

Exam QFIIRM

Date: Thursday, April 30, 2020

Time: 2:00 p.m. – 4:15 p.m.

INSTRUCTIONS TO CANDIDATES

General Instructions

1. This examination has a total of 40 points.

This exam consists of 6 questions, numbered 1 through 6.

The points for each question are indicated at the beginning of the question.

2. Failure to stop writing after time is called will result in the disqualification of your answers or further disciplinary action.
3. While every attempt is made to avoid defective questions, sometimes they do occur. If you believe a question is defective, the supervisor or proctor cannot give you any guidance beyond the instructions on the exam booklet.

Written-Answer Instructions

1. Write your candidate number at the top of each sheet. Your name must not appear.
2. Write on only one side of a sheet. Start each question on a fresh sheet. On each sheet, write the number of the question that you are answering. Do not answer more than one question on a single sheet.
3. The answer should be confined to the question as set.
4. When you are asked to calculate, show all your work including any applicable formulas. When you are asked to recommend, provide proper justification supporting your recommendation.
5. When you finish, insert all your written-answer sheets into the Essay Answer Envelope. Be sure to hand in all your answer sheets because they cannot be accepted later. Seal the envelope and write your candidate number in the space provided on the outside of the envelope. Check the appropriate box to indicate Exam QFIIRM.
6. Be sure your written-answer envelope is signed because if it is not, your examination will not be graded.

Tournez le cahier d'examen pour la version française.

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****BEGINNING OF EXAMINATION****

- 1.** (7 points) You are a consultant for an asset management firm. Your first assignment is to review the risk exposure of the firm's portfolio.

The portfolio consists of stocks, bonds, and options and has total market value of \$100M USD. The calculated 99% daily VaR is \$10M USD using the analytical method. You simulate the performance of the portfolio over 500 trials using Monte Carlo simulation. Below are your results:

Monte Carlo Results: 10 Worst Daily Returns Over 500 Simulations

Scenario Rank	Losses (\$M)
500.	5.5
499.	5.0
498.	4.8
497.	4.5
496.	4.0
495.	3.9
494.	3.6
493.	3.5
492.	3.3
491.	3.0

- (a) (1.5 points)
- (i) Define 99% daily VaR.
 - (ii) Compare the 99% daily VaR results under both the Monte Carlo and analytical approach.
 - (iii) Recommend the more appropriate VaR method in this situation.

1. Continued

The Chief Risk Officer (CRO) is developing a new capital requirement for the firm such that losses should not exceed \$25M in an event similar to the stock market crash of 1987. The CRO suggests that you use a 99% daily VaR calibrated based on 5 years of historical returns to project the loss in an event similar to the 1987 stock market crash.

(b) (1.5 points)

- (i) Explain why the approach proposed by the CRO is not appropriate.
- (ii) Recommend an alternate approach to determine the capital requirement.

The firm is considering the addition of \$10M in private equity funds to the portfolio. You are asked to perform scenario analysis to assess the tail risk of the new asset class. You consider the following methods:

- Standard Portfolio Analysis of Risk (SPAN) system
- Prospective scenarios
- Historical scenarios

(c) (2 points)

- (i) Describe each method above.
- (ii) Recommend the most appropriate method to assess the tail risk of the new asset class.

Your last assignment is to assess the tail risk of the firm's portfolio by using its option pricing models. You utilize the factor push method to assess the tail risk. Your results are below:

Factor	Standard Deviation σ_i Multiple	Change in Portfolio Value (\$M)
Risk-free rate	$-3\sigma_1$	-\$30M
Equity return	$-3\sigma_2$	-\$55M
Dividend yield	$+3\sigma_3$	-\$5M
Total Change in Portfolio		-\$90M

(d) (2 points)

- (i) Describe two shortcomings with your approach to quantifying tail risk.
- (ii) Recommend two improvements to your approach to quantifying tail risk.

2. (7 points) You are a management consultant hired by XYZ, a small life insurance company. The Board of XYZ has emphasized the importance of improving its corporate governance framework and ethics policies.

(a) (0.5 points) List two components of the CEO's role with respect to ERM.

Your manager asks you to develop a new governance framework that focuses on the roles and responsibilities of senior management.

(b) (1.5 points)

- (i) Describe briefly two case studies where weak corporate governance permitted senior management to make poor ethical decisions.
- (ii) Explain why focusing on senior management is not adequate when developing a corporate governance framework.

As you develop the corporate governance framework, you conduct a series of interviews with associates across various levels of the company. During your research, you learn the following:

- XYZ has a significant number of employees with long tenure with the company.
- A few specific lower level managers are sources of unethical behavior.

(c) (1.5 points) Recommend three actions senior management can take to immediately counter behavioral issues at the lower management levels.

2. Continued

Due to its small size, XYZ is looking to consolidate the following board functions into fewer committees. The following five committees must be consolidated into three distinct committees, A, B and C:

1. Audit
2. Compensation
3. Compliance
4. Risk
5. Nominating

- (d) (1 point) Propose how you would combine the above five committees into A, B, and C.

A board election is coming up and you have learned the following:

- The current board consists of one external member and three internal members
- Candidate W is the newly promoted CFO of the company and has been with the company for his entire career
- Candidate X has extensive technology experience and has worked for a competitor for a number of years
- Candidate Y has extensive accounting experience and has recently retired from a public accounting firm
- Candidate Z is the brother-in-law of the CEO and has been a consultant for the company in the past

- (e) (2.5 points)

- (i) Assess the suitability of each candidate for the board.
- (ii) Recommend the most appropriate committee (A, B, or C per part d) for each suitable candidate.

3. (7 points) You are the supervisor of a new employee in the risk management department of an investment management firm. The employee attended an internal training on risk management best practices and wrote the following notes.

- The entire firm is collectively accountable when a risk issue arises. Effective risk management requires participation by everyone.
- The Chief Risk Officer should be independent since it is strictly a policing role.
- Compensation should be adjusted for risk using the standard deviation of returns.

(a) (1.5 points) Critique each statement above.

You are interested in conducting a survey as part of the firm's risk identification process and ask the new employee to assist in this effort.

(b) (1.5 points)

- Describe two potential benefits of using a survey as a risk identification technique.
- Describe three potential problems your team could face while conducting this survey.
- Propose a way to overcome each potential problem identified.

The survey identified new risks and the organization decided to implement risk budgeting using VaR. The following table shows the allocation to its two business units and the most recent quarterly profits.

	Allocated Capital	Risk Budget	Quarterly Profit
Business Unit 1	500	25	10
Business Unit 2	1,000	125	30
Organization:	1,500	100	40

The employee observes that the sum of the individual business unit risk budgets is larger than the risk budget for the whole organization and shares this concern with you.

(c) (0.5 points) Critique the employee's risk budget concern.

3. Continued

Now assume that the risk budget of the organization was 150, but all the other data in the above table remain the same.

- (d) (1.5 points) Recommend an action that management should take based on a risk budgeting analysis.

Several quarters (Q) pass after implementing risk budgeting. No risk management actions have been taken and the risk budget is recalculated every quarter using the same statistical methods. You know the following facts:

	t=0	1Q	2Q	3Q	4Q
Total Risk Management Employees	10	11	11	11	11
New Risk Management Employees	2	1	5	0	0
# Workflow Documents	0	0	1	1	1
Organization Risk Budget (VaR)	100	100	100	100	100
Organization Risk Metric (VaR)	85	90	100	125	150
% Competitors Changing Strategy Since t=0	-	40%	75%	90%	95%

- (e) (2 points)
- (i) Describe four “Top Ten” operational risks which may have contributed to the problems with the firm’s risk budgeting. Support your answer with facts from the table.
- (ii) Recommend improvements to address the four risks from (i).

4. (8 points) You are a risk analyst for Loads of Funds (LF), which actively manages a variety of fixed income funds for both retail and institutional investors.

(a) (1 point) Compare and contrast Marginal VaR and Incremental VaR.

You have been asked to analyze a potential rebalancing of Fund A with the following information:

- Fund A consists of two fixed income assets, N and M
- No derivatives or leverage are used
- Expected return is 0%
- Correlation between the returns of N and M is 0.10
- Current position and proposed position are shown below

Fund A Position

Asset	Annual Volatility	Current Position	Proposed Position
N	10%	\$10,000	\$12,500
M	30%	\$5,000	\$2,500

(b) (3.5 points)

- Estimate the incremental 95% annual VaR for the proposed position above using the marginal-VaR method.
- Calculate the incremental 95% annual VaR for the proposed position above from a full revaluation of the portfolio.
- Explain why the results from (i) and (ii) are different.

One year later, you are asked to assess the risk of another Fund at LF, Fund B.

(c) (0.5 points) Describe active-management risk and policy-mix risk.

4. Continued

You calculate the 95% active-management VaR, policy-mix VaR, and total VaR as shown below. The risk limit for Fund B is 20% total VaR at a 95% confidence interval.

Source of Risk: Fund B

Active-management VaR	3.5%
Policy-mix VaR	15.2%
Total VaR	19.7%

Your colleague makes the following statements about the results:

- The active-management VaR is much smaller than the policy-mix VaR, indicating active managers are not deviating far from the benchmark.
- The total VaR exceeds the policy-mix VaR, indicating that active management is negatively correlated with the policy mix.

(d) (2 points)

- (i) Critique your colleague's statements above.
- (ii) Explain whether increasing active management is appropriate with respect to fund performance and risk limit.

You review Fund B's investment guidelines, which include the following components:

- Asset class restrictions
- Notional limits for each asset class
- Duration gap limits between the portfolio and benchmark

(e) (1 point) Explain one shortcoming of each component.

5. (7 points) You are an employee in the risk management department at ABC, a life insurance company. You are concerned about non-financial risks. Specifically, you are concerned about similarities to Equitable Life.

(a) (1 point)

- (i) List two significant non-financial risk categories that contributed to the collapse of Equitable Life.
- (ii) Explain how Equitable Life failed to address each of these risks.

One of ABC's consultants observing the current risk management practices made the following comments:

- 1. Currently risk identification and analysis are performed by the same group of individuals, but these functions should always be independent.
- 2. ABC can conduct Gap Analysis by exclusively surveying executives.
- 3. ABC's risk identification process should require input from multiple independent departments in order to avoid convergent thinking.
- 4. The Delphi Technique is appropriate for ABC since it is a small company with several experts willing to participate in risk management activities.

(b) (2 points) Assess each of the statements above.

ABC has traditionally grown its business primarily through direct mail, but management is considering two new distribution options to boost sales:

- 1. Develop a proprietary agency sales force and launch through third party distribution channel.
- 2. Advertise on social media while expanding technological capabilities and online presence.

(c) (2 points) Identify and explain the two most important operational risks for each option.

5. Continued

You have been tasked with evaluating which distribution option(s) to pursue by performing selectionism, or trial-and-error learning. You know the following:

- Limited resources are available to research, develop, and implement the new distribution option.
- Senior management views the distribution expansion as a long-term objective.

(d) (2 points)

- (i) Describe selectionism and trial-and-error learning approach.
- (ii) Recommend the most appropriate approach in this situation.

6. (4 points) HAQ is a publicly traded asset management company that manages the assets for XYZ, a large institutional client. HAQ assesses higher fees than most competitors.

(a) (1 point) Explain how HAQ's high fees could impact the short-term and long-term interests of its stockholders and XYZ.

You know the following about HAQ's marketing material:

- Performance is presented net of fees and trading costs
- Composite returns exclude terminated accounts
- Past returns are assumed to continue in future projections

(b) (1.5 points) Critique each bullet above from an ethics perspective.

Table 1 shows the recent fund balance to evaluate performance. Manager A only reports an average annual return over the last five years using equal weights for each year.

Table 1

Year	Year-end Fund Balance (\$M)	Annual return	Reported return over the last 5 years
2019	\$125	19.0%	8.2%
2018	\$105	8.2%	
2017	\$97	0.0%	
2016	\$97	6.6%	
2015	\$91	7.1%	
2014	\$85	-5.6%	
2013	\$90	N/A	

(c) (1.5 points)

- Critique Manager A's methodology for reporting performance.
- Recommend improvements, if any, to the methodology for reporting performance.
- Calculate the performance based on your proposed improvements.

****END OF EXAMINATION****

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