses. His influence and authority in back office operations allowed him to hide his speculative losses and report phantom profits. Lesson ignored and exceeded risk control limits, and senior management's lack of understanding about Leeson's role and oversight allowed his schemes to go undetected.

Q-43. Solution: B

Leeson was supposed to be running a low-risk, limited return arbitrage business out of his Singapore office, but in actuality he was investing in large speculative positions in Japanese stocks and interest rate futures and options. When Leeson fraudulently declared very substantial reported profits on his positions, management did not investigate the stream of large profits even though it was supposed to be associated with a low-risk strategy.

Q-44. Solution: D

Kidder Peabody's accounting system failed to account for the present value of forward trades, which allowed trader Joseph Jett to book an instant, but fraudulent, accounting profit by purchasing cash bonds to be delivered at a later date. These profits would dissipate as the bonds approached their delivery date, but Jett covered this up by rolling the positions forward with increasingly greater positions and longer lengths to delivery, which created a higher stream of hypothetical profits due to the accounting flaw.

Finally this stream of large profits was investigated and Kidder Peabody was forced to take a USD 350 million accounting loss to reverse the reported gains, which resulted in a loss of confidence in the firm and General Electric's subsequent sale.

Q-45. Solution: A

The housing bubble can be seen as the product of two broad factors:

1. Low interest rate. The lax interest policy Federal Reserve adopted and an increase in demand for U.S securities by foreign investors are mainly the factors of low interest rate.
2. Declining lending standards. Financial securitization and originate-to-distribute could transfer the default risk of the borrowers to investors, so the originating institutions had little intentions to be diligent in their creditworthiness assessment. As a result, lending standards fell substantially.

Q-46. Solution: C

Asset-liability mismatch refers to the purchase of long-term assets through short-term financing. Banks used commercial paper and repurchase agreements to finance the purchase of long-term assets. So they have to face funding liquidity risk.

Q-47. Solution: A

Securitization transfers the default risk of borrowers to investors, so the originating institutions do not have the incentive to be diligent on the borrowers' creditworthiness. By tranching, securitization could provide low mortgage interest rates to more risk-bearing investors. Securitization can help overcome regulatory hurdles.

Q-48. Solution: C

Having a clearinghouse can only reduce network risk, network risk can not be eliminated. CDOs,

interest rate swaps are traded in the over-the-counter market, they are not standardized products. As evidenced in the recent global financial crisis, an increase in the counterparty risk can produce systemic effects.

Q-49. Solution: C

A failure to minimize losses on credit portfolios is not necessarily a failure of risk management. The firm may have used prudent risk management and decided that the potential rewards from entering into the credit agreements adequately compensated the firm for the risks taken. It could also have ignored the advice of its risk managers to attempt to minimize its credit losses. Either way, this is not necessarily a failure of risk management.

Q-50. Solution: C

Consistency refers to the comparison of one element of data across two or more different databases.

Q-51. Solution: B

The completeness principle recommends that a bank be able to capture and aggregate all data on the material risks to which it is exposed across the organization. This will allow it to identify and report risk exposures, concentrations, and set exposure limits.

Q-52. Solution: B

According to the GARP Code of Conduct, violation(s) of the Code may result in the temporary suspension or permanent removal of the GARP Member from GARP's Membership roles, and may also include temporarily or permanently removing from the violator the right to use or refer to having earned the FRM designation or any other GARP granted designation, following a formal determination that such a violation has occurred.

Q-53. Solution: C

Standards 2.1 and 2.2 - Conflicts of Interest. Members and candidates must act fairly in all situations and must fully disclose any actual or potential conflict to all affected parties. Sell-side members and candidates should disclose to their clients any ownership in a security that they are recommending.

Q-54. Solution: B

Anderson must maintain the confidentiality of client information according to Standard 3.1. Confidentiality may be broken in instances involving illegal activities on the part of the client, but the client's information may only be relayed to proper authorities. Anderson did not have the right to inform the investment bank of her client's investigation.

Q-55. Solution: A

A Quigley's trades are most likely an attempt to take advantage of an arbitrage opportunity that exists between Craeger's common stock and its put options. She is not manipulating the prices of securities in an attempt to mislead market participants. She is pursuing a legitimate investment strategy. Participants in her hedge fund are aware of the fund's investment strategy, and thus Quigley did not violate the Code by not disclosing this specific set of trades in advance of trading (Standards 2.1 and 5.1).

Q-56. Solution: A

GARP Members must not offer, solicit, or accept any gift, benefit, compensation, or consideration that could be reasonably expected to compromise their own or another's independence and objectivity. Schleifer has appropriately rejected the offer of the hotel accommodations and the use of ChemCo's jet. However, Schleifer cannot accept the tickets to the dinner. Since it is a formal high-society dinner, the tickets are most likely expensive or hard to come by. Even though he has disclosed the gift to his employer and he plans to use the dinner as a marketing opportunity for his firm, the gift itself may influence Schleifer's future research in favor of ChemCo. Allowing such potential influence is a violation of Professional Integrity and Ethical Conduct (Standard 1.2).

Q-57. Solution: C

It is not reasonable for Bixby to expect a 40-to-60 stock mid-cap portfolio to track the entire S&P 500 Index, which is a large-cap index. She should know that there will be periods of wide variance between the performance of the portfolio and the S&P 500 index. There is no assurance that a premium of 2% to 4% will consistently be obtained. Bixby is in violation of Standard 1.4: "GARP Members shall not knowingly misrepresent details relating to analysis, recommendations, actions, or other professional activities," since she has made an implicit guarantee of the fund's expected performance.