CFE SDM Model Solutions
Spring 2014

General Commentary on the Exam:
The primary goal of the CFE track and SDM is to develop the candidates' critical thinking skills in the risk management space to prepare them for a career path (not just their current job or next job). The Fall 2013 Model Solutions provided guidance in constructing and framing responses to exam questions. They also provided an indication of how syllabus material might be tested. In particular, the preface was written expressly towards that purpose in the hope that candidates would read and heed its advice.

First, we provide the Fall 2013 preface in its entirety.

> *Many candidates struggled with higher level Analysis and Knowledge Utilization cognitive questions. Weaker candidates often used an approach that could be described as "list as many facts or as much information as possible." In many cases the information had little relevance. In general, they provided a "list" of information from the syllabus material or from general knowledge without connecting the information. They struggled to apply the information in the context of the question and/or failed to recognize which items from this "list" were applicable in the context of the question. A list of statements, whether factually correct or not, is not a substitute for analysis, evaluation, application, and utilization nor does a list demonstrate critical thinking.*
>
> *Stronger candidates selected information pertinent to the context of the question and connected the information to formulate and support positions. Stronger candidates were able to demonstrate a deeper understanding of the syllabus material by exploring relationships, providing cause and effects, assessing risk factors and impacts, linking factors and decisions to strategy, etc.*
>
> *Several questions sequentially asked candidates to consider a question for companies in general, for an industry, for one of the case study companies (e.g., in parts (a), (b), and (c)). Weaker candidates tended to answer all parts at a general level often relying on general knowledge and resorting to lists without providing connections. Stronger candidates were able to differentiate between general situations and context specific situations. Stronger candidates were able to cite and link specific items from the case study.*

As a result some candidates on the Spring 2014 exam used words such as 'because' and 'since,' but the arguments were vacuous or circular. Examples of weak responses include:

xyz method is better because it is better

a > b. *No possible causes or reasons why were provided*

It depends (*when the question asked for a recommendation*)

A list of many facts/reasons without an exploration of how the facts related to each other, how the facts were related to the context of the question/issues, whether it was a pro or a con, whether it was material or immaterial, or assessing a quantitative/qualitative impact (direction and/or magnitude), etc.

We should do ____ because it's a good thing to do

Weaker candidates seem to be under the impression that the quantity of response is more important than the strength of the response, construction of the arguments, the framing and presentation of the responses, and quality of explanations. The Exam Committee is aware that advice often has been provided to candidates that when they do not know an answer or even when they do know an answer to write down everything they know. The advice is based on a candidate receiving points if they happen to write down a 'key word or phrase' that appears in the answer. We strongly advise candidates to ignore this advice.

We prefer a few well thought out paragraphs getting at the essence of the issue versus five run-on pages of related but non-pertinent facts. Many of the questions do not have 'one' right answer and are not black and white. Instead there is a spectrum of acceptable answers. Take a position and convince us. **The points provided must be valid *AND* the reasoning sound.** We are looking for candidates to persuade us in regards to an analysis, a proposal, recommendation, or course of action. Weak candidates attempt to list as many *what's* but omit *why's*, justifications, or explanations. If a recommendation has an obvious or not so obvious concern that the recipient (e.g. CEO/CRO/CFO) would raise, your assessment should address it.

If the question is based on the Case Study, support/justifications for answers should include specific Case Study content. If a question has a chart of numbers and the question asks for an analysis, stating a > b is not an interpretation or analysis. Imagine a CFO explaining earning results to the CEO and the analysis is "earnings are up for the quarter", or a CRO saying the company should enter (exit) this market with the statement "it is (is not) a good market" *and no further explanation is provided*. It is difficult to imagine that would be acceptable or persuasive. In several questions, the question or Case Study may not have all the pertinent information. This mirrors reality. Companies and managers still have to make decisions

1. Learning Objectives:

3. The candidate will understand best practices for ERM processes and Capital Management and their use in setting a risk-return strategy.

Learning Outcomes:

(3a) Explain ERM principles and frameworks.

- Describe the best practices and frameworks for ERM processes under various industry forums and regulatory guidelines and standards.
- Explain the principles driving the direction of new regulation and industry standards in risk governance.
- Describe the components of a risk appetite statement. Design and develop a risk appetite statement and risk return strategy.

Sources:

Strategic Management: Competitiveness and Globalization, Concepts, Hitt, Michael, Ireland, Duane, and Hoskisson, Robert, 10th Edition

Commentary on Question:

Most candidates did well on this question, particularly on the recall type questions. Candidates who received full credit tailored their responses to the Frenz case study, the current board's specific weaknesses, and its current needs in terms of new board members.

Solution:

(a)

(i) Describe the characteristics of the three groups.

(ii) Classify each member of the current Frenz's Board of Directors into one of the three groups.

Commentary on Question:

Part (i) was a recall question. For part (ii), candidates had to correctly classify all of the current members of Frenz's Board of Directors. Candidates consistently did very well on this question. Most received full credit.

1. Continued

(i) Insiders – current top-level managers (e.g. CEO, CFO) who are involved in the company's day-to-day activities.

Related outsiders – individuals who are not involved in the day-to-day operations of the company, but they do have a relationship with the company that calls into question their independence.

Outsiders – individuals who are independent of the firm in terms of day-to-day operations and other relationships.

(ii) Insiders - Julien Jacobs, David Gillet, and Vincent Jansen
Related Outsiders -Gilroy Clyde and Oliver Collignon
Outsiders - Felix Hermans, Fred Coppens, and Abram Lemaire

(b) Describe four ways an organization can enhance the effectiveness of its board of directors.

Commentary on Question:
Part b is a recall question, though other reasonable responses were accepted. Many candidates received full credit.

1) Increase the diversity of its board members.

2) Establish and consistently use formal processes to evaluate the board's performance.

3) Modify the compensation of the directors. Especially consider reducing or eliminating stock options as part of their package.

4) Create a "lead director" role that has strong powers with regard to the board agenda and has oversight of non-management board member activities.

(c) Explain three weaknesses in the composition of the current Frenz's Board of Directors.

Commentary on Question:
Many candidates were able to list several weaknesses in the board composition. Those candidates that provided well-thought out weaknesses that were specific to the Frenz board received full credit.

1) Three of the eight members of the Frenz board are insiders who hold top-level manager positions within Frenz. Two of these are members of the audit committee. This can lead to relatively weak monitoring and control of managerial decisions.

1. Continued

With weak board monitoring, managers sometimes use their power to select and compensate directors and exploit their personal ties with them.

2) Fred Coppens is a potential conflict of interest. If Frenz's product offerings overlap the offerings of Vedegu, he could influence management decisions or the annual strategic plan to the detriment of Frenz or to the benefit of Vegedu. His actions may go against the interests of the shareholders.

3) There is a lack of diversity in board members. Few members are from outside of Europe, and there is only one woman on board. There is also no board member with risk management experience.

(d)

(i) Critique each candidate on the Nominating Committee’s short list.

(ii) Recommend Fred Coppen’s replacement. Justify your recommendation.

Commentary on Question:
To receive full credit, candidates needed to assess each potential board member, including the qualities of that board member and whether those qualities would be a good fit for the specific interests and needs of the Frenz board. Candidates also needed to provide a clear recommendation that was supported by their assessment.

(i) André Geisinger
Pros: He is an outsider, and they need more outsiders on the board.
Cons: He offers a similar background to the replaced board member (Fred Coppens). He does not increase diversity nor does he remove the conflict of interest regarding the chocolate company.

Rupert Edwards
Pros: He offers a diverse financial background, and he is non-European.
Cons: There are already too many insiders on the board.

Don Benito
Pros: He offers a legal and risk management background that is not present on the current board. He is a retired outsider and has a Latin-American background.
Cons: He is not a female and does not fill this void in the current board.

Olivia Kurtz
Pros: She has a diverse financial background, including experience with the hotel industry. Frenz is looking to build relationships with the hotel industry. She adds a female to the board.

1. Continued

Cons: There are already too many CEOs on the board.

(i) Recommendation:
I recommend Don Benito to replace Fred Coppen. He offers a legal and risk management background that is currently not present on the board and is much needed. He has experience in Latin America where there is significant growth potential for Frenz. He is retired, and there is currently no other retired member on the board. He adds another outsider to the board, which Frenz also needs. These qualities make him an ideal fit for Frenz's current strategy.

2. Learning Objectives:

4. The candidate will understand organizational behavioral concepts and apply strategic management frameworks to corporate financial and ERM business problems.

5. The candidate will understand the decision making process and the lessons learned from the risk taking activities and experiences of other organizations. In particular, the candidate will be able to apply the learning objectives of all the prior sections of the syllabus to the risk management principles embodied within the case studies explored in this section.

Learning Outcomes:

(4b) Evaluate and apply the concepts of strategic management, recognizing the factors that affect the development and implementation of strategies.

- Demonstrate the importance of analyzing the firm's external environment and the internal organization.
- Define types of business-level strategies and recommend an appropriate business-level strategy for a given situation.
- Explain the impact of competitive dynamics on strategic management.

(5c) Assess the risk of the status quo alongside any other risky and or risk management decision.

Sources:

SDM-138-14: When and When Not to Vertically Integrate

Commentary on Question:

The goal of this question is to have the candidate demonstrate that they understand what vertical integration is, the pros and cons of vertical integration (when and when not to use it), and some alternatives to vertical integration that may be superior in certain situations. Part (a) assesses the candidate's knowledge of vertical integration and its alternatives. Part (b) asks the candidate to apply this knowledge to the hypothetical Frenz corporation's strategic growth plans. Part (c) asks the candidate to recommend a strategy for the Frenz corporation based on their analysis. The solution provided below is one alternative, as supporting vertical integration could also receive full credit as long as the analysis supported this recommendation.

Solution:

(a) Describe each of the six considerations.

Commentary on Question:
Most Candidates did well on part (a) as it asked them to recall and describe items directly from the study notes.

2. Continued

Vertical Market Failure

- Vertical Market Failure can exist when there are few buyers and sellers, high asset specificity, durability and intensity, and frequent transactions.

Companies in Adjacent Markets

- Occurs when one stage of the industry chain is experiencing abnormally high returns, so it appears attractive to enter that stage.
- Should consider that entrants outside of the industry chain would also be attracted and ensure that entering this stage the acquisition price is lower than the economic surplus would create.

Raising Barriers to Entry / Price Discrimination

- Vertical integration may cause potential new entrants to enter all stages of the industry chain to compete, thus raising barriers to entry.

Growth or Declining Market

- In a young or growing market, a company may need to forward integrate to create sales for its products.
- In a declining market, a company may need to back-fill gaps left by other companies exiting the market.

Spurious Reasons

- Spurious (invalid) reasons for vertical integration are:
  - Reducing earnings volatility – shareholders can diversify their own portfolios.
  - Assuring supply and eliminating unfair prices – in efficient markets, prices are fair.
  - Capturing more value by being in stages of the industry chain closer to consumers – need to look at economic value of the stage; being closer to customers does not automatically create value.

Quasi-Integration Strategies

- Companies tend to over-integrate because Quasi-integration strategies aren't considered.
- Quasi-integration strategies include:
  - Joint Ventures / Strategic Alliances
  - Asset Ownership
  - Franchising
  - Licensing

(b) Evaluate whether or not each of the six considerations supports Frenz's vertical integration plan to set up a production facility in Vietombia. Justify your evaluation.

2. Continued

Commentary on Question:
Candidates should ensure that they clearly state whether each consideration does or does not support vertical integration, which was not always done. Supporting vertical integration was also acceptable for Companies in Adjacent Markets and Raising Barriers to Entry as long as analysis supported these statements. For these, the candidate may assume that the coffee bean production would be overly profitable and entering the stage of the industry chain would create economic surplus. Entering this stage would raise barriers to entry by forcing your competitors to follow suit or pay substantially higher prices for other available premium coffee beans.

Vertical Market Failure
Yes, vertical market failure is a risk and supports the strategy of vertical integration. There are few suppliers of premium coffee beans, and there would be frequent transactions as supply would have to be replenished often.

Companies in Adjacent Markets
No, this does not support the vertical integration plan. It is not indicated that the coffee bean production would be overly profitable, and even if it was, outsiders with experience in coffee bean production would be attracted to this business.

Raising Barriers or Price Discrimination
No, this does not support the vertical integration plan. Set-up costs would be too high to build a new facility for production, and similar sources of coffee beans could be found in the future.

Growth or Declining Market
No, this does not support the vertical integration plan. There is already an established, non-declining market for premium coffee.

Spurious Reasons
No, spurious reasons never support vertical integration. Some spurious reasons could include ensuring the supply of premium coffee beans, but efficient markets will always provide a source at a fair market price.

Quasi-Integration Strategies
No, this does not support vertical integration. However, quasi-integration through a joint venture or strategic alliance would be a good option in this case. Frenz does not have the skills required to set up a production facility in Vietomba – they have never been part of this stage of the industry chain. A joint venture would reduce trade conflict with Vietomba, and allow Frenz access to the premium coffee beans at a lower cost than full vertical integration.

2. Continued

(c) Recommend whether Frenz should pursue a full integration, quasi-integration or no integration strategy. Justify your recommendation based on your evaluation in part (b).

Commentary on Question:
A clear recommendation must be presented and supported by analysis in part (b) for full points. If a candidate provided multiple recommendations (i.e. you could do this, or you could do this other action) no credit would be given.

I recommend Frenz pursue a quasi-integration strategy through a joint venture or strategic alliance with Vietomba. Although there is a risk of vertical market failure due to the small number of suppliers, there are not enough valid reasons to vertically integrate. This quasi-integration would give similar benefits to Frenz, at a lower cost and risk, and allows Frenz access to the premium coffee beans without needing to enter an unfamiliar stage of the industry chain.

3. Learning Objectives:

3. The candidate will understand best practices for ERM processes and Capital Management and their use in setting a risk-return strategy.

5. The candidate will understand the decision making process and the lessons learned from the risk taking activities and experiences of other organizations. In particular, the candidate will be able to apply the learning objectives of all the prior sections of the syllabus to the risk management principles embodied within the case studies explored in this section.

Learning Outcomes:

(3b) Explain ERM and capital management concepts to evaluate and recommend corporate financial and ERM decisions.

- Apply capital allocation models to a multi-line organization.
- Compare and contrast various ERM and Capital Management frameworks as to their ability to assess value and articulate the risk-return strategy of an organization.
- Evaluate the value-added for an organization by jointly evaluating risk measurement and capital allocation.
- Asses how an ERM process can improve capital efficiency and articulate the risk-return strategy.

(5b) Evaluate the robustness and flexibility of the risk management framework and recommend approaches for continual improvement in the framework and processes.

Sources:

SDM-111-13 Quantitative Risk Management - Chapter 6

SDM-127:13: Nephila: Innovation in Catastrophe Risk Insurance

Commentary on Question:

This question tests the candidates' ability to apply risk and capital management concepts to their understanding of the case studies and described scenarios.

Solution:

(a)

(i) Determine whether Darwin is able to support a 30% increase in variable annuity sales from the baseline. Justify your answer.

(ii) Assess whether the current business plan for the variable annuity line of business is suitable for Darwin. Justify your answer.

3. Continued

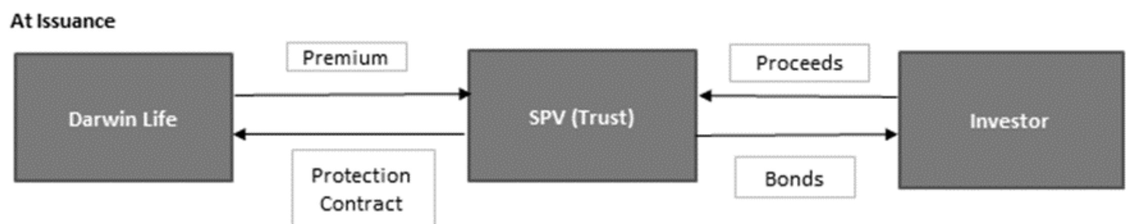
Commentary on Question:
Most candidates did not do well in part (a). They did not understand how to assess whether Darwin is able to support the described scenarios based on Darwin's risk appetite and the sensitivity tests given in the case study.

(i) Darwin Life is not able to support a 30% increase in variable annuity sales over 5 years starting from the base year 2013. The variable annuity sensitivities show that statutory capital changes by -2.90%, -9.15%, +0.62%, and -0.11% comparing one year to the next year (for example, 2013 to 2014), respectively. The change from 2014 to 2015 has the largest loss in statutory capital. With a 30% increase in variable annuity sales, Darwin Life's statutory capital loss is approximately 18.30%, which doesn't satisfy Darwin Life's risk appetite of less than 0.5% probability of having a 15 % loss of statutory capital in one year.

(ii) The variable annuity line of business is not within Darwin Life's risk appetite. The variable annuity sensitivities show that with a 15% decrease in market, Darwin Life's statutory capital changes by -6.79%, -17.72%, -0.23%, and -1.17% over the next 4 years starting from the base year 2013. Darwin Life's risk appetite is only 15% loss in statutory capital with the probability of less than 0.5%.

(b) Sketch a diagram that shows a possible structure and expected cash flows between Darwin, investors and the SPV at issuance.

Commentary on Question:
Candidates generally drew the diagram correctly, but only a few people got the cash flows correct.



Protection Contract = 5% x (100%-3%) x $1 billion = $48,500,000
Premium = $48,500,000 * 1% = 485,000
Proceeds = $48,500,000
Bond = $48,500,000

3. **Continued**

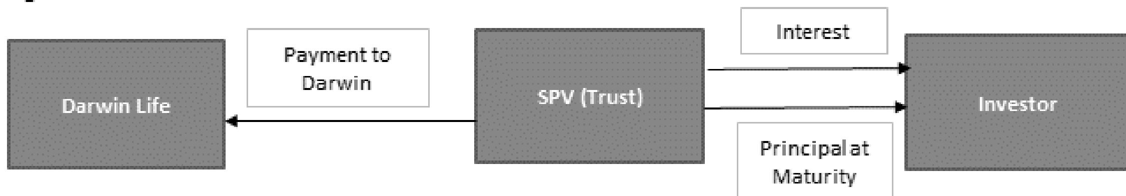
(c) Sketch diagrams that show the expected cash flows between Darwin, investors and the SPV at the end of the first year for the following scenarios:

(i) Withdrawals are 5% during the first year

(ii) Withdrawals are 10% during the first year

(i)

(ii)



Principal at Maturity = \$48,500,000 - Payment to Darwin
Interest = \$485,000
Payment to Darwin = 5% x (10% - 6%) x \$1 billion = \$2,000,000

4. Learning Objectives:

3. The candidate will understand best practices for ERM processes and Capital Management and their use in setting a risk-return strategy.

Learning Outcomes:

(3b) Explain ERM and capital management concepts to evaluate and recommend corporate financial and ERM decisions.

- Apply capital allocation models to a multi-line organization.
- Compare and contrast various ERM and Capital Management frameworks as to their ability to assess value and articulate the risk-return strategy of an organization.
- Evaluate the value-added for an organization by jointly evaluating risk measurement and capital allocation.
- Asses how an ERM process can improve capital efficiency and articulate the risk-return strategy.

Sources:

SDM-111-13: Quantitative Risk Management

Commentary on Question:

Commentary listed underneath question component.

Solution:

(a) Describe advantages and disadvantages of each of the following approaches to risk measures.

(i) Notional-Amount approach

(ii) Risk measures based on loss distributions

(iii) Risk measures based on scenarios

Commentary on Question:

Most candidates did well on this question. Three points for each risk measure were needed for full marks.

(i) Notional-Amount approach:

- Advantage: simple.
- Disadvantage: does not differentiate between long and short positions.
- Disadvantage: does not recognize netting.
- Disadvantage: does not recognize diversification.

4. Continued

(ii) Risk measure based on loss distributions:
- Advantage: natural to measure risk based on a loss distribution, makes sense on all levels of aggregation.
- Advantage: reflects netting and diversification so it is comparable across portfolios.
- Disadvantage: difficult to calculate.
- Disadvantage: based on past data.

(iii) Risk measures based on scenarios:
- Advantage: useful for portfolios exposed to relatively few risk factors.
- Advantage: provides useful complementary information to measures based on distributions.
- Disadvantage: difficult to pick scenarios and to assign scenario weights.
- Disadvantage: aggregating portfolios exposed to different risk factors is difficult.

(b) Explain three reasons why a coherent risk measure is desirable.

Commentary on Question:
Most candidates did well on this question. Three reasons were required for full marks.

Translational Invariance - adding or subtracting a known quantity to the position changes the capital requirements by just that amount.

Subadditivity - reflects the concept that risk can be reduced by diversification.

Positive Homogeneity - scaling the economic capital measure by a fixed multiple scales the risk proportionally.

Monotonicity - positions that lead to higher losses in every state of the world require more risk capital.

(c)

(i) Explain and support Houben's position.

(ii) Recommend another allocation principle. Support your recommendation.

Commentary on Question:
Some candidates had problems with this question. The goal was not just to list advantages and disadvantages of different allocation principles, but to apply it to the situation described.

4. **Continued**

1. With the RPPC formula, the hedge fund will have to switch to VAR because measures have to be consistent across the enterprise. VAR is not as good as CTE even as an internal measure of risk.

2. When VAR is used, the hedge fund may not benefit from diversification at all. VAR is not coherent, so the ratio of the capital for the group over the sum of the capitals of business units operating individually may be higher than 1. The hedge fund may need more capital as a result.

3. The formula suggested by RPPC does not reward business units for providing relatively more or less diversification. This is a disadvantage for the hedge fund which has a very low correlation with the company.

4. Covariance principle says that the proportion of capital allocated = cov(U,C)/var(C)^0.5 where U is a business unit and C is the entire company. That means that low correlation with the company is actually rewarded. This would benefit the hedge fund.

Alternate methodology: Expected Shortfall. It is a coherent risk measure, and it still based on the loss distribution. Other methodologies were accepted here as long as they were supported by well-reasoned arguments.

5. Learning Objectives:

3. The candidate will understand best practices for ERM processes and Capital Management and their use in setting a risk-return strategy.

Learning Outcomes:

(3b) Explain ERM and capital management concepts to evaluate and recommend corporate financial and ERM decisions.

- Apply capital allocation models to a multi-line organization.
- Compare and contrast various ERM and Capital Management frameworks as to their ability to assess value and articulate the risk-return strategy of an organization.
- Evaluate the value-added for an organization by jointly evaluating risk measurement and capital allocation.
- Asses how an ERM process can improve capital efficiency and articulate the risk-return strategy.

Sources:

SDM-109-13: Managing the Invisible: Measuring Risk, Managing Capital, Maximizing Value, Panning

Commentary on Question:

Candidates performed better on part (a) than they did on part (b). Most candidates only described the shape of the graph in part (b) when they were expected to also demonstrate their understanding by interpreting the important implications of varying yields on value added.

Solution:

(a)

(i) Describe short-comings of the cross-sectional approach to measuring the value of a company.

(ii) Identify an alternative to the cross-sectional approach and describe the features of this alternative approach.

Commentary on Question:

Many candidates missed the important features of the longitudinal approach for answering part (ii).

(i) Short-comings:
The market value of a firm's equity may exceed the value of its assets in the actual stock market.
Firms directly market insurance to their clients because they think about the business longitudinally – as a going concern due to the future business.

5. Continued

(ii) Alternative approach:
An alternative is the longitudinal or going-concern approach or longitudinal model, which values the firm as the default-risk-adjusted present value of its future earnings or cash flows.

Important features of the longitudinal approach:

- Focus of the model is on earnings rather than cash flows because the firm is assumed to pay dividends to shareholders equal to annual after-tax net income.
- Future dividend payments are discounted at the risk-free rate to obtain the present value.
- Each future dividend payment is multiplied by the probability that the firm might go through reorganization or bankruptcy.
- If a firm ceases to exist as a going concern, assets are liquidated to pay policyholders and reorganization costs. Cash remained after this is distributed to shareholders.

(b) Interpret the relationship between surplus and Value Added.

Commentary on Question:
Most candidates described the shape of the graph and didn't explain why the graph has such a shape. The graph shows that the immunization is working only at one level of surplus, not always. Varying yields have a large impact on the company's value added.

Implications for Darwin's surplus management based on the graph of the question:

- When the firm's surplus is 65, the firm's value added is virtually constant regardless of potential changes in interest rates. At that point, the firm's value added is essentially immunized if the other variables in the model remain at their assumed values.
- The point with surplus 65 is suboptimal for all of the interest rates.
- All of the yields have the optimal surplus 120 because each can get the maximum value added at that point.
- Immunizing a firm's value from potential changes in interest rates may be a suboptimal strategy when considered within the framework of value-focused enterprise risk management.
- Higher yields increase investment income but reduce value added because they reduce the present value of future income.
- The value added optimal point is between surplus position of 80 to 150 because 120 tested to be the highest value added.

6. **Learning Objectives:**

4. The candidate will understand organizational behavioral concepts and apply strategic management frameworks to corporate financial and ERM business problems.

Learning Outcomes:

(4a) Apply organization behavior concepts.

- Describe the communication process and explain the strategic importance of communication to organizations.
- Describe the fundamentals of decision making and explain decision-making styles and influences.
- Describe common types and causes of organizational conflict and apply the elements of a basic negotiation process.
- Assess how the behavior of individuals and groups in organizations drives organizational decisions and performance.

(4b) Evaluate and apply the concepts of strategic management, recognizing the factors that affect the development and implementation of strategies.

- Demonstrate the importance of analyzing the firm's external environment and the internal organization.
- Define types of business-level strategies and recommend an appropriate business-level strategy for a given situation.
- Explain the impact of competitive dynamics on strategic management.

Sources:

Organizational Behavior: A Strategic Approach, Hitt, Michael, Miller, C. Chet, and Colella, John Wiley & Sons, 3rd Edition – Chapter 9

Strategic Management: Competitiveness and Globalization, Concepts, Hitt, Michael, Ireland, Duane, and Hoskisson, Robert, 10th Edition – Chapter 1

Commentary on Question:

This question tests the candidates' understanding of barriers to effective communication and how those barriers could be overcome. Many candidates did well in their descriptions but had difficultly coming up with actions. Many candidates seem to have difficulty with certain barriers like "Noise" and "Network breakdown." Candidates need to demonstrate some true understanding instead of just "explaining the words." More detailed commentary is given under each part.

Solution:

(a) Define each of the following seven organizational barriers to effective communication:

6. Continued

(i) Information overload

(ii) Noise

(iii) Time pressures

(iv) Network breakdowns

(v) Specialty area jargon

(vi) Information distortion

(vii) Cross-cultural barriers

Commentary on Question:
Candidates performed acceptable here. Some barriers are almost "self-explanatory" therefore candidates need to demonstrate true understanding in order to receive full mark. Many candidates have trouble in (iv) Network breakdowns by relating it to technology/ system break down and many candidates have trouble with (ii) Noise by explain the English word "Noise".

(i) Information overload:
Too much information is provided for members of an organization to process, which makes it difficult to identify what is important.

(ii) Noise:
Noise includes anything that disrupts the effectiveness of communication or distorts information.

(iii) Time pressures:
Time pressure, like deadlines, could result in ineffective communication because the message may not be well thought-out or allow reasonable time for feedback before sending.

(iv) Network breakdowns:
A partial or inaccurate message is communicated to the audience due to a large volume of information that needs to flow through the network. This happens more often in large organizations.

(v) Specialty area jargon:
When specialized terminology is used in communication between field specialists and outside group, it could result in misunderstanding or confusion.

(vi) Information distortion:
Information distortion, which can be intentional or unintentional, is when a message is not communicated in its intended form or lacks expected detail. This could happen as a result of different perception or competition between departments.

6. Continued

(vii) Cross-cultural barriers:
It refers to miscommunication due to lack of language and culture fluency.

(b) Describe the three primary stakeholder groups, listed below, with which every company both establishes and maintains relationships:

(i) Capital market stakeholders

(ii) Product market stakeholders

(iii) Organizational stakeholders

Commentary on Question:
All candidates did well on this part. Since the question asks the candidates to "describe" each group, a simple answer like "Customers." may not receive full marks.

(i) Capital market stakeholders:
It refers to parties who provide firms with capital, including shareholders, bond holders, and banks.

(ii) Product market stakeholders:
It refers to parties who are impacted by firms' production activities, including buyers, supplies, unions, and host communities.

(iii) Organizational stakeholders:
It refers to the employees of the company at various levels, including both managerial and non-managerial personnel.

(c) Propose an action item for each of the barriers to effective communication in part (a) to formulate a successful communication strategy to the organizational stakeholders in part (b)(iii). Justify your proposals.

Commentary on Question:
Similar to (a), since some barriers are almost "self-explanatory," candidates needed to demonstrate an understanding of the context in order to receive full marks. Some candidates provided an answer "build higher cubical/ allow more space" for (ii) Noise. By interpreting the English word "Noise" literally, they showed a lack of understanding of the word in the context of "effective communication".

6. **Continued**

- Information overload:
  Organizations should pursue actions that help employees navigate through paramount information and identify the important message, such as setting up a face-to-face meeting, memos from senior management, and using technology (intranet, blogs, wiki-sites, and social media etc.).
- Noise:
  Organizations should pursue actions that help employees cut through the distractions and identify the key message, such as setting up a direct meeting with managers using various forms of communication, memos from senior management, and using technology (intranet, blogs, wiki-sites, and social media etc.).
- Time pressures:
  Organizations should leave enough time to allow thorough preparation and feedback. It also helps to give a timetable for key communication.
- Network breakdowns:
  Organizations should pursue actions that facilitate direct and accurate communication, such as presenting the message directly from managers with authority/responsibility and setting up an FAQ section about certain subjects on the intranet.
- Specialty area jargon:
  The best action here is to avoid using jargon, i.e. preparing clear message using layman terms.
- Information distortion:
  Organizations must ensure their communication is full and accurate. They could ask employees with direct knowledge of the subject to communicate or provide a dedicated FAQ section on their intranet about the subject.
- Cross-cultural barriers:
  Organizations need to take actions to overcome miscommunication due to the lack of language or cultural fluency through proper review and vetting processes. It also helps to include diverse ethnic groups and nationalities.

7. Learning Objectives:

4. The candidate will understand organizational behavioral concepts and apply strategic management frameworks to corporate financial and ERM business problems.

Learning Outcomes:

(4b) Evaluate and apply the concepts of strategic management, recognizing the factors that affect the development and implementation of strategies.

- Demonstrate the importance of analyzing the firm's external environment and the internal organization.
- Define types of business-level strategies and recommend an appropriate business-level strategy for a given situation.
- Explain the impact of competitive dynamics on strategic management.

Sources:

Strategic Management: Competitiveness and Globalization, Concepts, Hitt, Michael, Ireland, Duane, and Hoskisson, Robert, 10th Edition – Chapter 2

Commentary on Question:

This question tests the candidates' understanding of the five forces of competition analysis. In particular, candidates need to apply that understanding to Darwin Life Insurance Company from the Case Study in order to receive high scores.

Solution:

(a) Describe the impact of each of the five forces of competition on an industry's profit potential.

Commentary on Question:

This is the straight forward part of the question. Candidates did well here. Most of the candidates were able to describe a few forces.

- Threat of New Entrants:
  New entrants compete with existing players for market share, which results in lower revenue and profitability.
- Bargaining Power of Supplier:
  Suppliers could exert power over firms competing for the same supplies by raising price or lowering quality. Firms that are unable to cover the high cost or pass it through will suffer lower profitability.
- Bargaining Power of Buyer:
  Buyers could lower their bid on the products they buy, reducing profitability for firms.
- Substitute Products:
  Customers could use products outside a given industry to fulfill their needs. Companies will suffer reduced profitability unless the switching cost is high or there is significant price/quality differentiation.

7. Continued

- High Intensity of Rivalry:
  When firms are competing in the same industry, their actions could be mutually dependent. One company's action, i.e. price reduction, could trigger another company to react.

(b) Assess the impact of forces (I), (IV) and (V) on the life insurance industry.

Commentary on Question:
Candidates did not do very well on this part. Most candidates scored in the more straightforward "Threat of New entrants," and very few candidates were able to assess "the Intensity of rivalry among competitors."

The threat of new entrants is low for the life insurance industry.

- Capital requirement is significant in the life insurance industry, which prevents new players from entering.
- The life insurance industry is heavily regulated, which is another high barrier to entry.

The threat of substitute products is low to moderate for the life insurance industry.

- Life insurance companies differentiate themselves along service and cost, which are difficult to copy.
- The life insurance industry is facing competition from other financial service companies.

The intensity of rivalry in the life insurance industry is moderate to high.

- There are a number of equally balanced companies competing in the life insurance industry.
- The life insurance industry as a whole has very low growth.
- Products in general lack differentiation; however, firms that are successful in differentiating themselves are often able to enjoy higher profitability.

(c) Provide examples of Darwin's ability to earn above-average profits for each of the assessments in part (b).

Commentary on Question:
Candidates performed poorly on this part. Many candidates failed to pick up examples specific to Darwin from the case study. Different candidates picked up different examples. Candidates should strengthen their ability to draw the link between the question (i.e. above-average profit) and the case study (information on Darwin).

7. **Continued**

Darwin is expected to earn above average return due to the high barrier to entry it has created.

- Darwin has developed its core competency of distribution relationships, which creates barriers to entry.
- Darwin focused on product innovation and differentiation by going directly to small businesses.

Darwin is expected to earn above average return due to product differentiation which should fend off threat of substitute products.

- Darwin has enhanced its UL products to address customers' insurance, estate, and business planning needs.
- Darwin developed a broad array of competitive products with customization for both agency and institutional distribution channels.

Darwin is expected to earn above average return due to employing the right differentiation and distribution strategy.

- Darwin has a strategic focus on the niche market of wealth management for the middle to upper income market and professional and small business owners.
- Darwin is adding a new distribution outlet, increasing penetration rate for existing outlets, as well as expanding the agency network.

8. **Learning Objectives:**

5. The candidate will understand the decision making process and the lessons learned from the risk taking activities and experiences of other organizations. In particular, the candidate will be able to apply the learning objectives of all the prior sections of the syllabus to the risk management principles embodied within the case studies explored in this section.

Learning Outcomes:

(5b) Evaluate the robustness and flexibility of the risk management framework and recommend approaches for continual improvement in the framework and processes.

(5c) Assess the risk of the status quo alongside any other risky and or risk management decision.

Sources:

SDM-124-13: Air Canada - Risk Management

Commentary on Question:

This question tests candidates' understanding of the frequency and severity of a particular risk and their ability to deal with it in real life. Most candidates understood the question well. Those who are able to successfully identify frequency, severity, and corresponding strategies in part a) and part b i) tend to do well applying them to part b ii). Partial marks are granted for correct reasoning and justification even if the conclusion is wrong; however, self-contradicting answers are not acceptable. More details will be provided for each section.

Solution:

(a) Categorize each of the three risks into the appropriate quadrant of the Frequency Severity Analysis Matrix.

Commentary on Question:

This question requires candidates to apply risk frequency and severity concept to real life examples. Many candidates showed good understanding of low frequency high severity risk. One common mistake is to place Risk II – Material Cost Rise in Quadrant IV, underestimating its direct and significant impact on a company's bottom line. A few candidates did not understand the question and explained what the 4 Quadrants meant. They did not get any marks since the question targets a higher cognitive level – analysis rather than retrieval.

I: Quadrant II
II: Quadrant I
III: Quadrant IV

8. Continued

(b)

(i) Recommend one of the potential strategies that Blue Jay Air should use for each of the three identified risks based on the Frequency Severity Analysis Matrix. Justify your recommendation.

(ii) Propose an action Blue Jay Air can take for each of the three identified risks, to execute the strategy recommended in part (i). Justify your proposed action.

Commentary on Question:

To successfully answer this question, candidates need to associate the right frequency and severity to each risk first, then correctly identify a strategy and recommend an action to deal with it. Therefore, taking Risk II is not an acceptable answer. Candidates who did well on part a) tended to do well on this part b i).Partial marks are given to candidates who justified their answer with the correct frequency and severity association. Many candidates identified "buying reinsurance" instead of "buying insurance" as a way to transfer risk. It seems a direct recall from study material rather than applying the idea in the case context. A few candidates confused hedge with risk transfer. In part b ii), many correctly identified insurance as a way to transfer Risk I. A few provided recommendation without any justification and did not get full marks. Some proposed monitoring material cost as an action to mitigate Risk II, which was not accepted as a correct answer since it may require judgment on when to buy the material and does not reduce the risk exposure. However, long term supplier contract was accepted as a correct answer since it works similarly with using derivatives.

(i) I: This is a low frequency and high severity event, as accidents seldom happen, but they are usually serious whenever they do happen. For a low frequency and high severity event (Catastrophic Risk), (d) Transfer should be the strategy to use because catastrophic risk is hard to control and mitigate.
II: This is a high frequency and high severity event, as they happen continuously and Xolar/ Skylite are sensitive to it as an aircraft manufacturer. For a high frequency and high severity event, (b) Avoid and Control should be the strategy to use to minimize the severity as much as it can, given the frequency.
III: This is a high frequency and low severity event, as this happens very often to deal with the high volume of flights every day, but the consequences are not serious. For a high frequency and low severity event (Operational Risk), (c) Prevent and Reduce should be the strategy to use, which focuses on lowering the frequency.

(ii) I: Aviation insurance is the best way to transfer the risk to a third party in case of a high severity and low frequency.

8. Continued

II: Derivative financial instruments can be used to hedge material cost. For example, since cashflow hedges of the material needs in upcoming 1 to 3 years can keep expenses more stable, hedges can be useful for high frequency and high severity events.
III: Contingency plans (or back-up plans) should be in place in case of such a situation. They should also set up policies to ensure additional capacity is available in events like this. Answers like "Set up regulation or best practice for such situation." are also accepted.

9. Learning Objectives:

1. The candidate will understand measures of corporate value and their uses in risk management.

Learning Outcomes:

(1a) Apply basic accounting concepts used in producing financial statements.

(1c) Compare and contrast various financial reporting bases for use in risk management and corporate decision-making.

Sources:

SDM-100-13: Managerial Accounting for CERAs and FSAs, 2013

Commentary on Question:

This question is to test the candidates to apply knowledge of costing systems from Managerial Accounting

Solution:

(a) Identify two advantages of activity based costing.

Commentary on Question:

Candidates should be able to identify some of the benefits of an activity based system vs. other systems from the syllabus reading.

- Activity based costing refines the allocation process in the identification of overhead costs.
- It is easier to capture the cause and effect relationship between cost of an object and the incurrence of overhead costs.
- Able to incorporate multiple production process steps into cost allocations costs and/or use multiple cost drivers.
- Activity based costing can explicitly recognize a production processes' cost hierarchy.

(b)

(i) (*1 point*) Identify Frenz's current costing type. Justify your answer.

(ii) (*1 point*) Identify Bemowski's proposed costing type. Justify your answer.

Commentary on Question:

Candidates should identify the costing systems from the Frenz Case Study. This includes both the current system and the system proposed by Bemowski. The answer should be justified by linking the elements back to the reading.

9. Continued

(i) Frenz's current costing system for overhead expenses is an ACTUALCOSTING system with STANDARD COSTS.

- Actual overhead costs are accumulated.
- Those costs are spread over actual sales of the items with a standard cost per item.

(ii) Bemowski's proposed costing system for overhead expenses is a STANDARD COSTING system with BUDGETED COSTS.

- Overhead costs are accumulated from budgeted amounts.
- Those costs are spread over stores on a uniform basis.

(c) Compare Frenz's current costing approach to Coffee A's.

Commentary on Question:
Candidates should analyze the competitors costing and draw conclusions about how it may impact Frenz.

- Coffee A's appears to use an ACTUAL COSTING system with STANDARD COSTS.
- This is consistent with what Frenz is doing.
- This would indicate that Frenz's price/cost allocation should be competitive for coffee products (assuming underlying overhead is similar to or better than their competitors).

(d) Compare Frenz's current costing approach to Retailer B's.

Commentary on Question:
Candidates should analyze the competitor's costing and draw conclusions about how it may impact Frenz.

- Retailer B is using ACTIVITY BASED COSTING.
- This is not consistent with what Frenz is doing but is instead more consistent with the Bemowski proposal.
- This could lead Frenz to be uncompetitive or priced inconsistently with competitors purely due to a different overhead allocation.
- Some overhead should be allocated by store, but activity based costing should be used to ensure that each store is allocated an appropriate mix amount of overhead based on actual cost drivers.

(e) Identify a more appropriate costing approach for Frenz to reflect profitability of both its coffee and non-coffee sales. Justify your answer.

9. Continued

Commentary on Question:
Candidates could identify a specific method for changing overhead allocation or describe how to change elements of an existing overhead allocation methodology to achieve the same results.

- The general assumption is that the non-coffee products have much higher margins than the coffee sales.
- The costing approach should be based on the overhead allocation on some function of the margin on these other products.
- That way a $ of coffee sales absorbs less overhead than a $ of non-coffee sales.
- Frenz could use budgeted sales amounts to allocate overhead and adjust the budgeted amounts of coffee vs. non-coffee sales.
- If the coffee budgeted sales goal was easy to hit, all "extra" sales would not carry an allocation of overhead.
- Conversely, if the budgeted sales for the non-coffee products were a difficult goal, each actual sale would be carrying "extra" overhead.

10. Learning Objectives:

2. The candidate will understand various approaches to measuring and managing credit and liquidity risk.

Learning Outcomes:

(2a) Apply credit and liquidity risk concepts.

- Describe and analyze credit, counterparty, liquidity, and wrong-way risk.
- Assess and critique results of various credit and liquidity models for their impact on decision making.
- Assess credit value adjustment

(2b) Assess and critique credit and liquidity risk metrics for their impact on risk strategies, their uses in risk management and decision making.

Sources:

SDM-107-13: Chapter 17 of Financial Institutions Management: a Risk Management Approach, 2010 7th edition, by Saunders and Cornett.

SDM-108-13: Chapters 2 and 3 of Liquidity Risk – Measurement and Management, Matz and Neu

Commentary on Question:

Candidates will demonstrate their knowledge and understanding of reasons for liquidity risk and how it affects the liabilities and assets of the institution. They will explain how each side arises in defined pension plan management. Candidates will also demonstrate their knowledge and understanding of liquidity risk measurement approaches and their understanding of differences between measurement of liquidity and other risks.

Solution:

(a)

(i) Describe liability-side and asset-side liquidity risks.

(ii) Provide an example for each of these risks for BPP.

Commentary on Question:

Candidates should be able to define what liability-side liquidity risk means and what asset-side liquidity risk means. Candidates should be able to provide a correct example for each liquidity risk.

(i)

- Liability-side liquidity risk arises when there is a mismatch between the expected and actual timing of liability payouts.
- Asset-side liquidity risk arises when asset liquidity declines.

10. Continued

(ii)

- Three possible examples of larger than expected benefit payment amounts such that the plan might be forced to sell assets at an unfavorable price that require additional cash contribution include:
  - If a more than expected number of employees terminates or retires in a given year.
  - If a more than expected number of employees requests immediate lump sums.
  - If the lump sums are disproportionately more prevalent for people with large lump sums.
- Three possible examples of smaller than expected of benefit payment amounts such that (plan assets were converted to cash and incur an opportunity cost to earn interest necessary to cover increase in plan liabilities include:
  - If a less than expected number of employees terminates or retires in a given year.
  - If a less than expected number of employees requests immediate lump sums.
  - If the lump sums are disproportionately more prevalent for people with small lump sums.
- Three examples of asset side liquidity risk:
  - There is a change in liquidity premiums of plan assets allocated to cover short-term liabilities.
  - Equities pay less cash dividends.
  - BJPP becomes fully funded and Blue Jay Airline stops making cash contributions or makes a contribution insufficient to cover benefit payment in excess of existing liquid assets.

(b)

(i) Describe actions that Bollinger can take to implement a Purchased Liquidity Management method to manage BPP’s liquidity risk exposure.

(ii) Describe actions Bollinger can take to implement a Stored Liquidity Management method to manage BPP’s liquidity risk exposure.

Commentary on Question:
Candidates should be able to define what "Purchased Liquidity" means. For actions to implement PLM in the context of BJPP, the candidate should realize that unlike regular DI, BJPP cannot raise cash reserves by issuing debt securities (see conditions of the problem), and the only sources of outside cash influx for BJPP are BJA contributions and dividend/interest payments on assets. Candidates should be able to define what "Stored Liquidity" means and list actions to implement SLM in the context of BJPP.

10. Continued

(i) Purchased Liquidity Management (PLM): Seeks to increase liquidity by obtaining cash from the outside.
Actions that Bollinger can take:
- Ask BJA to make a larger annual contribution in exchange for reducing future scheduled contributions.
- Establish a funding policy requiring BJA to make a contribution at least equal to the excess of benefit payments over interest and dividend payments on assets.

(ii) Stored Liquidity Management (SLM): Seeks to increase liquidity by selling some of the assets and maintaining cash reserves.
Actions that Bollinger can take:
- Maintain cash reserve equal to the expected benefit payments.
- Invest in dividend and coupon paying securities.
- Maintain a position in sufficiently liquid securities such as short-term government debt.

(c) Propose an alternative method to the CRO's suggestion for estimating cash reserves to cover the liquidity requirement. Justify your proposal.

Commentary on Question:
Candidates should be able to describe an alternative method, the quantitative considerations, the quantitative measures, and the shortcomings of VaR when applied to liquidity risk. There are some other reasonable alternative methods.

We could use scenario analysis as an alternative method.
Scenario Analysis is used to create and evaluate a wide variety of cash flow scenarios including either or both deterministic and probabilistic scenarios.
Quantitative considerations:
- Should consider both inflows and outflows mapped to maturity buckets.
- Should use scenario-based cash flow projections.
- Differentiate between potential BJPP-specific problems (e.g. unexpected number of lump sums), BJA-specific problems (e.g. inability to make contributions), and systemic problems.
- Consider highly improbable scenarios.

Qualitative measures:
- Required to reduce the subjectivity in cash flow projections and behavioral adjustment.
- Consider impact of capital markets (low interest environment) on lump sum amounts and election rates.
- Consider employee perception of plan funding (decline in funding level may trigger higher lump sum election rates).

10. **Continued**

The shortcomings of CRO's proposed VaR method when applied to Liquidity Risk:

- VaR analysis assumes that future behavior is similar to past behavior, but Liquidity Risk is scenario driven.
- Normal relationships between standard deviation and confidence intervals are not holding because Liquidity Risk distribution is non-normal.
- "Worst-case" analysis based on the tail of distribution is misleading because estimated distribution parameters are biased towards the non-extreme cases since extreme events are not part of the past experience.

Some other alternative methods:
Modified VaR or modified Monte Carlo simulation based on hypothetical parameters and assumption integrated with deterministic scenario stress testing to isolate extreme events.

- Advantages: Assumptions and parameters can be based on historical data but without duplicating it, and they can be tailored to meet specific scenarios.
- Disadvantages: Assumptions and parameters are subjective.
- Assumptions need to be segmented for drivers, internally consistent, and reflect the severity of possible outcomes.

(d) Assess the impact of this amendment on BPP's liquidity risk exposure.

Commentary on Question:
Candidates should be able to identify the impact on both short term and long term for the liability side risk, and the increased risk of asset side as well.

Short-term increase of liability-side risk: Benefit payouts during the restructure period become more volatile.

- Annual benefit payouts are leveraged by individual decisions to take lump sum.
- Benefit payouts become less uniform, putting strain on monthly liquidity reserves.
- Paying out a large portion of the liability over a short period of time may significantly affect stored liquidity reserves.
- Paying out subsided lump sums increases prevalence of lump sum election rates and requires more subjectivity in estimating the rates for liquidity planning.

Long-term decrease of liability-side risk: Benefit payments in the years following the restructure become less volatile.

- Future benefit commencement dates and annuity amounts for people who elected age 65 annuities become known, which allows BJPP to better manage liquidity risk.

10. Continued

- Future benefit payouts are uniform, allowing for a more predictable cash flow matching.

Increases assets-side risk: Cash and existing liquid assets need to be used to make large benefit payments reducing the liquidity of plan assets.

- Plan may be forced to liquidate positions supporting future scheduled benefit payments.
- Additional liquid assets are needed to cover the value of the subsidies (additional value provided through determining lump sums using lower interest rate).
- Change in duration of plan liabilities may force rebalancing of the portfolio generating rebalancing cost.

11. **Learning Objectives:**

2. The candidate will understand various approaches to measuring and managing credit and liquidity risk.

Learning Outcomes:

(2b) Assess and critique credit and liquidity risk metrics for their impact on risk strategies, their uses in risk management and decision making.

Sources:

Counterparty Credit Risk, Gregory, Jon, 2nd edition - Ch 8, 9.1-9.5, 10.1-10.2, 12, 16.1-16.4

SDM-140-14: Interest Rate Swaps–An Exposure Analysis

Commentary on Question:

Demonstrate a detailed understand of both Risk-Neutral and Real-World calibration of models.

Solution:

(a) Compare and contrast Risk-Neutral and Real-World calibration. Include comments on the assumptions and data underlying each type of calibration.

Commentary on Question:

Candidates should be able to compare and contrast Risk-Neutral and Real-World calibration and cover the sections of assumptions and data used.
The following bullet points are a subset of the concepts that can be referenced when comparing and contrasting RN and RW calibration. Award points based on the candidate's ability to demonstrate that they have a clear understanding of the similarities and differences between RN & and RW calibration. To receive full-credit, candidates must reference the data used, and the underlying assumptions, in RN and RW calibration when making the comparison.

Data used:

- When implementing Risk-Neutral calibration, the current market prices of available securities are used to calibrate the parameters of the model.
- When implementing Real-World calibration, some subset of historical data is used to calibrate the parameters of the model.

Assumptions/implications of RN & RW calibration:

- Risk-Neutral calibration reflects the market-implied levels of drift, volatility, correlation, etc. that are incorporated in the current market prices of securities.
- Risk-Neutral calibration is "forward-looking," in the sense that it incorporates the market's expectation of future rates, prices, inventories, supply & demand, etc…

11. Continued

- Risk-Neutral calibration is related to the concept of Arbitrage-free prices. Risk-Neutral calibration results in prices which are Arbitrage-free. Conversely, the price of a security is Arbitrage-free if it equals the price calculated using some set of Risk-Neutral probabilities.
- Risk-Neutral calibration facilitates the hedging considerations that are required for pricing.

- Real-World calibration is backwards-looking in that it reflects historical levels of drift, volatility, correlation, etc.
- Implicit in the use of Real-World calibration is the assumption that "the past will repeat itself."
- Real-World calibration is subjective since results depend on the choice of time-horizon and securities used.
- Real-World calibration tends to be more conservative and more consistent with passive risk management strategies, such as credit limits.

(b) Justify your claim that Risk-Neutral calibration can be used for risk management, and conversely, that Real-World calibration can be used for pricing.

Commentary on Question:
The candidates should be able to demonstrate their clear understanding of the exceptions to the rules that Risk-Neutral calibration is used for pricing and Real-World calibration is used for risk management.

Argument for Real-World calibration for pricing:
- Real-World calibration is justified whenever the price information necessary for Risk-Neutral calibration is unavailable, such as with correlations.
- Risk-Neutral mean-reversions are likely to underestimate the observed mean-reversion.
- Risk-Neutral default probabilities based on credit spreads, and even CDSs, are likely to exceed the actual, observed, default rates.
- Risk premiums embedded in Risk-Neutral (market-implied) volatilities may cause systematic overestimation of risk.
- Risk-Neutral calibration is not compatible with some standard risk-management procedures such as back-testing.
- Risk-Neutral calibration is less important when the underlying hedging considerations are less relevant, such as with CVA, which is practically difficult to hedge. Hence, Real-World calibration is justified when pricing CVA.
- If markets aren't truly "perfect," then the market-implied prices used in Risk-Neutral calibration may not be the best estimates of future prices.

11. Continued

Argument for Risk-Neutral calibration for Risk Management:

- Risk-Neutral calibration is often desirable due to the subjectivity and restrictive assumptions underlying Real-World calibration.
  - Real-World calibration is backwards-looking in that it reflects historical levels of drift, volatility, correlation, etc.
  - Implicit in the use of Real-World calibration is the assumption that "the past will repeat itself."
  - Real-World calibration is subjective since results depend on the choice of time-horizon and securities used.
- Risk-Neutral calibration is often used for convenience-sake within models used for Risk Management since:
  - Risk-Neutral calibration circumvents the need to estimate Real-World parameters.
  - So that the modeled prices of simple instruments will be consistent with the market prices.
- The inconsistency caused by the need to use Risk-Neutral calibration for the re-evaluation of trades within Real-World risk management simulations provides an argument for the consistent use of Risk-Neutral calibration for both Pricing and Risk Management.

(c) Explain to the CEO why the line labeled Risk Neutral is higher than the line labeled Real World.

Commentary on Question:
The candidates should be able to provide valid explanations for the differences between the graph under RN calibration vs. the graph under RW calibration. Also, the candidates should make a connection between the calibration method used and the resulting effects on the model or modeled quantities.

- Risk-Neutral mean-reversions are likely to underestimate the observed mean-reversion. Hence, modeled risk factors have a greater tendency to significantly deviate from the long run average under Risk-Neutral calibration.
- Risk premiums embedded in Risk-Neutral (market-implied) volatilities may cause systematic overestimation of risk. Hence, there is likely to be greater volatility in modeled risk factors under Risk-Neutral calibration.
- Risk-Neutral calibration may result in a larger drift parameter.
- Risk-Neutral default probabilities based on credit spreads, and even CDSs, are likely to exceed the actual, observed, default rates.

12. Learning Objectives:

2. The candidate will understand various approaches to measuring and managing credit and liquidity risk.

Learning Outcomes:

(2a) Apply credit and liquidity risk concepts.

- Describe and analyze credit, counterparty, liquidity, and wrong-way risk.
- Assess and critique results of various credit and liquidity models for their impact on decision making.
- Assess credit value adjustment

(2b) Assess and critique credit and liquidity risk metrics for their impact on risk strategies, their uses in risk management and decision making.

(2c) Explain how regulatory requirements impact capital and management of credit and liquidity risks.

Sources:

SDM-107-13: Chapter 17 of Financial Institutions Management: a Risk Management Approach, 2010 7th edition, by Saunders and Cornett.

SDM-108-13: Chapters 2 and 3 of Liquidity Risk – Measurement and Management, Matz and Neu

Commentary on Question:

Commentary listed underneath question component.

Solution:

(a) Explain what it means to have an 87% portfolio Liquidity Index.

Commentary on Question:

This question is to test candidates on their comprehensive knowledge of liquidity index. In general, candidates did well on this question.

Liquidity Index measures the potential portfolio losses from a sudden or fire-sale disposal of assets compared with the amount it would receive at fair market value established under normal market conditions. Liquidity Index of 87% in the context of Orlean Company's pension plan means that liquidation of the entire pension plan portfolio at fire-sale prices would result in 13% capital loss.

(b)

(i) Provide two considerations for rebalancing the assets to increase the Liquidity Index.

(ii) Propose an approach that the company could use to restore the Liquidity Index to 90% without any contributions to the plan.

12. **Continued**

Commentary on Question:
Most candidates did well on the first part of the question. Only a few could apply the formula of Liquidity Index to make an appropriate proposal of an approach that the company can use to restore LI to the required level.

(i)

- Maintain balance between Liquidity and Potential Return: Converting too many assets into cash results in a missed opportunity to earn assets return and may potentially require making a cash contribution. Therefore, the company needs to manage Liability Side Liquidity Risk which arises when there is a mismatch between expected and actual timing of liability payouts. Also, when larger than expected amounts of benefit payments may need to be made, the plan may be forced to sell assets at fire-sale prices or the company needs to make an additional contribution. This would happen when a more than expected number of people retire in a given year, a more than expected number of people request lump sums, or when lump sums may be disproportionately more prevalent for people with large lump sums.
- Consider risk of future portfolio liquidity changes: Assets Side Liquidity Risk arises when Assets Liquidity declines. There is a change in liquidity premiums of plan assets allocated to cover short-term liabilities.
- Consider cost of rebalancing vs. additional cash contribution. Cash contribution may result in plan overfunded and inefficient use of company's capital / stranded assets. Rebalancing may be costly and should be made gradually.
- Consider alternative rebalancing scenarios such as cost of rebalancing vs. change in liquidity, change in liquidity vs. potential return, or volatility of liquidity index.

(ii) $I = \sum(w_i)(P_i / P_i^*)$ over all i,
where
I is the Liquidity Index;
P_i is the Fire Sale Price of asset i;
P_i^* is the fair market price of asset i;
w_i is the percent of asset i in portfolio and $\sum(w_i)=1$.

One way to increase Liquidity Index is to convert a portion of the portfolio into cash.
Assuming no friction costs, let I_1 be the liquidity index of the portfolio prior to increasing cash position, and let c be the portion of the portfolio converted to cash.
The liquidity index of rebalanced portfolio (I_2) is equal to:

12. Continued

$I2= \sum(wi \times (1 - c)) \times (Pi / Pi^*) + c = I1 \times (1-c) + c = I1 + (1 - I1) \times c$
Solving for c: $c= (I2 - I1)/(1-I1) = (0.9 – 0.87) / (1 – 0.87) = 0.23$.

Therefore, convert 23% of each non-cash position to cash.

(c) Identify two significant changes from the original to the proposed asset allocation.

Commentary on Question:
This question tests the candidates on identifying the changes in asset allocation. It is an easy question and most candidates could list two changes.

Higher portfolio yield: 6.9% original vs. 8.5% proposed.
Higher portfolio yield variance: 11.7% original vs. 14.8% proposed.
Lower portfolio liquidity: proprietary index of 3.1 for the original vs. 4.2 for the proposed.
Higher risk price (yield to yield STD): 20% for the original vs. 22% for the proposed.

(d) Explain two concerns with the proposed asset allocation.

Commentary on Question:
Candidates were asked to explain two concerns with the proposed asset allocation and demonstrate their understanding of Liquidity Risk from different asset types.

The allocation to cask is dangerously low. Holding only 1% of securities in cash may not be enough of a buffer for the company to meet immediate liquidity needs when the sale of other assets is not possible.

The proposed asset allocation puts significantly more weight in the portfolio on less liquid assets such as US large corp, US small cap and private placements. Although these asset classes can generate higher returns, they also expose the company to significant liquidity risk. If there is a financial crisis and the market declines substantially, the value of these assets will drop significantly, too. In addition, these assets are more volatile and unpredictably compared to cash and medium term treasuries. In case of distressed scenarios, these assets would have a much lower fire sale prices than assets like cash.

Candidates can also comment on the risk of having lower sharp ratio (promotes high volume assets).

13. **Learning Objectives:**

2. The candidate will understand various approaches to measuring and managing credit and liquidity risk.

3. The candidate will understand best practices for ERM processes and Capital Management and their use in setting a risk-return strategy.

Learning Outcomes:

(2c) Explain how regulatory requirements impact capital and management of credit and liquidity risks.

(3b) Explain ERM and capital management concepts to evaluate and recommend corporate financial and ERM decisions.

- Apply capital allocation models to a multi-line organization.
- Compare and contrast various ERM and Capital Management frameworks as to their ability to assess value and articulate the risk-return strategy of an organization.
- Evaluate the value-added for an organization by jointly evaluating risk measurement and capital allocation.
- Asses how an ERM process can improve capital efficiency and articulate the risk-return strategy.

Sources:

SDM-131-14: Solvency Modernization Initiative Country Comparison Analysis– Switzerland, UK, Australia,

Solvency II, CanadaSDM-130-14: A Comparison of Solvency Systems: US and EU

Commentary on Question:

This question tests the candidates on their retrieval of the comparison between US and Solvency II capital requirement. The candidates need to demonstrate their knowledge on the application of the concept in real world questions.

Solution:

(a) Compare U.S. Solvency and EU Solvency II with regard to the following components:

(i) Liability Valuation

(ii) Asset Valuation

Commentary on Question:

Most candidates put down something relevant on the two capital requirement valuation methods under the two capital regimes at a high level. However, there was a lack of detailed knowledge, especially for Asset Valuation method comparison.

13. **Continued**

(i) Liability Valuation:

a. US Solvency uses a principles-based method and implicit risk margin in P&C; US Solvency uses a rule based approach. A principles based project is underway with implicit risk margins in Life.

b. EU Solvency II uses Current Exit Value as the overriding principle of the technical provision. If there is a hedge-able component in the technical provision with replicating portfolio of assets, use the market value of that portfolio (so no separation into current estimate and risk margin for these). If there is no hedge-able, do a proxy for market value by decomposing into a current estimate + an explicit risk margin. Cash Flows include all in and out flows, including future discretionary bonuses, embedded financial guarantees, and contractual options.

(ii) Asset Valuation:

a. US Solvency varies. It is primarily market/fair value, amortized cost, equity method, or book value (cost). Asset Valuation Reserve for life is established to smooth the impact of investment gains/losses on capital/surplus.

b. EU Solvency II is market value based. It is fair valued based if it is using the current IFRS definition, with specifics to be developed in implementing measures. Potential Equity Dampener Approach reduces Pro-cyclical effects (although this would be adjusted in capital requirements rather than in Asset Valuation).

(b) Explain the merits of the revised sales projection as it pertains to the solvency capital ratio if Darwin is to adopt the EU Solvency II capital basis.

Commentary on Question:
This question is designed to test the candidates on capital requirements under different capital regimes at a knowledge application level. There are a few candidates that did really well on it, while most candidates only commented on a few of the products.

An EU solvency II framework would consider all significant risks, including operational risk, reflect the current fair market value price and reflect current minimum capital level over the next 12 month. Thus the projected sales projection should take into consideration the short-term impact of adopting the EU solvency II capital basis. A VA guarantee is a capital intensive product and would have a significant increase in capital with EU Solvency II capital basis (over 30%). Thus having the revised sales projection lowered relative to other products does make sense. On the other end, the term product line of business is the least capital intensive and the capital requirement is decreased under an EU basis. Thus it makes sense that the revised sales projection has increased sales target.

13. Continued

For Traditional Life product, there are no significant change of capital requirements under both US and EU Solvency II capital bases. Thus there should not be much need to revise sales projection for this line of business. An increase in this line of business should also be fine as this is not a very capital intensive product relative to other lines of business. For the UL product line, there is also an increase in capital requirement (about 9.7%) under the EU basis. This is a more capital intensive product than the traditional Life line of business. Therefore, the revised sales target should not increase more than the Traditional Life line of business. For the Other product, it seems to be quite capital intensive and it has a significant increase in capital requirement (about 20%) under the EU basis. Thus the revised sales target should be lowered for this line of business rather than maintaining the current sales target.