QFI IRM Model Solutions
Fall 2017

1. Learning Objectives:

1. The candidate will understand the needs and methods of governing investments.

Learning Outcomes:

(1a) Compare the interest of key stakeholders.

(1d) Describe governance mechanisms that attempt to address these conflicts.

(1f) Explain how governance may be structured to gain competitive advantages and efficiencies.

Sources:

Integrated Risk Management - Why is Risk So Costly to Firms - Chapter 7 (Doherty)

Strategic Management: An Integrated Approach - Corporate Performance, Governance, and Business Ethics - Chapter 11 (Hill & Jones)

Commentary on Question:

This question tested the candidates' knowledge of hedges and asked them to identify their appropriateness, from the viewpoints of different stakeholders. The question concluded with a recommendation regarding compensation and its links with the goals of the CEO.

Solution:

(a) Evaluate the appropriateness of buying hedges.

Commentary on Question:

Candidates performed better than expected on this section. While the majority of candidates earned credit for recommending the use of hedges based on the favorable after-tax return, only a minority of candidates also recognized the convex tax structure associated with this decision.

Without hedging: 50% x 200 + 30% x 300 + 20% x 75 = 205 pretax
70x35% = 24.5 taxes; 205 - 24.5 = 180.5 after tax

With Hedging: 200 pretax
50 x 35% = 17.5 taxes; 200-17.5 = 182.5 after tax

1. Continued

Nature of taxes is non-linear/convex which drives decision to use hedges

Decision should be to buy hedges

(b) Explain how higher costs of financial distress would affect the economics of buying hedges.

Commentary on Question:
Candidates performed better than expected on this section. Most candidates recommended the use of hedges would improve the economics by reducing the costs of bankruptcy, some did not provide sufficient reasoning for their recommendation.

Buy hedges
Hedging reduces volatility
As risk increases the costs driven by bankruptcy, hedging reduces these costs and adds value

(c) List the key steps of a stakeholder impact analysis.

Commentary on Question:
Candidates performed better than expected on this section. Nearly all candidates earned credit by being able to provide a sufficient number of steps; however, a few included steps in their list that were not relevant or inappropriate.

1. Identify stakeholders.
2. Identify stakeholders' interests and concerns.
3. Identify what claims stakeholders are likely to make.
4. Identify most important stakeholders from org's perspective.
5. Identify resulting strategic challenges.

(d) Assess whether the company should hedge from the viewpoint of:

(i) Bondholders

(ii) Shareholders

Commentary on Question:
Candidates performed as expected on this section. While most candidates provided sufficient support for recommending that bondholders would be in favor of hedging, candidates either failed to recommend or provided insufficient support for making a recommendation for shareholders.

1. Continued

Bondholders favor hedging. Hedging reduces the probability the firm defaults on their payment. Bondholders' main concern is the receipt of their principal and coupon payments.

Shareholders may or may not favor hedging. Their main concern is current profitability as well as the firm's ability to grow.

Hedging may reduce risks and costs.

Hedging may limit the upside potential.

(e) Recommend a compensation structure for ABC's management that addresses the CEO's goals. Justify your answer.

Commentary on Question:
Candidates performed exceptionally on this section. Nearly all were able to recommend a structure including both a flat salary and bonus/variable component. A few candidates sided for only one of these or failed to provide sufficient support for their recommendation.

Recommend a structure with both a flat salary plus incentive bonus, based on performance.
Flat salary provides stable and minimum income.
Incentive bonus motivates managers to work towards better performance.
Stock shares vs. options are preferred, as options may reward risk with no downside. Shares will incentivize hedging as well.

2. Learning Objectives:

2. The candidate will understand and be able to apply the components of an effective risk management system.

3. Understand and be able to apply different approaches to risk measurement.

Learning Outcomes:

(2e) Evaluate a company's risk management process.

(3c) Compare different approaches to stress testing.

(3d) Analyze and evaluate risk aggregation techniques, including the use and misuse of correlation, integrated risk distributions and copulas.

Sources:

QFII-107-14: Chapter 14 of Value at Risk, Third Edition, Jorion
"Correlation: Pitfalls and Alternatives" RISK, Vol. 12, No. 5, (May 1999)
Risk Aggregation Basel committee on the Developments of Risk Aggregation

Commentary on Question:

In general, most candidates performed very well in this question. An important note is to show interim calculation steps rather than just demonstrating the final answer.

Solution:

(a) Describe two areas where stress testing can supplement VaR.

Commentary on Question:
In general, most candidates performed very well in determining the weaknesses of VaR and how stress testing can be used to supplement VaR.

VaR is a statistical measure that is used to capture losses at a pre-specified confidence level under normal market conditions. VaR does not provide additional insights to the tail distribution beyond the confidence level.

Stress testing can be used to supplement VaR by providing additional information in tail distribution that is not quantified by VaR under extreme and stress scenarios.

(b) List four problems of using linear correlation as a dependency measure.

Commentary on Question:
In general, most candidates performed very well in listing at least four problems with using linear correlation as a dependency measure.

No additional credits were given for listing more than four problems.

2. Continued

1. Correlation is simply a scalar measure of dependency.
2. Possible values of correlation depend on the marginal distributions of risks. All values between -1 and +1 are not necessarily attainable.
3. Perfectly positively dependent risks do not necessarily have a correlation of 1; perfectly negatively dependent risks do not necessarily have a correlation of -1.
4. A correlation of zero does not indicate independence of risks.
5. Correlation is not invariant under transformations of risks.
6. Correlation is only defined when variances of risks are finite. It is not an appropriate dependence measure for very heavy-tailed risks where variances appear infinite.

(c) Identify a family of copula that does not exhibit tail dependency.

Commentary on Question:
In general, most candidates performed very well in this question.

Gaussian copula is a family of copula that does not exhibit tail dependency.

(d) Identify three actions to mitigate the losses in this scenario.

Commentary on Question:
Candidates performed fairly well in this question.

1. Purchase derivatives such as interest rate swaps and credit default swaps
2. Lower allocation in mortgages or CDOs. Reduce exposure through diversification across assets
3. Develop an investment plan for significant write down of assets in a rising rate environment
4. Diversify the investment of mortgages from one geographical area.

(e) Calculate the loss of mortgages (x) and corporate bonds (y) respectively based on the simulated sample set of uniform random variables.

Commentary on Question:
In general, candidates performed very well in this section.

Define x from the CDF:
$F(x) = 1 - e^{-\lambda x}$
$1 - F(x) = e^{-\lambda x}$
$\text{Ln}(1 - F(x)) = -\lambda x$
$x = -(1/\lambda) * \ln(1 - F(x))$

2. Continued

Calculate simulated loss or mortgages (x):
$\lambda = 1/6$
x = -6 * ln(1 – 0.892) = 13.354

Calculate simulated loss or mortgages (y):
$\lambda = 1/9$
y = -9 * ln(1 – 0.438) = 5.186

(f) Calculate the joint probability that the loss of mortgages and corporate bonds are less than the result calculated in (e). Assume the copula distribution follows Gumbel with $\theta = 2$ as shown below *(Hint: Calculate P(X<x ,Y<y)).*

$$C_\theta^{gum}(u,v) = \exp\left\{-\left(\left(-\ln u\right)^\theta + \left(-\ln v\right)^\theta\right)^{\frac{1}{\theta}}\right\}, \qquad 1 \le \theta < \infty, \qquad \forall u,v \in [0,1]$$

Commentary on Question:
Approximately half the candidates were able to utilize the copula to generate the joint probability of losses.

Define Gumbel copula as H(x,y) with F(x) and F(y) as simulated losses:
H(x,y) = C((F(x),F(y)) = exp^{-[(-lnF(x))^ϑ+(-lnF(y))^ϑ]^(1/ϑ)}

Plug in F(x) = 0.892 and F(y) = 0.438 and ϑ = 2 as given:
H(x,y) = C((F(x),F(y)) = exp^{-[(-ln0.892)^2+(-ln0.438)^2]^(1/2)}
= exp^{-[(0.114289)^2+(0.825536)^2]^(1/2)}
= exp^{-[(0.013062+0.68151]^(1/2)}
=exp^{-0.83341}
= 43.46%

3. Learning Objectives:

1. The candidate will understand the needs and methods of governing investments.

2. The candidate will understand and be able to apply the components of an effective risk management system.

Learning Outcomes:

(1e) Understand the importance of an organizations culture in effectuating governance.

(2a) Explain the importance of risk culture in an investment firm.

(2c) Identify and describe various approaches for managing risks including risk budgeting, position limits, etc.

(2d) Explain the features of a best practices enterprise risk management system.

(2e) Evaluate a company's risk management process.

(2f) Examine examples of risk management failure.

Sources:

Managing Investment Portfolios section 1-4,6: Marginn & Tuttle
Risk Management: Foundations for a Changing World, Haslett, 2012 Chapter 18
Sweeting Chapter 20
Wilmott Introduces Quantitative Finance Chapter 26 (Derivatives ****ups)
Advances in Risk Management and Risk Governance by Leslie Rahl

Commentary on Question:

Commentary listed underneath question component.

Solution:

(a) Calculate the optimal risk allocation for each asset class with and without correlation given that the overall risk budget is 200bps.

Commentary on Question:

Candidates generally lost points by calculating the optimal risk allocation with correlation incorrectly.

Portfolio Information Ratio: $\mathbf{IR_p^2 = \sum (IR_i)(IR_i^*)}$ where IR_i = Information Ratio for each asset class and IR_i^* is the Correlation adjusted Information Ratio

Optimal Tracking Error: $\mathbf{TE_i = (TE_{max})/(IP_p) * (IR_i^*)}$ where TE_{max} is the overall risk budet (200bps)

3. Continued

No Correlation: $\mathbf{IR_p^2 = \sum (IR_i)(IR_i^*)} = (.4)(.4) + (.7)(.7) = 0.6500$, $\mathbf{IR_p = 0.8062}$
No Corr/US Equity: $\mathbf{TE_i = (TE_{max})/(IP_p) * (IR_i^*)} = (200)/(0.8062)*(.4) = 99$bps
No Corr/Int'l Equity: $\mathbf{TE_i = (TE_{max})/(IP_p) * (IR_i^*)} = (200)/(0.8062)*(.7) = 174$bps

Correlation: $\mathbf{IR_p^2 = \sum (IR_i)(IR_i^*)} = (.4)(.47) + (.7)(.39) = 0.4610$, $\mathbf{IR_p = 0.6790}$
Corr/US Equity: $\mathbf{TE_i = (TE_{max})/(IP_p) * (IR_i^*)} = (200)/(0.6790)*(.47) = 138$bps
Corr/Int'l Equity: $\mathbf{TE_i = (TE_{max})/(IP_p) * (IR_i^*)} = (200)/(0.6790)*(.39) = 115$bps

(b) Critique the CRO's statement.

Commentary on Question:
Candidates lost points by stating the statement is partially correct and trying to find errors in the statement.

The statement is entirely correct.

(c) For each of the above changes:

(i) Identify a real life, high-profile, risk management failure where the change could have prevented the failure.

(ii) Explain how the change could have prevented the failure.

Commentary on Question:
Credit was also given to other cases if candidates provided sufficient explanation to show the applicability.

Appropriate Segregation of Functions

Barings Bank: There was no level of internal scrutiny because Leeson was responsible for both the trading and accounting of his trade. The error account used to hide losses was not uncovered because he was responsible for back office accounting his trades.

Peer Review with Internal and External Auditors

Bernard Madoff: There was insufficient scrutiny through the audits to uncover the fraud that was being carried out in the firm.

3. Continued

Cultural training and round table discussions that have less emphasis on hierarchy
Korean Air: The flight crew was reluctant to challenge decisions made by their superior due to the hierarchical nature of Korean society. This was needed to avoid the crash.

Clear Reporting Lines for Each Individual

Barings Bank: Leeson had two separate reporting lines, one to London and one to Tokyo. This reporting structure allowed him to better hide his losses in the error account with less scrutiny from either office.

(d) Recommend other ways the CRO could encourage a strong risk culture.

Commentary on Question:
Credit was also given to items such as:

- *Employees should understand and consider risk-reward trade-offs*
- *Risk tolerances need to be established*

-Educate employees about risk management and each employee's role in the company

-Establish policies and procedures around risk management and culture at the company

(e) Critique the approach described in the email with respect to the ERM steps stated above.

Commentary on Question:
Credit was also given to other critiques provided they are appropriately explained. Full credit was given when candidates critiqued the approach in relation to each of the three ERM steps stated in the question. Otherwise, partial credit was given.

Bullet 1 - Identify each risk factor to which the company is exposed.

Critique – ABC and XYZ are exposed to more risks than just market and credit risk thus we are not identifying each risk factor to which the company is exposed to. XYZ has a lot of exposure to foreign countries thus one can infer that it is exposed to additional risks that ABC might not be exposed to (e.g. regulatory risk, foreign exchange risk, etc.).

3. Continued

Bullet 2 - Quantify each exposure's size in monetary terms.

Critique – It is probably incorrect to just add the risk limits. The CRO should assess if there are any offsetting risks between the two firms as simply adding the risk limited may overestimate total risk.

Bullet 3 - Set up a process to report on these risks periodically to senior management, who will set up a committee of division heads and executives to determine capital allocations, risk limits and risk management policies.

Critique – An annual report on risk exposures is probably too infrequent.

4. Learning Objectives:

3. Understand and be able to apply different approaches to risk measurement.

Learning Outcomes:

(3b) Explain the advantages and limitations of different risk metrics including value at risk.

(3c) Compare different approaches to stress testing.

Sources:

Liquidity Measurement and Management: A Practioner's Guide to Global Best Practices, Ch 2 & 3

Commentary on Question:

This question tests the candidate's understanding on liquidity risk sources, liquidity risk measurement, and corresponding scenario analysis and stress testing. Overall, candidates performed poorly on this question.

Solution:

(a) Explain how liquidity risk differs from market risk in regards to risk measurement.

Commentary on Question:

Candidates performed poorly on this section. Below is a sample of potential responses. Other reasonable responses were accepted.

- Market risk can be measured using net asset value, P&L.
- Liquidity risk is measured using net cumulative outflow.
- Liquidity risk must be measured as a secondary risk, market risk can be isolated.
- Net cumulative outflow must be measured over a time horizon while P&L can be measured at a point in time.

(b) Evaluate quantitatively and qualitatively ABC's liquidity position before and after the acquisition using balance sheet liquidity analysis.

Commentary on Question:

Candidates performed very poorly on this section. A number of students skipped this section.

4. Continued

Classification of Assets and Liabilities

Assets ($M)	Class	Sticky/Volatile
Mortgages	Loan/receivable/investment	Sticky
Derivatives	Trading asset	Volatile
Corporate Bonds	Loan/receivable/investment	Sticky
Long-term Government Bond	Loan/receivable/investment	Sticky
Security Borrowing	Reverse repo	Volatile
Commercial Real Estate	Loan/receivable/investment	Sticky

Liabilities ($M)	Class	Sticky/Volatile
CDs	Non-bank deposit	Sticky
Mortgage Backed Securities (Short position)	Trading Liability	Volatile
Equity	Equity	Sticky
Security Lending	Repo	Volatile
Other Non-Bank Deposits	Non-bank Deposit	Sticky

Sticky Assets = Loans/receivables/investments
Volatile Assets = Trading assets + Repos
Sticky Liabilities = Non-bank deposits + Equity + Certified Liabilities
Volatile Liabilities = Unsecured bank deposits + Trading liabilities + Repos

Assets

Category ($M)	ABC	XYZ	ABC + XYZ
Sticky Assets	250=180+25+20+25	80=5+25+45+5	330=185+50+65+30
Volatile Assets	75=60+15	30=20+10	105=80+25

Liabilities

Category ($M)	ABC	XYZ	ABC + XYZ
Sticky Liabilities	230=0+55+175	100=40+5+55	330=40+60+230
Volatile Liabilities	95=65+30	10=5+5	105=70+35

4. Continued

- Before acquisition, ABC's volatile liabilities (95) exceed the value of volatile assets (75) . In a potential liquidity crisis, the firm may have to sell non-liquid assets at a discount or seek funding.
- This mismatch illustrates potential liquidity risk, as ABC has over-allocated to sticky assets (250) relative to sticky liabilities (230).
- Post acquisition, ABC's liquidity position improves. sticky assets match sticky liabilities
- Volatile assets match volatile liabilities. XYZ's over-allocation to volatile assets relative to volatile liabilities corrects the current mismatch in ABC's allocation.

(c) Identify two shortcomings of Larry's approach.

Commentary on Question:
Candidates performed well on this section. Any two responses below would suffice.

- Missing time dimension.
- Off-balance sheet commitments not considered.
- Impact of accounting rules not considered.
- Marketability of securities not considered.

(d) Identify and describe an alternative approach that could address these shortcomings.

Commentary on Question:
Candidates performed relatively well on this section. Either approach below was accepted. Candidates must provide descriptions to receive credit.

Cash Capital
The approach measures a bank's ability to fund assets on a fully collateralized basis by calculating the gap between unencumbered assets and short-term funding + non-core deposits. The approach considers the maketability of securities by applying haircuts to unencumbered assets.

Maturity Mismatch
The approach measures liquidity risk per time period and under different scenarios by mapping balance sheet and off-balance sheet items to a maturity ladder. These items are placed into one of four categories based on whether the amount and/or timing of cash flows are deterministic or stochastic.

4. Continued

(e) Explain how the approach identified in part (d) would improve Larry's evaluation of ABC's liquidity position before and after the acquisition.

Commentary on Question:
Candidates performed poorly on this section. Most candidates only elaborated on the identified approach in general. However, the question asked for explanations of how the improvements are related to ABC and XYZ specifically. .

Cash Capital

- The cash capital approach considers ABC's and XYZ's ability to fund assets on a fully collateralized basis.
- Long term and short term debt are separated in this approach and the inclusion of unencumbered assets addresses the omission of off balance sheet commitments.
- Haircuts are subtracted from the market value of securities in the cash capital approach. Haircuts can be taken off government bonds (small), MBS and corporate bonds.
- Core (long-term, stable) and non-core deposits (volatile, more liquid) are considered separately under the cash capital approach. Other non-bank deposits should be split up in this approach.

Maturity Mismatch

- This approach addresses the missing time dimension from the balance sheet approach.
- Government bonds and callable bonds must be separated: government (fixed-rate) bonds have deterministic cash flow timing and amount while callable bonds have stochastic cash flow timing.
- Non-bank deposits should be split into term deposits (deterministic cash flow timing and amount) and savings deposits (stochastic cash flow timing and amount).

(f)

(i) Identify the main cash flow driver(s) for each of the above cash flows.

(ii) Describe how each driver impacts each cash flow.

Commentary on Question:
Candidates performed poorly on this section. Most candidates did not identify the main drivers correctly.

4. Continued

Loan Prepayments

- Drivers:
  Contractual agreements
  Economic conditions (interest rates).
- Prepayments vary inversely with changes in interest rates (as rates decline, prepayments increase). Contractual agreements determine the timing and volume payments and amount of remaining principal. These items will also impact prepayment volume, as loans just issued and near expiry are less likely to see a prepayment.
- Bank decisions or counterparty confidence should not drive prepayments, assuming the issuing bank is federally insured.

Renewal of CDs

- Drivers:
  Contractual agreements
  Economic conditions (interest rates)
  Counterparty confidence
  Bank management decisions
- Renewal of CDs occurs at the end of the contract. If interest rates are low, customers are less likely to renew unless there are high guarantees. If the issuing bank has credit issues that reduce counterparty confidence, renewals are less likely. The interest rate that a policyholder can earn is set by the bank and will also be a main driver.

Short term funding

- Drivers:
  Economic conditions
  Counterparty confidence.
- As ABC's credit quality declines, so will the amount of funding it can borrow as banks will lose confidence in the firm's ability to pay loans back. During time of poor economic conditions (low interest rates, recession) there is a flight to quality and banks will be reluctant to make funding available.
- The bank's decisions are less impactful than the counterparty confidence when receiving short term funding. Existing contractual agreements (ex CD expirations, loan payments) may determine when funds are available to the bank but shouldn't drive the funding available in the future.

4. Continued

(g) Evaluate qualitatively, for each of the scenarios above, the impact on the following items, post ABC's acquisition:

(i) Net cumulative cash outflow

(ii) Net cumulative cash inflow

(iii) Overall liquidity

Commentary on Question:
Candidates performed very poorly on this section.

Yield curve inversion

Cash Outflows
Customers may start to draw money out of savings to take advantage of higher short term rates. Depending on how long rates stay at the high level, a run on the bank is possible. Customers who purchased a CD are less likely to renew if the yield curve remains inverted.

Cash Inflow
Market value of short term corporate bonds will be lower but coupons can be reinvested at higher rates. The market value of long term government bonds and commercial real estate will increase. The demand for 30 year mortgages may increase with the decrease in long term rates. Similarly, the demand to refinance at these rates could increase prepayments.

Liquidity

- With very little cash flow cushion (using analysis from part b), ABC may not have enough cash on hand to meet the spike in withdrawals. ABC should have no problems securing funding as a large national bank, but short-term borrowing rates have increased. Coupon payments and the simultaneous increase in demand for mortgages and CDs could offset liquidity needs in the immediate term, but problems could exist in the future.
- If short term rates decline over time, coupons will be reinvested at lower rates while the high guarantees of CDs must still be honored. If the inverted yield curve persists, the poor long term outlook for the economy could lead to recession, leading to an increase in mortgage defaults and a flight to quality/short term investments creating potential funding problems for all banks and cash flow mismatch for ABC.

4. Continued

Reduce credit requirements

Cash Outflows
Expected increase in number of loan and loan amount in 3 years, as lower credit quality borrowers will have lower down payments. Increase in the number of CDs sold will increase the cash needed to pay when they become due in 3 years.

Cash Inflow
More CD purchases increase the amount of structured (relatively illiquid) money coming in. Lower credit quality loans have a higher risk of default and payments are at a higher risk in 3+ years.

Liquidity
Without any changes in the marketplace, ABC's short term liquidity needs should be met. In 3 years when loans will be awarded, there will be a need for additional funding which should not be a problem initially for ABC. Liquidity issues could exist in the future if lower credit quality loans begin to default. The shortfall of payments will not only reduce cash inflow but will also call into question the bank's creditworthiness. As a result, customers may choose to withdraw money from ABC.

5. Learning Objectives:

1. The candidate will understand the needs and methods of governing investments.

2. The candidate will understand and be able to apply the components of an effective risk management system.

Learning Outcomes:

(1c) Identify sources of unethical conduct and explain the role of a fiduciary.

(1d) Describe governance mechanisms that attempt to address these conflicts.

(1f) Explain how governance may be structured to gain competitive advantages and efficiencies.

(1g) Demonstrate understanding of how ethics relates to business decision-making, and relate ethics in business to personal ethics.

(2b) Identify and describe the various kinds of risks, including market, credit, operational, etc.

(2c) Identify and describe various approaches for managing risks including risk budgeting, position limits, etc.

Sources:

Financial Enterprise Risk Management, Sweeting, 2011 Ch 1: An Introduction to ERM (pg. 6-7)

QFII-101-14: Chapter 11 of Strategic Management: An Integrated Approach, Hill & Jones (pg. 390-391)

QFII-101-14: Chapter 11 of Strategic Management: An Integrated Approach, Hill & Jones (pg. 399-401)

Managing Investment Portfolios, Maginn & Tuttle Ch. 9: Risk Management, sections 1¬4 and 6 (pg. 587-596)

Commentary on Question:

This question was intended to test the candidates knowledge of appropriate governing practices and ethical issues along with their ability to identify financial risks in an applicable scenario.

Candidates generally did well on parts b) and c). In part a) candidates struggled to provide enough detail in their response. In part c), most candidates struggled to provide an adequate explanation of how the loan changes the financial risks.

5. Continued

Solution:

(a) Evaluate each bullet point from an ethics and/or governance perspective.

Commentary on Question:
In part a), candidates generally did not provide the level of detail that graders were looking for. In order to receive full credit, candidates were expected to provide several comments for certain bullets where multiple ethical and governance issues were present. Candidates were expected to point out examples of both positive and negative governances/ethical practices. Many candidates only provided one comment for each bullet point.

1st Bullet

- The low labor costs enabled by poorly enforced labor laws is unethical

2nd Bullet

- It is good governance that the Chairman and CEO are different people
- It is good that the CRO is on the board
- It is bad that the Chairmen and CEO have close family ties so they are unlikely to be independent
- It is bad that the Chairmen is also the CRO – the Chairmen should not be an inside director

3rd Bullet

- Rewarding a former regulator who helped the company with a position on the board could be seen as a form of corruption which is unethical
- The Board is very small so there are less perspectives and expertise at hand
- The Chairmen should avoid nominating outside directors to the board since that board member will be inclined to side with the Chairmen. Outside directors should be nominated by shareholders.

4th Bullet

- Having outside directors on the board is a good governance practice.
- Its questionable whether these directors have enough knowledge of the gold industry to be effective as board members.
- Appointing board members with strong environmental track records is good from an ethics perspective.

5. Continued

5th Bullet

- It is good that the compensation committee doesn't include inside directors.
- One of the outside directors on the compensation committee was nominated by the Chairmen so he is unlikely to be impartial.
- The board should include an audit committee which consists of outside directors.
- The board should include an appointment committee which consists of outside directors.

(b) Compare and contrast the financial risks in each strategy.

Commentary on Question:
Candidates generally did well on this part of the question. In order to receive full credit, candidates had to describe the different financial risks between the two strategies rather than simply list them.

Market Risk

- Both Strategy 1 and 2 have foreign exchange risk since future P&I must be converted back to USD
- Both Strategy 1 and 2 have interest rate risk since the future cash flows of both investments are fixed and the price will change in response to changes in interest rates.
- Strategy 1 has commodity price risk since firm ABC's profitability and ability to repay the loan is highly linked to gold prices.

Credit Risk

- Strategy 1 has higher credit risk than strategy 2 since an unfavorable business outcome could result in firm ABC's inability to repay the loan.
- Strategy 2 still has some credit risk in the even the government defaults on its debt; however this is very unlikely. This is known as sovereign risk.

Liquidity Risk

- Strategy 1 has more liquidity risk than strategy 2.
- Trading volume on the loan to ABC is very low and it will be difficult to sell the loan to ABC if a liquidity need comes up.
- Government bonds are traded in deeply liquid markets and should be easy to sell if a liquidity need comes up.

5. Continued

(c) Describe how introducing the swap changes the financial risks in strategy 1.

Commentary on Question:
Candidates generally did well on this part of the question. In order to receive full credit candidates needed to include the following three points.

Entering the swap eliminates FX risk (market risk) since the firm receives interest in USD.

Entering the swap introduces interest rate risk since future interest payments are linked to an uncertain floating rate.

Entering the swap introduces counterparty credit risk with the bank who owns the opposite leg of the swap.

(d) Explain how the loan changes the financial risks of strategy 2.

Commentary on Question:
Candidates needed to explain the concept of leverage and how it could be good and bad for the firm. Most candidates struggled with this part of the question.

The loan introduces leverage which increases XYZ's exposure to the underlying risks. This can potentially increase XYZ's returns if exchange rates remain at their current levels or move favorably. It can also increase XYZ's losses if exchange rates move unfavorably. XYZ exposure to losses would also be higher if JLK were to default on its sovereign debt.