QFI IRM Model Solutions
Fall 2018

1. Learning Objectives:

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

Learning Outcomes:

(3a) Evaluate a company's or a portfolio's exposures to various risks.

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

Sources:

Maginn and Tuttle, Chapter 9.5

Risk^2: Measuring the Risk in VaR

Commentary on Question:

This question aims to test candidates' understanding of Value at Risk (VaR): different calculation methods, testing, and alternative measures. Overall, candidates performed well on this question, but many struggled with part (f). Further commentary is listed underneath each question component.

Solution:

(a) Calculate the 5% weekly VaR for this portfolio using the variance-covariance approach.

Commentary on Question:

The candidates performed well on this question. Some candidates did not correctly convert the given monthly assumptions to weekly assumptions.

Monthly Portfolio Return $= .5(.85\%) + .5(.95\%) = .9\%$

Monthly Portfolio Standard Deviation $=$

$\sqrt{.5^2(3.2\%)^2 + .5^2(5.26\%)^2 + 2(.5)^2(3.2\%)(5.26\%)(.35)} = 3.5246\%$

Weekly Portfolio Return $= (.9\%)\left(\frac{12}{52}\right) = .2077\%$

Weekly Portfolio Standard Deviation $= (3.5246\%)\sqrt{\frac{12}{52}} = 1.6931\%$

5% Weekly VaR $= .2077\% - 1.645(1.6931\%) = 2.5775\%$

In terms of dollars, the 5% Weekly VaR is $(\$200\ million)(2{,}5775\%) = \$5.155\ million$

1. Continued

(b) Calculate the 5% weekly VaR using the Monte Carlo approach.

Commentary on Question:
The candidates performed well on this question. Most candidates received full or partial credit. Some candidates identified the 95th simulation rather than the 96th.

$$(5\%)(100\ simulations) = 5th\ worst\ simulation = \$5.1\ million$$

(c) Compare and contrast the Monte Carlo and variance-covariance approaches to computing VaR.

Commentary on Question:
Candidates performed well on this question. Most candidates were able to identify differences between the Monte Carlo and variance-covariance approaches. Some candidates did not state similarities between the two approaches. Candidates frequently wrote their responses in terms of pros and cons of each rather than similarities and differences.

Similarities:

- Both techniques must assume an underlying distribution

Differences:

- Variance-covariance assumes a normal distribution, which makes it unsuitable for complex portfolios containing options, etc.
- Monte Carlo is flexible in that it can simulate many distributions and is more suitable for complex portfolios
- Monte Carlo requires significantly more computational power

(d) Recommend a more appropriate measure of the tail risk from the list above. Justify your choice.

Commentary on Question:
Candidate performance varied on this question. Most candidates were able to provide a clear recommendation and explain how the recommended measure was a more appropriate tail risk measure. However, many candidates did not address the specific concerns about back testing results.

For a 5% VaR, we would expect the actual weekly portfolio losses to exceed $6.1 million about 2.6 times per year. The back testing results indicate that our VaR measure is accurate, but the manager's concerns are still warranted as the losses that do occur are double the VaR estimate, indicating that the distribution has large tail risk.

1. Continued

CTE would be a more appropriate measure of tail risk than VaR because it measurers the expected loss in excess of VaR.

Stress testing can identify specific scenarios that would lead to large losses, but it lacks an associated probability measure.

Copulas can be useful in calculating a dependency structure between risks. However, the most commonly used copula, the Gaussian copula, does not adequately model extreme events.

(e) Critique your colleague's statement.

Commentary on Question:
Candidate performance varied on this question. Many students failed to specifically address the statement, which focused on the frequency of times that the VaR was exceeded in recent years. Most candidates who did refer to the statement did well.

Your colleague is correct in that the number of instances VaR is exceeded each year seem inconsistent. However, a single year is relatively small amount of data points. Over two years, 5 instances in 104 weeks is in line with expectations.

It is reasonable to see some variability in the losses over a shorter period of time. We should expect the results to be closer to expectations as the sample size increases. Your colleague is likely being too quick to dismiss VaR as a reliable risk measure from this sample alone.

(f)

(i) Explain the reasonableness of the back testing results.

(ii) Recommend two improvements to estimate VaR.

Commentary on Question:
Candidates performed poorly on this question. Many candidates failed to clearly justify their recommendations.

(i) Back testing the estimate for VaR with a 95% confidence interval, one would expect the weekly VaR to exceed the upper band approximately once per year $\left(52 * \frac{5\%}{2} = 1.3\right)$. Because the weekly VaR fell outside of the interval three times, the VaR estimate might not accurately reflect the risks faced by the portfolio.

1. Continued

(ii) Recommendation #1: the firm should reevaluate the assumptions used to create the VaR estimate. The assumptions used may not be valid as the portfolio or the market conditions change over time. Regularly revisiting the assumptions used should correct this problem.

Recommendation #2: the firm should supplement VaR wit stress testing or scenario analysis. By looking at specific situations that create large losses, the firm will get a more complete picture of extreme events.

2. 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:

(1a) Compare the interest of key stakeholders.

(1b) Explain principal versus agent conflict.

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

(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.

Sources:

"Advances in Risk Management and Risk Governance" by L. Rahl

"Stategic Management: An Integrated Approach" by Hill & Jones Ch 11

"Investment Ethics" by Peck Ch 7

"Financial Enterprise Risk Management" by Paul Sweeting Ch 1

"Managing Investment Portfolios" by Marginn & Tuttle Ch 9

Commentary on Question:

Overall, candidates' performance varied on this question. Candidates performed well in parts b, d, and e, but performed poorly on parts a and c.

Solution:

(a) Explain three restrictions you would impose on the Xander family's participation on the board and its committees to facilitate effective board governance.

Commentary on Question:

Candidates performed poorly on this question. While most candidates were able to list or describe general considerations, few were able to identify three distinct and specific restrictions to the Xander family's participation on the board and provide clear explanations or rationale.

2. Continued

Restriction 1: Xander family members should not be chairman of the board.
The chairman of the board controls the agenda and is best filled by independent directors to preserve the board's independence.
Restriction 2: The Xander family should not dominate the board's membership. For the board to effectively executive its governance function it needs to maintain sufficient independence from management. The majority of the board members should be independent directors.
Restriction 3: No Xander family members should be on the Compensation, Nominating, and Audit committees.
The compensation committee structures compensation contracts for the CEO. The audit committee hires the independent auditor, makes recommendations on non-audit services, and evaluates internal controls. The nominating committee makes recommendations for new directors to be elected to the board. Independent directors with relevant experience should be appointed to these important committees. The Xander family members would have inherent conflicts of interests in being on these committees (e.g. structuring their own compensation).

(b)

(i) Assess each statement.

(ii) Recommend improvements where applicable.

Commentary on Question:
Candidates performed well on this question. Some candidates failed to provide adequate responses that address the correct, incorrect, and partially correct parts of the statement. Some candidates failed to explain the rationale for their assessments or provide clear recommendations.

Statement 1: This statement is not correct.

Rationale: Boards that are too big can be ineffective. In larger boards, individual board members are less likely to take responsibility. It also can be difficult to develop board consensus and efficient decision-making.

Recommendation: Have a board size of 6-10 members. Boards with this number of directors appear to be associated with firms having higher firm values.

Statement 2: This statement is partially correct.

Rationale: A certain level of board turnover is healthy to prevent entrenchment, but too much turnover can make it difficult for the board to be effective. For example, it can take a while for directors to get up to speed on board matters.

Recommendation: Increase the term limit to 3-5 years.

2. Continued

Statement 3: This statement is partially correct.

Rationale: While it is good to focus on having outside directors, individuals who have backgrounds in finance or accounting tend to be more proficient directors. The management team is often judged by accounting performance and can have incentives to manipulate earnings. Directors who have sufficient expertise to see through management's manipulation are likely to be better monitors.

Recommendation: Change focus to having outside directors with backgrounds in finance or accounting.

Statement 4: This statement is correct

Rationale: Individuals who serve on many boards make poor monitors as they may be overcommitted.

(c) Develop a stakeholder impact analysis on stockholders and customers.

Commentary on Question:
Candidate performed poorly on this question. Many candidates failed to clearly identify the key aspects of a stakeholder impact analysis and a minority of candidates who did identify the key aspects failed to perform an analysis.

- Identify stakeholders' interests and concerns:
  Stockholders are interested in the company's profitability while the customers are mostly interested in the quality and the affordability of the company's products.
- Identify what claims stakeholders are likely to make on the organization:
  Stockholders will ask the firm to maximize their profit while customers will ask the firm for high quality and affordable products.
- Identify the stakeholders who are most important from the organization's perspective: Customers and stockholders should be equally important.
- Identify the resulting strategic challenges:
  The stakeholders have contradictory claims. The highest quality product might decrease the profit margins and hence decrease stockholders' value. The challenge for the organization is to find the middle ground where both stakeholders are satisfied.

(d) List the steps of an effective ERM system.

Commentary on Question:
Candidates performed well on this question. This was a retrieval question and most candidates successfully recalled and listed key steps from one of the syllabus readings.

2. Continued

1. Assess the context in which the framework is operating
2. Create a consistent risk taxonomy
3. Identify risks to which the organization is exposed
4. Implementation
5. Monitor
6. Documentation
7. Communication

(e) Explain the potential shortcomings of each interaction model

Commentary on Question:
Candidates performed well on this question. Nearly all candidates demonstrated understanding of the interaction models and were able to identify a shortcoming for each. The best responses provided clear explanations linking the degree of interaction between the lines of defense to a potential shortcoming, instead of merely identifying or listing a potential shortcoming.

1. Offence and Defense Model
This model sets the first line and the CRF in opposition. First-line units have no incentive to consider risk in their decision-making, since they view it as the CRF's role, which may lead to excessive risk-taking. Meanwhile, the CRF may only focus on minimizing all risk-taking.

2. Policy and Policing Model
This model has very little direct interaction between the CRF and first-line units. The CRF may become too detached to be effective—the model can be too "hands off."

3. Partnership Model
This model has the CRF and first-line units working very closely. This could lead to a situation where the CRF becomes too involved with the first-line units and loses the ability to independently assess and manage the risks within those units.

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:

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

(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:

"The Top Ten Operational Risks", Miller

Chapter 11 of Strategic Management: An Integrated Approach, Hill & Jones

Chapter 3 of Investment Ethics, Peck

Chapter 8 of "Financial Enterprise Risk Management", Sweeting

Chapter 9 of "Managing Investment Portfolios", Marginn & Tuttle

Commentary on Question:

Overall, candidates generally performed poorly on this question.

Solution:

(a) List five of the top ten operational risks according to Miller.

Commentary on Question:

Candidate performed well on this question. This was a retrieval question.

- complacency
- blind leading the blind
- novices, apprentices, and soloists
- dropped batons
- naïve reliance on technology

3. Continued

(b)

(i) Evaluate each statement in terms of operational risk management.

(ii) Recommend one improvement for each deficiency identified in part (i).

Commentary on Question:
Candidates performed poorly in the second part of the question. Item 3 included both good and bad aspects, and some candidates failed to evaluate both parts. Candidates struggled to recommend improvements.

(i)

- Having the trade desk forward trade confirmations to investment operations is a bad practice.
- Giving new employees workflow documentation for onboarding is good.
- Having an up-to-date system with the latest software releases from the vendor is a good practice. However, passing the information to many other downstream systems in the company is a bad practice since it introduces difficulties in maintaining those systems in response to the vendor software updates.
- Having a specialized team for each type of derivative instrument is a bad practice.

(ii)

- For bullet 1, investment operations should receive trade confirmations directly from counterparties so the trading desk and investment operations are independent.
- For bullet 3, the company should try to reduce the number of downstream systems relying on the vendor software in order to minimize maintenance issues related to frequent software updates.
- For bullet 4, the company should merge these teams together in order to reduce key person risk.

(c) Identify the type of unethical behavior displayed by XYZ's competitor.

Commentary on Question:
Candidates performed well on this question.

The type of unethical behavior displayed by XYZ's competitor is information manipulation.

3. Continued

(d) Describe four possible causes for this unethical behavior.

Commentary on Question:
Candidates performed well on this question.

- The employees are not aware of doing anything unethical resulting from a failure to ask themselves whether their actions are ethical.
- Unrealistic performance goals that can only be achieved through unethical behavior
- The employees' personal sense of ethics may be lacking.
- Unethical leadership sets a bad example for others

(e)

(i) Evaluate each of XYZ's practices described above.

(ii) Recommend one improvement for each deficiency identified in part (i).

Commentary on Question:
Candidates performed poorly on this question, particularly on the third statement. Although many were able to explain why the given historical period is inappropriate, few were able to recommend an appropriate alternative.

(i)

- Providing the benchmark return is good, but it doesn't provide the full picture without also considering the risk.
- Identifying the fund manager and key investment team members in communications to clients is good, since the performance of the fund directly relates to how skilled the team members are.
- This historical period chosen does not represent a full market cycle since the end points selected are neither both peaks nor both troughs. This is a bad practice.

(ii)

- For item 1, provide benchmark risk to the client.
- For item 3, the returns from N-5 to N-1 should be used because this captures a full market cycle from trough to trough. The returns from N-7 to N cannot be used because the values immediately beyond those points are unknown, so it is unknown whether N-7 and N are troughs or peaks.

3. Continued

(f)

(i) Critique Susan's risk register entry for the fund.

(ii) Recommend improvements for the deficiencies identified in (i).

(iii) Identify six additional pieces of information that should be present in this entry.

Commentary on Question:
Candidates performed poorly on this question. Many left the entire question or parts of this question blank. Among the candidates that answered the question, candidates were typically able to identify the risk identifier, risk category, and frequency of review as wrong and provide a recommendation. Candidates performed poorly on (iii).

(i)

- For item 1, risk identifiers should not be used more than once.
- For item 2, the type of non-operational risk should be specified.
- For item 6, more specifics about the characteristics of the option should be identified.
- For item 7, this is not frequent enough of a review, especially since the guarantee period is less than this.

(ii)

- For item 1, each risk identifier should be unique.
- For item 2, the risk category should be equity risk.
- For item 6, more specific information should be included such as type of option purchased or maturity.
- For item 8, David should be the risk owner because he is the fund manager.

(iii)

- Severity of the risk
- Exposure period of the risk
- Clear description of the risk
- Linked risks
- Residual risks
- The cost of the risk response

4. Learning Objectives:

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

Learning Outcomes:

(3a) Evaluate a company's or a portfolio's exposures to various risks.

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

Sources:

Risk Management: Foundations for a Changing World, Haslett, 2012 – Ch. 2 & 14

Commentary on Question:

Candidates performance varied on this question. The question was testing the candidates' ability to calculate and interpret risk measures for a portfolio, with a focus on tracking error, effective duration and spread duration. It also asked the candidate to evaluate changes in risk measures when portfolio adjustments or changes to the environment took place.

Solution:

(a) Describe the four ingredients for an effective risk management group.

Commentary on Question:

Candidates performed well on this question.

Culture: the "language" of risk, from sounds of hiring process to the risk-reward policies in place

Data: sufficent variety and quantity of data to increase model flexibility

Technology: the system that captures, analyzes and distribution risk information

Process: puts in place responsibilities, risk limits and procedures

(b)

(i) Calculate X and Y in the table above and interpret your results.

(ii) Calculate Z and explain its attribution among risk factors by asset class.

(iii) Explain whether the projected results meet your client's risk objective.

Commentary on Question:

Candidates performed poorly on this question. Many candidates did not correctly calculate and interpret results in part (i).

4. Continued

(i) X = 0.11 -0.01 +0.03 = 0.13

The duration gap is positive 0.13 years, meaning the portfolio is slightly longer than the benchmark

Y = 0.00 – 0.03 + 0.35 = 0.32

The spread duration gap is positive 0.32 years. This gap means that spread instruments are overweighed in the portfolio and a significant contributor to the duration gap.

(ii) Z = 0.41 + (-0.05 – 0.03) + (0.08 + 0.43) = 0.84

The predicted tracking error for this portfolio is 84 bps. The interest rate component accounts for 44 bps of error while the spread component accounts for the remaining 40 bps.

(iii) No, the risk objective is not met since the predicted error of 84 bps exceeds the objective of 75 bps

(c)

(i) Describe the expected impact on tracking error for each adjustment.

(ii) Recommend one adjustment to best satisfy the risk objective.

Commentary on Question:
Candidates performed poorly on this question. Many candidates did not consider the ex-ante model results when describing the impact on tracking error in part (i). For part (ii), many candidates did not adequately support their recommendation.

(i)

1. Moderate reallocation from Treasury Securities to MBS

Ex-ante results
Treasury Securities will be further underweighted and MBS will be more overweighed. The duration gap due to Treasury Securities should increase with this change, which will increase the IR contribution to tracking error. MBS does not contribute significantly to tracking error.

4. Continued

Correlation matrix
The slightly negative correlation suggests that some additional spread exposure could offset interest rate exposure slightly.

Tracking error should slightly increase.

2. Slight reallocation from Industrial Bonds to Treasury Securities

Ex-ante results
Slight reallocation to Treasury Securities should bring the relative weight closer to benchmark and thus reduce the duration gap. This will reduce the interest rate contribution to tracking error. Minimizing duration gap should be a priority over spread duration gap, since the contribution to tracking error is less sensitive to spread duration gap than duration gap.

Correlation matrix
The negative correlation implies that some of the interest rate contribution to tracking error will be offset by spread exposure.

Tracking error should decrease.

3. Significant reallocation from Industrial Bonds to Treasury Securities

Ex-ante results

A significant reallocation to Treasury Securities would reduce the overweighting of Industrial Bonds relative to the benchmark but would overweight Treasury Securities, as well. Reducing overweighting to Industrial Bonds will reduce the spread duration gap. However, Treasury Securities are a significant contributor to tracking error and so an overweighting could introduce more tracking error through interest rate marginal contribution

Correlation matrix
Some of the expected increase in tracking error due to the duration gap will be mitigated by the negative correlation between Treasury Securities and Industrial Bonds.

Tracking error should increase.

4. Continued

(ii)

Slight reallocation from Industrial Bonds to Treasury Securities is recommended.

The high historical volatility of Treasury Securities causes slight changes in the duration gap to cause more significant contributions to tracking error. As a result, only slight reallocations to T-Bond should be made from Ind Bonds.

(d) Describe two reasons why tracking error should not be used as a standalone risk metric to address your client's market crash request.

Commentary on Question:
Candidates performed well on this question. Most candidates were able to name and describe two reasons. Below are two acceptable answers.

Tracking error does not give insight into the tail events, it assumes normal distribution of returns

Tracking error is relative to the benchmark chosen and will not identify if benchmark is suitable for the needs of the client.

(e)

(i) Interpret the stress test results.

(ii) Determine which test better addresses your client's request.

Commentary on Question:
Candidates performed well on this question. The majority of candidates who did not receive full credit did not explicitly mention profitability and volatility in their answers.

(i)

Financial Crisis
The impact of widen spreads causes a slight decrease in profits and the falling interest rates have a significant negative impact on profitability. The net impact to the portfolio is -21%.

Portfolio moved nearly 3 standard deviations in 6 months, indicating a large increase in volatility over that timeframe.

4. Continued

Prolonged Recession
While the impact to spread increases profitability, the impact from interest rates decreases profitability. The net impact is a 2% decrease in profitability.

The portfolio moved just over 1 standard deviation over 2 years. This is a significant increase in long term volatility, but more manageable especially considering the longer time horizon.

(ii)

Financial Crisis is a 1 in 400-year event (0.10%) and involves a market crash, so it meets both criteria set forth by your client.

(f) Identify two ways that you could hypothetically use to improve reported results for the client.

Commentary on Question:
Candidates performed poorly on this question.

Showing results based on strategies that do not line up with what the clients want to do (ex. the portfolio has hidden options or leverage that the client clearly does not plan to include).

Review different calculations of averages (ex. weighted average, simple average, equally weighted averages) and only show results that are favorable.

5. Learning Objectives:

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

Learning Outcomes:

(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.

(2f) Examine examples of risk management failure.

Sources:

Financial Enterprise Risk Management - Chapters 7, 8 and 20
Maginn - Chapter 9, questions 1-4
Paul Wilmott Introduces Quantitative Finance, 2nd Edition, 2007 - Chapter 26

Commentary on Question:

Overall, candidates performed well on this question.

Solution:

(a) Describe two financial risks (other than interest rate risk) to which ABC is exposed.

Commentary on Question:

Candidates performed exceptionally well on this question. Most candidates were able to describe two appropriate financial risks. Some candidates listed a risk without describing it, or described a non-financial risk. Candidates were expected to describe the risk in the context of the question.

Several financial risks were acceptable for full credit, two are described below. Interest rate risk was not an acceptable answer.

Credit risk: risk of bank failing to make a payment

Liquidity risk: risk caused by the inability to sell swap without a significant concession in price, due to market's inability to accommodate this transaction efficiently.

(b) Describe two nonfinancial risks to which ABC is exposed.

5. Continued

Commentary on Question:
Candidates performed exceptionally well on this question. Most candidates were able to describe two appropriate non-financial risks. Some candidates listed a risk without a description. Candidates were expected to describe both risks in the context of the question.

Several non-financial risks were acceptable for full credit. Two are described below:

Operational risk: the risk of loss from failures in the company's systems and procedures

Regulatory risk: the risk associated with the uncertainty of how the swap will be regulated.

(c) Calculate the potential loss over the remaining 9 years.

Commentary on Question:
Candidates performed slightly poorly on this question. Many candidates were able to compute each component of the swap correctly, including the final potential loss figure. Some candidates made calculation errors or ignored the 9-year component of the question.

Payments made by the bank:
$525 million × 9 years × 1.00% × max((100 ×(1.50%+1.50%))/(2.00%)-80,0) = $3,307.5 million

Payments made to the bank:
$525 million × 9 years × 4.00% = $189 million

Potential loss:
3,307.5 – 189 = $3,118.5 million

(d) Describe two key drivers of the Space Shuttle Challenger failure that also apply to entering the proposed swap.

Commentary on Question:
Candidates performed well on this question. Many candidates were able to apply the errors made with the Space Shuttle Challenger failure to the details of the case. Some candidates were unable to provide sufficient details for two separate drivers of the failure.

5. Continued

Managers' perception of risk was flawed

- Although a low probability of failure was reported, the severity of any failure was not properly considered
- ABC is not testing the worst outcome of the swap transaction, i.e., negative movements in Treasuries should be considered

Managers chose to ignore the warnings that conflicted with their aims

- This was done to increase profits
- Interest rates may change soon, especially in the current low-rate environment

(e) Explain the advantages and disadvantages of Ted's suggested risk identification techniques.

Commentary on Question:
Candidates performed exceptionally well on this question. Most candidates were able to state both an advantage and disadvantage of each technique.

Brainstorming
Advantage: not all members need to be an expert
Disadvantage: free rider problem could arise with some individuals failing to contribute

Interview
Advantage: if answer is unclear, clarification is immediate
Disadvantage: question framing could influence how respondents answer the question

Delphi
Advantage: more flexibility than a normal survey
Disadvantage: very time consuming

(f) Explain how ABC is exposed to risk in each derivative strategy.

Commentary on Question:
Candidates performed poorly on this question. Most candidates answering this question were able to identify at least one of the risks, but only some candidates were able to sufficiently identify and describe both of the risks.

1. Interest rate risk - ABC is subject to the risk of loss from a rise in interest rates. If interest rates rise, ABC could experience losses due to the floating rate. The use of leverage further magnifies this risk.

5. Continued

2. Basis / Hedging Mismatch risk (either acceptable) – 3-month futures and 15-year forwards exposes ABC to this risk since these instruments are not perfect hedges. Futures contracts are marked-to-market and forwards are not. Also, additional margin payments may be required for futures contracts that are not required for forwards.