SS16 Risk Management

1. Consider a 10 million portfolio of stocks. You perform a Monte Carlo simulation to estimate the VaR for this portfolio. You choose to perform this simulation using a normal distribution of returns for the portfolio, with an expected annual return of 14.8 percent and a standard deviation of 20.5 percent. You generate 700 random outcomes of annual return for this portfolio, of which the worst 40 outcomes are given below.

– 0.400	–0.320	–0.295	–0.247
– 0.398	–0.316	–0.282	–0.233
– 0.397	–0.314	–0.277	–0.229
– 0.390	–0.310	–0.273	–0.226
– 0.355	–0.303	–0.273	–0.223
– 0.350	–0.301	–0.261	–0.222
– 0.347	–0.301	–0.259	–0.218
– 0.344	–0.300	–0.253	–0.216
– 0.343	–0.298	–0.251	–0.215
– 0.333	–0.296	–0.248	–0.211

Using the above information, compute the following:

a) 5 percent annual VaR.

b) 1 percent annual VaR.

Solutions:

a) Of the 700 outcomes, the worst 5 percent are the 35 worst returns. Therefore, the 5 percent VaR would be the 35th worst return. From the data given, the 35th worst return is –0.223. So, the 5 percent annual VaR in dollars is 0.223(10,000,000) = 2,230,000.

b) Of the 700 outcomes, the worst 1 percent are the 7 worst returns. Therefore, the 1 percent VaR would be the seventh worst return. From the data given, the seventh worst return is –0.347. So, the 1 percent annual VaR in dollars is 0.347(10,000,000) = 3,470,000.

2. DGI currently provides a 5 percent yearly VaR on the equity portfolio that it manages for Stimson. The €50 million portfolio has an expected annual return of 9.6 percent and an annual standard deviation of 18.0 percent. With a standard normal distribution, 5 percent of the possible outcomes are 1.65 standard deviations or more below the mean. Using the analytical (variance–covariance) method for calculating VaR, DGI estimates the 5 percent yearly VaR to be €10.05 million.

The monthly VaR that Stulz wants to estimate for the Stimson portfolio is closest to:

A. € 0.8 million.

B. €2.9 million.

C. €3.9 million.

Solutions: C

The monthly return is 9.6%/12 = 0.8%.

The monthly standard deviation is $18.0\%/\sqrt{12} = 5.196\%$

The percent VaR is 0.8% – 1.65 (5.196%) = –7.7734%.

The dollar VaR is 7.7734% (€50 million) = €3.8867 million, or €3.9 million.

3. Client B asks:

"I am preparing to make a VAR presentation to my Board of Directors. I am familiar with the analytical method of measuring VAR that Galaxy & Co. uses. Please describe other methods for estimating VAR and indicate a disadvantage of each."

Fraser drafts a number of possible responses to Client B. An appropriate response would include:

A. The Monte Carlo simulation method requires an assumption of normally distributed returns.

B. The historical method is nonparametric and does not allow the user to make assumptions about the probability distribution of returns.

C. The historical method relies completely on events of the past, and the probability distribution of the past may not hold in the future.

Solution: C.

The historical method relies completely on events of the past, and whatever distribution prevailed in the past might not hold in the future. This is a disadvantage of the measure.

The following information is related to Question 4

Baltic uses value at risk (VAR) as a probability-based measure of loss potential for its fixed income strategies. Reinfeldt states that the VAR for the fixed income strategy is SEK10 million over any 5-day time period with a probability of 5 percent. Larsson asks Reinfeldt to estimate the fixed income strategy's VAR at given levels of probability for specified time periods.

4. Given Reinfeldt's estimate of VAR for the fixed income strategy, which of the following statements is most likely accurate? Over a 5-day period, there is a:

A. 5% probability the portfolio will lose at least SEK10 million.

B. 95% probability the portfolio will lose at least SEK10 million.

C. 5% probability the portfolio will lose no more than SEK10 million.

Solution: A.

A is correct because VAR is a minimum. That is, there is a 5% chance that the portfolio will lose SEK10 million or more.

5. Baltic manages an equity strategy in addition to the fixed income strategy. The trading desks for each strategy are each granted risk budgets that consider the allocation of both capital and daily VAR. The correlation between the equity desk and the fixed income desk is low. Risk-budgeting data for both desks are provided in Exhibit 1.

Exhibit 1		
Trading Desk Data (SEK million)		
	Equity Desk	Fixed Income Desk
Capital	200	100
Daily VAR	10	10
Monthly Profit	25	15

With regard to the fixed income and equity trading desks, based on Exhibit 1, which of the following statements is most likely accurate?

A. The trading desks have the same risk budget.

B. The combined daily VAR of the trading desks is less than SEK20 million.

C. The fixed income desk generates better returns on its allocated capital given its VAR.

Solution: B.

B is correct because the trading desks engage in activities that are weakly correlated; therefore, a diversification benefit is experienced, and it would be reasonable to expect that the combined VAR of the two desks will be less than the sum of the VARs of the individual desks (SEK20 million).

6. Karin Larsson is a new employee in the risk management group at Baltic Investment Management, Inc. She is replacing Sten Reinfeldt, who has agreed to help her transition into her new role. Reinfeldt explains that risk governance refers to the process of setting risk management policies and standards for an organization, enabling firms to establish appropriate ranges for exposures and to emphasize individual risk factors within a centralized type of enterprise risk management.

Baltic manages proprietary investment strategies, which creates risk exposures for the firm. Larsson explains that these risks are both financial and nonfinancial in nature and proceeds to list several specific sources of risk:

Which element of Reinfeldt's initial statement to Larsson is least likely correct?

A. Ranges for exposures

B. Individual risk factors

C. Risk management policies

Solution: B.

B is correct because risk management incorporates a centralized type of risk management called enterprise risk management (ERM). ERM's distinguishing feature is a firm-wide or across-enterprise perspective. The corporate governance structure is much broader than risk governance and encompasses the system of internal controls and procedures used to manage individual companies.