



Strathmore
UNIVERSITY

**STRATHMORE INSTITUTE OF MATHEMATICAL SCIENCES
BACHELOR OF BUSINESS SCIENCE IN FINANCIAL ENGINEERING &
FINANCIAL ECONOMICS
END OF SEMESTER EXAMINATION
BSF 4126: Financial Risk Management**

DATE: 2nd August 2022

Time: 2 Hours

Instructions

1. This examination consists of **FIVE** questions.
2. Answer **Question ONE (COMPULSORY)** and any other **TWO** questions.

QUESTION 1 (30 Marks)

1. Explain how the following risks arise in contracts, asset or liability books of financial or non-financial institutions (6 marks)
 - a) Settlement Risk
 - b) Concentration Risk
 - c) Risk Contagion
2. Explain the role of derivatives in risk management (6 marks)
3. Discuss the risk management control cycle, clearly explaining each step (6 marks)
4. Discuss any 3 methods that could be applied in risk identification (6 marks)
5. An analyst after joining a new firm goes through the previous year's files for the Risk Management Department. He makes note of the following that the reported weekly 95% VaR, the h-day 99% VaR and the h-day 70% volatility stressed h-day 99% VaR are summarized as follows:

Estimated	Reported
95% VaR	9%
h-day 99% VaR	12.5%
Stressed h-day 99% VaR	17%
Portfolio Size	USD 115,000

He is interested in determining the first 2 moments - expected return and the volatility of the portfolio and assessing the previous analysis h period estimate. Determine the values these variables that the analyst is interest in. (6 marks)

QUESTION 2 (20 Marks)

1. An analyst's credit management desk is involved with 3 classes of borrower's namely: students, small businesses and financial institutions. The analyst estimates that the expected credit losses from each borrower class would be \$12M, \$14M, \$16M and that the aggregate credit loss would be \$60M. The analyst assumes a Gaussian distribution function for loss distributions of the categories. They estimated the annual default correlations naively by a Pearson correlation coefficient across the categories and found this to be zero, although the analyst insisted in the report that this did not strictly imply probabilistic independence. He further reported that 99% VaR for the portfolio was 12.5% and that the total credit desk portfolio amounted to \$600M. He however failed to provide the credit exposure for each borrower class. Determine the credit exposures for each class of borrower. (12 Marks)

2. Operational risks must be proactively managed by a bank's board of directors and senior managers as well as its business line managers and employees. Discuss any 8 of the 11 fundamental principles of operational risk management suggested by the Basel Committee. (8 Marks)

QUESTION 3 (20 Marks)

1. Differentiate the following terms as used in financial risk management :
 - i) risk vanities vs risk culture (2 marks)
 - ii) pure vs speculative risks (2 marks)
 - iii) static vs dynamic risks (2 marks)

2. One of the main rationales for the Basel II Accord is to provide a capital adequacy methodology that is more clearly driven by risk and provide for effective risk management. Clearly explain the requirements of the three pillars of Basel II Accord. (9 marks)

3. Discuss the key components in internal risk model validation process (5 Marks)

QUESTION 4 (20 Marks)

The recommendations of the Basel Committee after the 2007 Financial Crisis highlighted the importance of top management and board involvement in stress testing. In particular, top management and board members should be involved in setting stress-testing objectives, defining scenarios, discussing the results of stress tests and decision making. It makes the point that the banks that fared well in the financial crisis were the ones where senior management as a whole took an active interest in the development and operation of stress testing, with the results of stress testing serving as an input into strategic decision making.

- i) Explain two benefits and two criticisms against regulatory frameworks for banks and insurance companies (8 marks)
- ii) Apart from involvement in stress testing, explain 3 other ways that the risk committee is able to influence the risk culture and capabilities in an organization (6 marks)
- iii) Discuss any 3 approaches for used in measuring operational risk (6 Marks)

Question 5 (20 Marks)

An investment bank holds a portfolio of Global ETFs and Infrastructure Bonds with allocations of USD 800,000 and USD 700,000 on each instrument. On Monday 6th June 2022, the 7 day quoted prices of the instruments were as follows:

Asset Class	6/06/22	Day 1	Day 2	Day 3	Day 4	Day 5	Day 6	Day 7
Equity	40	43.2	44.5	47.6	40.9	38.34	42.2	39.6
Bond	100	97.86	99.8	102.1	101.9	94.56	93.9	96.67

The Pearson correlation estimate between the ETFs and Infrastructure bonds was determined to be 0.1472.

Required:

- i) Compute the 7-day 95% Value-at-Risk (VaR) of the constructed portfolio (6 marks)
- ii) Compute the 252-day 95% Expected Shortfall of the portfolio, given that the standard Gaussian density function is $\varphi(z) = \frac{e^{-0.5z^2}}{\sqrt{2\pi}}$ (6 marks)
- iii) “Financial institutions (and firms in general) take on operational risk in running their daily business. The growing level of interest in operational risk management are due to the Increasing complexity of financial assets and trading procedures, particularly the rapid growth of financial engineering and the resulting derivative products.” Discuss any four way of managing operational risk of a company (8 marks)