CFE SDM Model Solutions
Fall 2017

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 in any industry.

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:

(3a) Explain ERM principles and frameworks.

- Evaluate a company's ERM processes in its ability to adapt to emerging issues and identify risk opportunities.
- Critique 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.

(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.

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

Sources:

SDM-300-17 The Failure of Risk Management

SDM-305-17 Risk Management and the Rating process for Insurance Companies

1. Continued

SDM-314-14 Risk Appetite Linkage with Strategic Planning

SDM-304-17 Exploring Risk Appetite and Risk Tolerance

SDM-600-17 Case Study

Commentary on Question:
Commentary listed underneath question component.

Solution:
(a) State the elements of catastrophic risk management important to A.M. Best.

Commentary on Question:
This question was poorly answered. The list from the reading is quite specific and answers not consistent with the reading did not earn any credit. Full marks were awarded if the answer covers any three points below.

A.M. Best considers catastrophic loss, both natural and man-made, to be the No. 1 threat to the financial strength and policyholder security of property and casualty insurers. The elements of catastrophic risk management important to A.M. Best includes the followings:

- Sophisticated catastrophe modeling tools that account for natural and man-made risks;
- Data quality;
- Constant monitoring of aggregate and individual exposures;
- Disciplined adherence to underwriting controls;
- Implementation of an integrated reinsurance program.

(b) Describe one scenario that could lead to catastrophic losses for each product, I to III. Justify your answer.

Commentary on Question:
Any plausible scenario that could lead to catastrophic losses for each of Blue Ocean's expansion products is acceptable. Full marks were awarded if the answers correctly and logically explain catastrophic scenarios for all three products.

This question was well answered. Students were able to successfully identify a scenario that leads to catastrophic losses. The biggest challenge for this question was solar energy insurance scenario where students mistakenly identify a scenario that leads to increase in energy price.

1. Continued

Pet Insurance Scenario: Outbreak of an incurable disease affecting dogs in North America leads to increased veterinary costs, increasing claims.

Travel Insurance Scenario: Natural disaster at a popular travel destination (e.g. Florida, Alberta, California) leads to cancelled flights, increasing claims.

Personal Solar Energy Insurance Scenario: Sudden global downturn in energy prices (e.g. production action by OPEC, discovery of new and cheap energy resources, etc.) while the solar energy insurance guarantees the sale price. The lower the market energy price, the higher the claims.

(c) Identify six key risk management procedures to ensure Blue Ocean avoids common fundamental Monte Carlo modelling errors resulting from the lack of empiricism.

Commentary on Question:
This question was poorly answered. The list from the reading is quite specific and answers not consistent with the reading did not earn any credit. Candidates who correctly identify any five key risk management procedures were awarded full marks.

Any subject matter expert that FAST consults at Blue Ocean or in the industry should be vetted to ensure they have knowledge and prior practical experience related to the subject;

All probabilities associated with catastrophic scenarios must be calibrated using prior data and no subjective estimates of probabilities should be used.

The model should be back tested with catastrophic events that could have led to catastrophic losses for travel insurance, pet insurance, and personal solar energy insurance products;

Follow up on previous forecasts to see how well they did against reality

The model should make use of new empirical measures specifically made for highly uncertain and sensitive variables in the model

Opportunities for marginal uncertainty reduction should not be overlooked

1. Continued

(d) Assess the simulation results provided above within the context of RPPC's Risk Appetite. Justify your answer.

Commentary on Question:
This is an analysis question to test the candidate's overall knowledge and understanding of assessing risk measurement and connecting it to risk strategy. This question was well answered. Most students were able to justify products set 2 is not acceptable. Students must be able to explain and logically justify the answer to receive full credits.

Identify Current available capital base of $3 billion from the case study

Available capital accounting for Blue Ocean's ability to raise new capital = $3 billion + $0.5 billion = $3.5 billion

For product set-1 (existing business + travel and pet insurance expansion), the capital required from simulation is less than the risk appetite (to hold redundant capital for two 1 in 100 years events), therefore product-set is acceptable

For product set-2 (existing business + travel, pet, and personal solar energy insurance expansion), assess that the capital required from simulation is more than the risk appetite, therefore product-set is not acceptable

2. Learning Objectives:

2. The candidate will be able to identify the presence of liquidity & counterparty credit risk, and critique approaches to measure and manage these risks, and identify second order impacts of mitigating these risks.

Learning Outcomes:

(2a) Identify counterparty credit and liquidity risks concepts that arise from specific business activities.

(2b) Assess the critical nature of the counterparty credit risk exposure and the specific situations where liquidity risk exposure also becomes critical.

(2c) Critique the applicability and relevance of various counterparty credit and liquidity measurement and management techniques, as well as the associated impacts.

Sources:

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

SDM-150-16 Management Solutions: Liquidity Framework and impact on management

SDM-600-17 Case Study

Commentary on Question:

Most candidates struggled with recognizing the potential scenarios that may trigger a liquidity crisis. They focused too much on gift card sales and redemptions; therefore they attempted to answer every part of the question using "gift card" scenarios, although the case in the question gives enough information on other possible liquidity crisis scenarios. Many candidates also failed to provide sufficient justifications of their responses, even though the question specifically asked them to do so.

Solution:

(a) Critique XYZ Chief Executive Officer's statement. Justify your answer.

Commentary on Question:

Most candidates failed to "critique" the CEO's statement. They failed to realize that how to use the cash generated from gift card sales determines whether XYZ's liquidity position is improved or not. Very few candidates clearly stated that "if the cash is invested in expansion strategy, then…."

2. Continued

The Chief Executive Officer's statement is correct only if the generated cash is kept in liquid assets. It is not correct if cash is invested in the expansion strategy. Liquidity risk is to meet the net cumulative cash outflow (NCO) within a certain time period. If the cash generated from gift card sales is invested in liquid assets, then the NCO and unencumbered eligible assets to offset NCO will be reduced, so the liquidity position is improved. If the generated cash is invested in expansion strategy, then the liquidity position will be worsened in the future when more people use gift cards to get their coffee----causing incoming CFs are reduced and NCO are increased.

(b) Describe two scenarios that may trigger a liquidity crisis for XYZ.

Commentary on Question:
Many candidates tried to come up scenarios related to gift card sales only. As a result, they came up with either similar or unrealistic scenarios, even though there are enough information in the case to indicate other scenarios that will trigger liquidity crisis.

Scenario 1: Bank ABC refuses to continue financing due to the recent fact that XYZ got downgraded. This will cause a liquidity crisis for XYZ since XYZ relies solely on Bank ABC for it borrowings.

Scenario 2: Real-estate market value suddenly drops. Since real-estate is used as a collateral. XYZ would have to post additional collateral. This will create a liquidity issue for them.

(c) Describe a mitigating strategy for each scenario in part (b).

Commentary on Question:
Depending on how candidates answered part (b) of the question, answers to this part of the question can be totally made up or unrealistic, but the strategy should clearly link to the specific scenario in part (b).

Mitigating Strategy for Scenario 1: Secure additional sources of financing.

Mitigating Strategy for Scenario 2: Sell some of the properties and keep money in liquid assets.

These actions will allow XYZ to have cash available when it is needed.

(d) Recommend a metric for XYZ to measure its liquidity risk for each scenario in part (b). Justify your recommendation.

2. Continued

Commentary on Question:
Depending on how candidates answered part (b) of the question, answers to this part of the question may vary and may be made up by the candidate. The metric must clearly tie to the scenario.

Scenario 1: Recommend (Cash inflows for the following month + collateral value of marketable securities) / cash outflow for the next month. This ratio is appropriate for XYZ since the company's business involves large monthly cashflows. A target ratio should be set by management so that there should be actions once the ratio is below target.

Scenario 2: Recommend (collateral Market Value)/(loan amount). This ratio measures the risk of the collateral MV dropping, which is appropriate for XYZ since it's using Real-estate as collateral.

A target ratio should be set for the above two ratios by management, so that there should be actions once the ratio is below target.

(e) Explain how to incorporate the metrics in part (d) into XYZ's liquidity risk management framework. Justify your answer.

Commentary on Question:
Most candidates were able to hit a few key points about how to incorporate the metrics. Only a few candidates can justify their answers well.

The metrics defined in part d need to be monitored continuously. Points need to be defined where management needs to be notified, and where actions must be taken. There should also be a target point, where we want the metrics to be. And then there should be a clear plan for when these points are hit.

There needs to be a plan when a metric moves into a warning region. Diversified funding sources should be established, in use and back-tested. Since XYZ has been dealing with only one bank so far, such criteria is important for the company to assess the quality of the risk management framework.

There should be a board-approved liquidity policy in place with fixed standards on responsibilities, methodologies, limit system and reporting.

A liquidity contingency plan should exist that addresses responsibilities of each unit and the measures to be taken. This is an appropriate criteria since liquidity risk is a new concept for XYZ.

3. **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:

(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.

(4c) Use organizational behavior and strategic management concepts to evaluate and recommend corporate financial and ERM decisions.

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

Sources:

SDM-240-13

SDM-241-13

SDM-242-13

SDM-600-17

3. Continued

Commentary on Question:
This question tests candidates on their ability to evaluate and recommend changes to the current behaviors of a team and their decision regarding a production facility. Overall, candidates performed poorly and had difficulty identifying the topics considered from the Organizational Behavior text. Additionally, the application and evaluation of these topics was considerably inadequate.

Solution:

(a) Describe the impact to the team development life cycle introduced by Ginger Harmon joining the Production Expansion Committee.

Commentary on Question:
Most of the candidates obtained points on part (a). The most points were lost if the candidate failed to explain where in the cycle the team had been in addition to where the team now found itself.

- The team as it currently exists has entered into the performing stage.
- Although flawed (dominated by an individual) team members know their roles and are committed to the team and its current dynamic.
- The addition of one team member who is not a part [of the current norms] will force the team back to the storming stage, which may face resistance.
- Moreover, because Harmon has been asked to point out ways to improve the team's effectiveness and role within Blue Jay, the team must essentially begin again (forming stage.)
- This creates additional conflict to overcome and will create additional time needed to get the team though the next stages.

(b) Explain why the relationship between BJA and BJT might increase the risk of team failure.

Commentary on Question:
Most of the candidates obtained few points on part (b). Candidates failed to respond regarding the BJA-BJT relationship's effects on team dynamics (from Ch. 11 of <u>Organizational Behavior.</u>) Very few points were given to responses regarding the Production Expansion Committee's makeup. Very few points were given to responses describing why the relationship would lead to business failure.

- The reporting structure for the committee has not changed since inception, and there remains no direct tie between the committee and BJA.
- Effective teamwork requires support from the top of the organization; BJT does not have the support.
- There is no explicit vision and plan to ensure desired outcomes from the Product Expansion Committee's activities.

3. **Continued**

- Self-managed teams can be thwarted by leaders who become too autocratic, as is the case with Tavares
- Insufficient accountability and recognition lead to team members becoming too complacent (going along with Tavares)

(c) Identify the predominant dimension of Jack Tavares' communication style. Justify your answer.

Commentary on Question:
Most candidates obtained most of the points on part (c). Some candidates responded regarding Jack's decision making style or regarding a negotiation strategy. No to little points were given in those situations.

verbal aggressiveness

- personal positions are advocated – "and then you can all agree with me"
- authoritarianism – the team is led by a dominant leader, and this is expressed in his communication; he feels he has the right answer, and is looking to not be challenged
- derogatoriness, angriness, and/or unsupportiveness – "And don't give me any strife Ginger, this is obvious! "

(d) Identify two cognitive biases exhibited by Jack Tavares regarding his decision to abandon the Mobile facility for the Buffalo facility. Justify your answer.

Commentary on Question:
Candidates performed poorly on part (d). Most responses did not include proper justification to receive a larger amount of points. Many responses attempted to identify heuristics or other ideas from Nudge, but again found difficulty providing proper justification.

sunk-cost bias

- the sunk costs are being treated as relevant [sunk costs should not be considered when making the decision to continue, but future cash flows should be considered]
- included in the IRR calculation
- need to understand that IRR at time = 2 is what is relevant

confirmation bias

- Jack first sees the start-up costs coming in higher than expected and latches on to what he sees as a continuation of this trend and pays no attention to slightly better start-up costs for the next year, and unchanged expected returns for the next five years

3. Continued

- He also uses the revised expectations IRR (3.47%) for Mobile as further support to move forward with the Buffalo facility, ignoring that this is a flawed measurement

(e) Describe one element for each item above that is relevant for Ginger Harmon to achieve the goal of persuading senior management to keep the Mobile facility.

Commentary on Question:
Candidates received few points for part (e). To reiterate, candidates had difficulty identifying the topics considered from the Organizational Behavior text. For instance, candidates responded with a negotiation strategy instead of a communication style, or with a base of power instead of a political tactic. In addition, some candidates confused team dynamics with group decision making. Points were also lost for flawed recommendations that would exacerbate the problems faced by the Production Expansion Committee.

COMMUNICATION STYLE

- The memo must <u>emphasize preciseness</u>
  - The team is already uneasy with the introduction of an outsider. Care must be taken to minimize further conflict.
  - Structuredness & Conciseness – carefully construct and keep brief to persuade

TEAM DEVELOPMENT

- The team has moved to the <u>forming stage</u>
  - Substantiveness – the team is used to following along with a dominant leader and has stagnated in a norming stage. Ginger Harmon must regard that the team is in a re-forming stage.
  - It will be important that meaningful information regarding what needs to be accomplished is communicated.
  - The process of how the team will do this must also be communicated

POLITICAL TACTIC

- using <u>rational persuasion</u>; logical arguments or factual information used to persuade

3. Continued

DEGREE OF OVERSIGHT FROM THE BOARD

- The P.E. Committee must report directly to the BJA Board of Directors
  - Effective teamwork requires support from the top of the organization
  - The use of this team must be tied to the business objectives of the entire organization
  - Currently, there is very little accountability for the Production Expansion Committee to adhere to the BJA objectives and strategies.
  - A closer relationship between the PEC and BJA will allow active management and review of support systems

LEADERSHIP STRATEGY

- The individual responsible for leading this team does not have to change, but a successful team leader must fulfill a role as a team liaison, the role of direction setter, and the role of an operation coordinator
- These three roles are grossly inadequate under current leadership.

FINANCIAL ANALYSIS

- Continuing to operate the Mobile, Alabama factory is justified
  - Although the startup costs for the facility are greater than expected, the income generating capabilities of this location remains high
  - The decision to abandon or continue must ignore sunk costs (whether they are high, low, or as expected) and focus on what is to be expected going forward
  - The 3.47% IRR is meaningless since we are no longer at the beginning of 2016
  - Alabama continues to be a right to work state. The introduction of a union does not necessarily affect the entire workforce.

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Learning Outcomes:

(3a) Explain ERM principles and frameworks.

- Evaluate a company's ERM processes in its ability to adapt to emerging issues and identify risk opportunities.
- Critique 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.

(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.

(5a) Critique financial models, assumptions and decisions including the impact of behavioral finance concepts.

Sources:

SDM-151-17 Risk Appetite Framework: How to spot the genuine article, Deloitte

SDM-153-17 Exploring Risk Appetite

SDM-250-13 Nudge: Improving Decisions about Health, Wealth and Happiness

SDM-152-17 The final Countdown Solvency II/ORSA, The Actuary Feb. 2015

SDM-600-17 Case Study

4. Continued

Commentary on Question:
Commentary listed underneath question component.

Solution:
(a)

(i) Identify two reasons the regulatory environment, prior to ORSA, hindered the adoption of risk appetite frameworks across the insurance industry.

(ii) Critique the effectiveness of ORSA of addressing the hindrances listed in part (i) above.

Commentary on Question:
This was a recall question from the syllabus, but was answered poorly by most candidates.

(i)

- Regulators have been reluctant to spell out what they expect.
- Varying definitions available.

(ii)

- ORSA's implementation was not entirely helpful for companies looking for direction in their risk appetite frameworks.
- Firms asked for more guidance about what exactly was meant by ORSA but the consistent response was vague: "your own assessment of your own risks and the associated solvency requirements."
- There was continued reluctance to be specific on what was expected of firms.

(b) Compare the following terms with respect to their use in risk monitoring:

(i) Risk capacity

(ii) Risk appetite upper trigger

Commentary on Question:
This part of the question was answered well by most candidates. Full marks were only awarded if the candidate identified that a) the firm would be unviable if the risk capacity was breached, and b) that corrective action should be considered if the risk appetite upper trigger was breached.

4. Continued

(i)

- Maximum level of risk at which a firm can operate, while remaining within constraints implied by capital & funding needs and obligations to stakeholders.
- When exceeded, firm is unviable. Firm must enact its recovery and resolution plan.

(ii)

- Level at which escalation occurs to a higher forum, committee or level of authority.
- Corrective actions should be considered.

(c) Describe three ways, using choice architecture, that Darwin could nudge the VA customers to choose products with reduced investment and insurance risk. Justify your answer.

Commentary on Question:
This part of the question was answered well, with most candidates able to identify three "nudges" that could influence consumers to choose products with reduced risk. Full marks were only awarded if justification was provided.

1) Darwin could change the default fund to one with low risk / volatility. Humans generally tend to stick with default options, even when given other options that are better in their minds.

2) Darwin could create a questionnaire to assess policyholder needs, simplifying the choice set for the client and tailoring low risk funds for risk-averse clients.

3) Provide incentive, such as exclusive offers, for clients who choose products with reduced risk.

(d) Evaluate the appropriateness of each of I to V above as a risk tolerance statement and its applicability to Darwin. Justify your answer.

Commentary on Question:
This part of the question was answered poorly by some candidates. Candidates who did well knew the case study well, and were able to connect each risk tolerance statement to Darwin's strategy and lines of business. There were many possible solutions to this question, as long as the candidate was able to justify their answer and relate it appropriately to the case study for each statement.

4. **Continued**

(I)

- Directly contradicts Darwin's current strategy to increasing growth in distributions.
- Natural disasters are mainly a P&C risk and is not as relevant to Darwin.
- Difficult to implement and monitor.

(II)

- Does not relate to organizational objectives.
- According to Darwin's financial analysis, to be successful in the market, Darwin needs to have a defensible market position; not advisable to limit growth when trying to gain market share.

(III)

- Not applicable, as company wants to mitigate the risk of a rating downgrade – this would require maintaining its stat capital, which is volatile due to conditions outside of Darwin's control. *(No points were awarded if the candidate confused rating capital and statutory capital).*

(IV)

- Not applicable, as this would increase credit risk, decrease liquidity, and increase the cost and complexity of hedging.
- Regulatory limits that limit private equities / punitive capital for holding such assets.

(V)

- 'Probability of loss' is vague as a risk metric. CTE measure may be better measure for assessment.

5. Learning Objectives:

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

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:

(1b) Explain how economic capital and related concepts can be used as the building block of value measure in any industry.

(1c) Evaluate various financial reporting metrics for use in corporate decision-making.

(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.

(4c) Use organizational behavior and strategic management concepts to evaluate and recommend corporate financial and ERM decisions.

(5a) Critique financial models, assumptions and decisions including the impact of behavioral finance concepts.

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

Sources:

SDM-100-13: Managerial Accounting

SDM-105-13: Market Consistent Embedded Value Principles

5. Continued

Commentary on Question:
This question tested various concepts - Basic analysis of financial statements and their use in financial decisions, analysis of the change in risk profile from a competitor entering the market, and applying the concept of MCEV in a non-standard fashion. Candidates generally did well on the recall and quick analysis portions of this question, but struggled a bit to find meaningful responses when higher cognitive levels were required.

Solution:
(a)

(i) Describe each profit measure shown in the table above.

(ii) Evaluate which company, GT or BJT, exhibits better financial performance based on the overall assessment of these profit measures. Justify your answer.

Commentary on Question:
This portion of the question was answered well by most of the candidates. Points were missed by candidates who did not mention the relationship between Gross profit and Operating profit in their assessment of company performance.

(i) Gross Profit Margin = (Sales – Cost Of Goods Sold) / Sales

- The higher the Gross Profit Margin, the more the company retains on each dollar of sales to service its other costs and debt obligations.
- Operating Profit Margin = Operating Profits / Sales
- Low Operating Profit Margin relative to Gross Profit Margin signals high operating expenses.
- Return on Equity = NOI less preferred stock Dividends / Average Common Equity
- This metric is an indicator of how much profit each dollar of equity generates for investors

(ii) GT has better gross margins, but lower operating margins than BJT. This indicates that GT has higher operating expenses and may have issues managing its expenses.

- BJT has a higher return on equity investment
- Overall BJT shows better performance

(b) Identify three Risk Factors from the Case Study that BJT is positioned to manage better than GT in the North American market. Justify your answer.

5. Continued

Commentary on Question:
This portion of the question was generally answered well by candidates, where most were able to list and describe at least two relevant risk factors.

Distributor risk:
- BJT has strong and long-standing relationships with its Canadian distributors.
- GT is new competitor from overseas, and have to establish relationship with distributors.
- BJT can use its good relationship with distributors to try to squeeze GT's sales and margins.

Political risk:
- GT is from overseas who is new to the North American market, and not part of NAFTA.
- GT is exposed to political risk through import and export quotas between Canada/USA and its host country.
- BJT likely has better arrangements under NAFTA than GT.

Currency risk:
- GT has additional exposure from its home currencies in addition to BJT's currency exposure.
- GT's additional currency exposure will introduce volatility in revenue and create an additional barrier.

Manufacturing risk:
- GT has higher LTIFR than BJT
- BJT Canadian branch has very low LTIFR, and with time can potentially transfer its knowledge to lower US plants' LTIFR.

(c)

(i) Define Market Consistent Embedded Value (MCEV).

(ii) Identify the three components of MCEV.

Commentary on Question:
While candidates were able to identify the three components of MCEV, most candidates were unable to define MCEV properly.

(i) MCEV represents the present value of shareholders' interests in the earnings distributable from assets allocated to the covered business after sufficient allowance for the aggregate risks in the covered business. MCEV's allowance for risk should be calibrated to match the market price for risk where reliably observable.

5. Continued

(ii) The three components of MCEV are: 1) free surplus allocated to the covered business 2) required capital; and 3) value of in-force covered business

(d) Evaluate whether MCEV is appropriate to determine the value of BJT. Justify your answer.

Commentary on Question:
Candidates generally had a hard time giving supporting arguments for their decision. Marks were awarded for all answers with reasonable arguments. An example can be found below.

Yes, MCEV can be used to determine the company's value.
MCEV values the earnings that BJT can distribute to its investors (or buyer) based on its assets and ongoing business.
Value of in-force covered business is the present value of future profits that BJT can bring to the investors (buyer).
Mark to market concepts apply since the assets used are traded with an observable market price (compared to insurance liabilities).

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(5a) Critique financial models, assumptions and decisions including the impact of behavioral finance concepts.

Sources:

The Failure of Risk Management
SDM-500-17

Commentary on Question:

In general, most candidates struggled with linking this case to the risk management concepts in the syllabus, specifically from "The Failure of Risk Management" reading. Many candidates also failed to provide sufficient justifications of their responses, especially since the questions specifically asked them to do so.

Solution:

(a) Describe three significant failures of risk management illustrated by the quarter-end process. Justify your answer.

Commentary on Question

Very few candidates received full credit on part a. Many candidates simply restated the obvious issues from the stem, without linking them to risk management concepts/failures.

6. Continued

Company XYZ has several significant failures of risk management. At the top, there is a lack of proper corporate governance as management seems to care more about growth and results. Profits and stockholders' view of the company is considered higher priority than risk management. This is resulting in a lack of proper oversight and controls. There is also insufficient resources dedicated to proper management & too much emphasis is put on simply improving the audit score versus the quality of their work. Furthermore, there is not calibration of the model and insufficient monitoring and oversight to ensure the models are being updated correctly, reconciliations performed in a timely matter, and appropriate versions of the models run for producing reported results.

(b) Recommend the order in which the three failures identified in part (a) should be addressed. Justify your ranking.

Commentary on Question:
To receive full credit, candidates needed to provide a justification of their ranking, not just describe each item. Many candidates lost some points due to this. Multiple answers were accepted based on reasonability and justification. Below is a sample response.

The three failures should be addressed in the following order:

1) Proper governance must be addressed
2) Resources must be allocated
3) Calibration must be performed

A strong risk management framework should start from the top. Incentives should be based on the quality of controls, not the ability to pass an audit or to receive higher profits at the expense of controls. With the proper governance in place, many of the issues would be caught ahead of time.

Once proper governance is in place, the increased focus on risk and controls will make it easy for management to identify that there is a lack of resources in this area. They will need to allocate the appropriate resources to risk management in order to perform the necessary controls. They also need to hold employees accountable for their work and provide the proper oversight and monitoring to ensure controls are being performed appropriately.

6. **Continued**

Once there is proper governance and appropriate resources to perform controls, calibration must then be performed. What good is it to do a ton of tie-outs to ensure the data that is received is complete and accurate, if that is not what ultimately gets reported? All assumption updates need to be thoroughly reviewed and implemented in a locked-down model to ensure the appropriate results are reported. The tie-outs should go from the beginning to the end where results are ultimately reported to make sure nothing gets missed along the way. Receiving signoff from accounting that items have been booked, should not make actuarial confident that reserves were booked correctly. If actuarial spends a lot of time putting together the reports, performing tie-outs, and obtaining independent model review, but that's not actually what gets reported, then it is pointless.

Alternately a candidate could claim that re-calibration is the most pressing issue and that the current issues should be triaged before attempting a new governance process – the graders are looking for critical thinking in terms of addressing the scope of issues.

(c) Critique the audit firm’s scoring mechanism and overall approach.

Commentary on Question:
Candidates generally did well on this part of the question and recognized many of the pitfalls of the audit.

The firm’s approach to the audit is significantly flawed. The arbitrary risk scoring mechanism used has no clear definitions, which can be subjective and relies on expert knowledge. The score does not take into account the frequency and severity of potential breakdowns. An overall average score is determined that can mask some important deficiencies. Scoring mechanisms in general suffer from many pitfalls, including range compression, presumption of regular intervals, and presumption of independence.

Furthermore, the audit is performed on a retrospective basis, which will not ensure proper controls are followed in real time. The metrics do not match all the underlying risks - i.e. need to have 5 controls, but doesn't specify what those controls need to be. There is no concern over demographic information or what reserves are actually reported.

The score of Darwin improved, while there are many flaws/failed controls. Clearly, the audit is not properly performing its purpose.

6. Continued

(d) Compare and contrast Darwin with Volkswagen in the context of failures of risk management.

Commentary on Question:
To receive full credit, candidates needed to provide specific examples from both companies. To simply state that both suffered from risk management failures was not an acceptable answer as that is a given from the question. Also, candidates needed to both compare and contrast the two companies' failures. Some focused only on the similarities or only the differences.

Similarities:
Both Darwin and Volkswagen suffer from lack of strong corporate governance. There is a strong push from management to improve results, even if it means sacrificing integrity. Both companies fudged items in order to pass their audits. The metrics used for risk management and controls do not properly match the underlying risks in both cases.

Differences:
Volkswagen made more serious manipulations, were caught and forced to make significant retribution. Though Darwin also used some loopholes, the consequences if found out are likely not as immaterial. The control failures are much different between the two companies, Volkswagen manipulated emission results; while Darwin did not perform a thorough end-to-end tie-out in the required timeframe. The manipulated results at Volkswagen were done purposely and mostly due to employees fearing the leaders; whereas, Darwin's failures were more due to a lack of resources and oversight.

(e) Recommend one material improvement to Darwin's risk management and one material improvement to Harmon & Strauss's audit process to address the failures identified in parts (a), (b) and (c). Justify your recommendations.

Commentary on Question:
In general, candidates were easily able to identify material improvements for both Darwin and Harmon & Strauss. Some candidates; however, only described the improvements, and did not provide a justification for their recommendations (i.e. they described their suggested improvements, but did not say why the improvements were needed or how they would fix the problems). Thus, only partial credit was awarded.

6. Continued

Darwin's management should focus more on the quality of controls and reward employees for making effort to move toward this, instead of focusing compensation based on passing an audit and increasing profits. If the management team links compensation to the quality of controls, it will highly encourage the employees to focus on improving them and not use loopholes to get more favorable results. It will demonstrate corporate's intent to run the company based on integrity instead of the bottom line, which should boost employee morale and transparency of the company, as well as reduce risk of potential errors or failures being discovered by more meticulous audit firms.

The audit process should use metrics that clearly match all the underlying risks - such as demographic impacts on results, tying out actual reported values, ensuring models actually used for production are controlled and are the ones that were signed off on, etc. Without matching the audit with the underlying risks, the audit is not providing much of a benefit to Darwin or a good representation of its actual control shortfalls. The use of the risk scoring mechanism can mask some important deficiencies and underlying risks as it is subjective and averaged. Each item should be treated as a separate control and not averaged. Additionally, instead of using numeric values, the firm should move towards using more of a red/yellow/green system to better show which items are good, which could be improved, and which definitely failed. By doing this, Darwin will more easily be able to identify the shortfalls and can make improvements in the future.

7. Learning Objectives:

2. The candidate will be able to identify the presence of liquidity & counterparty credit risk, and critique approaches to measure and manage these risks, and identify second order impacts of mitigating these risks.

Learning Outcomes:

(2c) Critique the applicability and relevance of various counterparty credit and liquidity measurement and management techniques, as well as the associated impacts.

(2d) Qualify the impact of various regulatory requirements on exposure, capital, and the management of counterparty credit and liquidity risk.

Sources:

Counterparty Credit Risk, Gregory, Jon, 3rd edition, 2015 Chapter 4, Chapter 6, Chapter 8 and Chapter 18

Commentary on Question:

The question tests the candidates' understanding on counterparty risk. Candidates generally did well with the straight recall of the study material parts of the questions but struggled to demonstrate their understandings on how those elements should be applied.

Solution:

(a) Analyze the impact on exposure of each of the following features in a collateral agreement:

(i) Threshold

(ii) Minimum transfer amount

(iii) Initial margin

Commentary on Question:

This is a recall type question. Candidates generally did well for this part.

(i) Threshold is the amount of exposure cannot be collaterised. Collaterals cannot be called if the mark to market (MTM) of the portfolio is below the threshold. Threshold would increase exposure.

(ii) Minimum transfer amount (MTA) is the minimum amount of mark to market changes required before collaterals are transferred. This creates a discrete effect on the movement of exposure cannot be tracked perfectly. So it can increase or decrease exposures depending on the movement of the portfolio.

7. Continued

(iii) Initial margin can be thought of as negative thresholds. It needs to be held regardless of the value of the portfolio and it reduces exposures.

(b) Calculate the uncollateralized exposure based on this scenario. Show your work.

Commentary on Question:
The intent of the question is to test the haircut of the collateral, but some candidates had confusion on whether the threshold and MTA comes into play

Uncollateralised exposure = MTM of portfolio – initial margin – MTM of collateral held * (1 – haircut)
= 1500 – 0 – 1300 * (1 – 5%)
= 265

Now assume that new market information just became available. Because of it, MTM of portfolio has decreased to 1,350. At the same time, the expected volatility of the portfolio has significantly increased.

Assume potential future exposure stays the same.

(c) Determine the change in exposure at default:

(i) Under the current exposure method.

(ii) Under the standardized approach for counterparty credit risk.

Show your work.

Commentary on Question:
Candidates generally had better understanding of the current method but most candidates struggled with how the replacement cost should be calculated under standardized approach.

(i) Current exposure method (CEM)
EAD = Replacement costs (RC) + Add-ons
Add-ons are not impacted
RC = max (V (value of the derivative transaction) - C (haircut value of net collateral held), 0)
Before the MTM drop, RC = 1500 – 1300 * (1 – 5%) = 265
The MTM drops by 150 > MTA (100), collateral transfers will be called and this is generally done almost instantaneously without much lag. But there is some ambiguity around the timing of when the EAD the question is trying to capture. So full credits will be given for calculating the EAD after shock before the collateral transfers or right after.

7. Continued

Before the collateral transfer, EAD after drop = 1350 – 1300 * (1-5%) = 115=> change in EAD is a decrease of 150

After the collateral transfer, EAD after drop = 1350 – 1150 * (1 – 5%) = 257.5 => change in EAD is a decrease of 7.5

(ii) Standardised Method
EAD = alpha * (RC + PFE)
since the PFE stays the same, EAD is only impacted by RC under the standardized method.
RC = Max(V – C, threshold + MTA – net independent collateral amount (NICA), 0)
[Threshold + MTA – NICA] = [200 + 100 – 0] = 300 (> V- C)
RC = 300 before and after the MTM drop.
EAD is unchanged

(d) Describe how your answer to part (c) changes assuming that potential future exposure is affected by the new volatility assumptions.

Commentary on Question:
Most candidates got partial marks for this part as they failed explained how PFE is impacted by the volatility

PFE is a measure similar to VAR, higher volatility will lead to higher PFE. Under the standardised method, higher PFE leads to higher EAD
The add-ons under CEM does not recognize the change in PFE and EAD under CEM does not change.

(e) Explain the shortcomings of the current exposure method that are addressed by the standardized approach for counterparty credit risk.

Commentary on Question:
This is a re-call type question, most candidates did well

1) The add-ons under CEM were calibrated many years ago and do not reflect volatilities observed over recent stress periods, especially during the global financial crisis; SA- CR recognizes the changes in PFE;
2) The nature of the add-on methodology in CEM does not capture the fact that off-market transactions (negative MTM) should have a lower exposure than the equivalent par transactions; SA-CCR recognizes negative MTM;
3) Recognition of netting benefits under CEM is simplistic and may produce conservative estimates for offsetting and hedging transactions; SA-CCR has a better recognition of netting;

7. Continued

4) CEM treatment of collateral is simplistic and does not account for the benefit of receiving collateral in the future and overcollateralization; SA-CCR has a more risk-sensitive treatment of collateral, in particular initial margin.

(f)

(i) Describe two ways that Bank ABC can re-design the collateral agreement to lower its exposure at default under the standardized approach for counterparty credit risk. Justify your answer.

(ii) Explain why lowering the exposure may have drawbacks for Bank ABC.

Commentary on Question:
Most candidates listed appropriate recommendations on how Bank ABC can re-design the collateral agreements, but failed to justify how those recommendations would specifically impact the EAD under the standardised approach. Limited or no credits are given for simply repeating answers in part a as the justification/ reasoning.

(i) Under SA-CCR EAD = alpha * (RC + PFE)
the replacement cost is measured as max {V -C; TH + MTA - NICA; 0}.
In order to lower the exposure, the new collateral agreement should consider lowering threshold and minimum transfer amount.
For potential future exposure(PFE), SA – CCR rewards collateral by allowing applying a multiplicative factor of 3/2*sqrt (MPR / 250) to potential future exposure. Bank ABC can increase the initial margin in the agreement to reduce Margin Period Risk and improve the potential future exposure.

(ii) The introduction of initial margin may lead to over-collateralization; Reducing threshold and minimum transfer amount can bring more operational and liquidity risk due to increased frequency of collateral calls and transfers.

8. **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 11th Edition, Chapters 1, 2, 3

Commentary on Question:

Commentary listed underneath question component.

Solution:

(a) Define the Industrial Organization model of above average returns.

Commentary on Question:

Note that alternate answers (such as listing out the steps of the Industrial Organization model) were also accepted.

The Industrial Organization model of returns states that the industry or segment of industry, i.e. the external environment in which a company competes has a stronger influence on its performance than the choices its managers make (or internal capabilities).

(b) Explain why each assumption (I to III) is essential to the I/O model.

I) If the external environment dictates the winning strategies, then firms would be rewarded for responding correctly to the external environment.

Alternate answer:

If the external environment does not impose pressures or constraints, (i.e. resources are abundant for all firms), then the external environment would have no differentiating influence on performance for each firm. Performance would instead be differentiated by something else, such as some internal capability.

8. Continued

II) If most firms employ similar strategies or control resources, then that implies a common factor (i.e. the external environment) has more influence on performance than the varying factors (i.e. internal capabilities).

Alternate answer:

If we observe divergent strategies or a divergent set of resources, then that implies that the common external environment has limited influence on each firm.

III) If resources are fluid, or any resource advantages short-lived, then a firm's actions (i.e. how it uses its resources) would have a limited influence on its performance relative to its competitors.

Alternate answer:

If resources are highly restricted from moving across firms, then a firm's actions (i.e. how it uses its resources) become much more strategically relevant to earning more than its competitors.

(c) Assess whether each assumption (I to III) of the I/O model holds for Frenz. Justify each answer with at least one specific example from the Case Study.

Commentary on Question:
Partial marks were awarded regardless of answer, provided justification was included to support the given answer.

I) Yes, this applies to Frenz. The external environment imposes pressures such as a limited number of distributors/coffee products. Zero-sum demand is established in developed countries such as those in Europe, where customers would choose either Frenz or a competitor.

II) This applies to Frenz to an extent. On the one hand, competitors employ similar strategies such as building relationships with distributors, scoring endorsements at events, developing smartphone applications etc. On the other hand, because resource advantages are likely not sustainable, differentiation is all the more important. An example of this is Frenz's investment into building their boutique brand and innovation with digital strategy.

III) Yes, this applies to Frenz. Inputs to business are not rare. Coffee raw materials are essentially commoditized, as are labor inputs required to operate retail food and beverage.

8. Continued

(d) Define the Resources-based model of above average returns

Commentary on Question:
Note that alternate answers (such as listing out the steps of the Resource-based model) were also accepted.

The Resource-based model argues that each company is a collection of unique resources and capabilities, and that a company's strategies are based primarily on leveraging its unique resources and capabilities.

(e) Explain why each assumption (IV and V) is essential to the Resource-based model.

Commentary on Question:

IV) If firms acquire resources and develop unique capabilities, then each firm is implementing its own set of strategies in order to perform well (rather than be influenced by the industry's structural characteristics).

Alternate answer:

If firms do not acquire resources or develop unique capabilities, then a given firm's performance has nothing to do with the uniqueness of its resources or capabilities.

V) If resources are not highly mobile across the industry, then this allows firms to safely invest in resources and capabilities, since over time this would give the firm a competitive advantage.

Alternate answer:

If resources are highly mobile across the industry, then firms would be discouraged from investing in acquiring resources and developing capabilities, resulting in an industry marked by imitation and influenced more by the external environment.

(f) Assess whether each assumption (IV and V) holds for Frenz. Justify each answer with at least one specific example from the Case Study

Commentary on Question:
Partial marks were awarded regardless of answer, provided justification was included to support the given answer.

8. Continued

IV) No, this does not apply to Frenz. Frenz's resources (i.e. access to coffee beans or labor, relationship with distributers etc.), or capabilities (i.e. economies of scale, advertising to develop its household brand identity etc.) are not unique. Specifically, the board was "unhappy with the geographical market concentration which caused Frenz's losses" which implies that industry characteristics matter more than Frenz's unique capabilities.

V) No, this does not apply to Frenz. Frenz's apparent success despite high staff turnover implies that labor resources are highly substitutable/highly mobile.

(g)

(i) Identify the model that applies to Frenz's current competitive position. Justify your answer.

(ii) Assess strategy A against your answers for part (i).

(iii) Assess strategy B against your answers for part (i).

(iv) Recommend either Strategy A or B. Justify your recommendation.

Commentary on Question:
Generally, higher marks resulted from candidates recognizing that Frenz's current competitive position relates more closely to the Industrial Organization model.

Note that for the recommendation, either choice can be selected, but its justification must be logical. Successful candidates understood that Strategy A is a differentiation play on the demand side consistent with the Industrial Organization model, while Strategy B is a cost leader play on the supply side consistent with the Resource-based model. There are appropriate justifications for pursuing either strategy. Marks were given for all rational and well-articulated arguments.

(i) Most of the assumptions from the Industrial Organization model apply to Frenz, whereas the two assumptions from the Resource-based model do not apply. Therefore, the Industrial Organization model is more relevant to Frenz in determining its ultimate set of strategies.

8. Continued

(ii) Strategy A consists of developing a unique capability of strengthening brand identity with Frenz's existing customers. This is not the best strategy for Frenz to take considering that the structural constraints of the industry in which Frenz is operating are more relevant to earning above average returns than developing unique capabilities. Frenz investing heavily in the development of this app, and acting as a first-mover towards creating "an app of this scope" would likely incur high costs of innovation. Additionally, there is a risk of having another competitor fast-follow, and create an imitation product more cheaply shortly thereafter.

(iii) Strategy B consists of essentially securing a lower cost resource. This exclusive deal with the Vietombian government is favorable for Frenz from the perspective that it would combat the downsides of resource-mobility that exist in the industry in which Frenz operates. This deal also creates a more attractive marketplace for Frenz in reducing the power of other suppliers, and lowers the threat of new entrants by restricting a seemingly highly desirable resource.

(iv) Strategy A is recommended. Franz's current competitive position is more relatable to the Industrial Organization model, there are no supply side advantages to be had and so success is largely predicated on differentiation and demand innovation. To this extent, Strategy A can be seen as a worthwhile investment given that it is a differentiation strategy that if successful can boost demand as well as customer experience.

Alternate answer:

Strategy B is recommended as it presents a rare opportunity to disrupt the Industrial Organization competitive landscape and secure a material resource advantage. Frenz can potentially move into a resource-based competitive position and set themselves up for a cost leadership strategy, or at the very least to an extent mitigate bargaining power of their suppliers.

9. **Learning Objectives:**

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

Learning Outcomes:

(1b) Explain how economic capital and related concepts can be used as the building block of value measure in any industry.

Sources:

SDM-129-14

Commentary on Question:

This question aims to test candidates' understanding on economic capital, such as the key risks for insurance companies and the factors impact the economic capital. In order to do well on this question, candidates are expected to have a good understanding on how risks impact insurance's economic capital. A response without justification was not given full credit. The majority of candidates failed to evaluate interest rate risk by duration.

Solution:

(a) Explain how Easy Life is exposed to counterparty risk:

(i) Assuming Easy Life pursues option I.

(ii) Assuming Easy Life pursues option II.

Commentary on Question:

Most candidates were able to describe Easy Life's exposure of counter party risk.

For (i) and (ii) Easy Life is exposed to the counterpart risk at the time of settlement. When counterpart default at settlement, both options will loss 5% $Y return, but Option 2 also loses out on the return of the strips.

Exposure in Option 1 at the settlement is the max of (105% $Y in cash- market value of AA 10-year corporate bonds,0)

Exposure in Option 2 at the settlement is the max of (market value of Treasure STRIPS-95% $Y in cash,0)

(b) Describe the change in Easy Life's interest rate risk as a result of either option.

Commentary on Question:

Candidates performed poorly in explaining the change of Easy Life's interest rate risks under each option. The sale of the assets will shorten the duration for Easy Life but will not necessarily create a duration mis-match. No information is provided about the liability duration or the existing mis-match (if any).

9. Continued

(i) Under option 1, the asset duration is reduced by changing from the long STRIPs to cash.

(ii) Under option 2, the asset duration at time 0 is unchanged as the STRIPs are returned.

(c) Assess the impact on economic capital due to the change in interest rate risk described in part (b).

Commentary on Question:
Candidates who did poorly in part (b) struggled with the part (c) as well. Many candidates were not able to conclude that both the asset-liability duration match and the asset return will impact the economic capital requirement.

(i) The impact to Economic Capital will depend on the liability duration: if reducing asset duration shifts overall duration away from 0 (i.e., if net duration is already negative) then economic capital will increase. Alternatively, if asset duration shifts toward 0, economic capital will decrease.

(ii) Under option 2, economic capital is marginally reduced as Easy Life retains the STRIPs and gains 5% of the STRIP value in cash.

(d) Critique the CEO's comments. Justify your answer.

Commentary on Question:
In part i) of question (d), many candidates were able to show their understanding that collateral loan agreement is not a risk free lending agreement. Some of them struggled to justify their assessments by stating that although the collateral is received by the lender, the collateral itself contains risks. In part ii), many candidates failed in identifying the factors that will impact the economic capital requirements. In order to receive the full credit, candidates should demonstrate that economic belance sheet will be impacted by market value of asset as well as fair value of liabilities. The discount factor of liabilities should reflect future market trend.

(i) Disagree with CEO's comment. Easy life will face credit risks from the counterparty as well as from the issuer of the asset used as collateral defaults.

9. Continued

(ii) One year later, the economic balance sheet will be impacted not only by capital gains. The STRIPS will be returned to Easy Life. If the interest rates decline, the market value of the STRIPS increases. Earnings increase from change in market value. On the other hand, the discount factor for liability's cash flows will decrease due to the lower interest rate. This will increase the liability and the change of liability will offset the change of asset, only if the duration of Easy Life's assets and liabilities are perfect matched.

(e) Recommend whether Easy Life should implement Option I or Option II. Justify your answer.

Commentary on Question:
Candidates perform poorly on this question. Option 2 is the most logical conclusion under the given scenario (maximizing the return on economic capital.) Most of the candidates didn't answer the questions based on the given scenario. Candidate can also receive the full or partial credits for choosing Option 1 if they make some additional assumptions on the default possibility of the counterparty and the issuer of AA 10-year corporate bonds.

The sample solutions are listed below.

Sample solution 1:

Assuming the default possibility from counterparty will not be changed when interest rate decreases. In order to maximum the return on capital. Option 2 is recommended. It is because:

(i) Easy Life will still get the 5% gain through the re-purchase.
(ii) Easy Life will also get the mark-to-market gain on the treasury STRIPS, which they could then sell.
(iii) Under option 1, Easy Life would not benefit from the mark-to-market gain by selling the STRIP at the outset. The return is fixed at 5% of Y in Option 1.

Sample solution 2:
When interest rate decreases, the market value of AA 10-year Corporate Bond will increase. If the market value of AA 10-year Corporate Bond is larger than 105% Y and the corporate bond default risk is assumed to be unchanged, recommend Option 1. Under this scenario the counterparty default risk is minimized.

Easy Life can keep its corporate bond when counterparty defaults. The corporate has a higher market value than 105% Y. Easy Life will benefit from the capital gain of the corporate bond.

10. Learning Objectives:

2. The candidate will be able to identify the presence of liquidity & counterparty credit risk, and critique approaches to measure and manage these risks, and identify second order impacts of mitigating these risks.

Learning Outcomes:

(2a) Identify counterparty credit and liquidity risks concepts that arise from specific business activities.

(2c) Critique the applicability and relevance of various counterparty credit and liquidity measurement and management techniques, as well as the associated impacts.

Sources:
SDM-Counterparty Credit Risk-Ch.4 (p.36 – p.46) and Ch.14 (p.309 - 310)

Commentary on Question:
This question tested the candidate's understanding of counterparty risk, CVA, and related concepts. The candidate was meant to apply their knowledge of these concepts to the specific scenario provided.

Solution:

(a) The CRO of Bank XYZ comments that the bank is not exposed to much counterparty risk, because its portfolio has a large number of counterparties.

Critique the CRO's comment.

Commentary on Question:
The candidate should have commented on the CRO's statement as it relates to XYZ's situation. Answers that were purely general were only given part marks.

The CRO's statement is misleading for a number of reasons. Firstly, the combined loans of company #1 and #2 amounts to about 20% of the total outstanding loans of Bank XYZ. Even though the total number of client companies is 1,002, there is too much counterparty risk concentrated in these two companies.

Generally, diversification across counterparties cannot reduce Bank XYZ's counterparty risk significantly. Counterparty risk is not diversifiable by the law of large numbers in the same capacity as mortality risk for example, because credit events are largely interrelated and correlations exist which are difficult to filter out in their entirety.

10. **Continued**

(b) The CRO recommends using CVA to manage counterparty risk for Bank XYZ.

Evaluate the CRO's recommendation. Show your work.

Commentary on Question:
Using the information provided, the candidate was meant to apply CVA to determine the risky value of Bank XYZ's loans, and comment on its benefits and limitations, as they would related to Bank XYZ.

The CRO's suggestion involves using CVA, which is applied to risk-free values to determining risk-adjusted values.

Risky Value = Risk-free Value + CVA (since CVA here is defined as a negative number)

The loan amount given is in its risk-free value. The risky values can be determined as follows:

Client Company	Risk-free Value of Loan Amount ($ billion)	CVA ($ billion)	Risky Value of Loan Amount ($ billion)
#1	13	-2	11
#2	7	-1	6
#3-#1002	0.08 each	-0.01 each	0.07 each
Total	100	-13	87

Company #1's risky value amounts to 11/87 = 13% of the total Bank XYZ's risky value and company #2's is 6/87 = 7%.

The total risky value of companies #3-#1,002 as a group is 70 billion (0.07 each), which accounts for about 70/87 = 80% of the total risky value of XYZ's loans.

Despite being small and of equal size, companies #3-#1,002 are all mining companies in Canada. Therefore, they are all exposed to similar economic factors specific to their jurisdiction and industry. Their financial performances and consequently credit qualities are likely to be heavily correlated, which means they cannot be used to diversify against one another.

The CRO's suggestion is a good start to measuring and managing counterparty risk, but it is not enough on its own. CVA reflects counterparty risk mitigation such as netting and collateral, and is additive across different counterparties. However, it cannot distinguish between counterparty portfolios that are highly concentrated.

10. **Continued**

(c) Recommend an enhancement to using only CVA to better manage counterparty risk for Bank XYZ. Justify your answer.

Commentary on Question:

The answer below is an example of the most ideal sort of recommendation. Points were given for various alternative recommendations, provided they were sensible and justified by the candidate.

CVA focuses on evaluation counterparty risk at the trade level (incorporating all specific features of the trade) and at the counterparty level (incorporating risk mitigants), but it does not capture the portfolio level.

An enhancement to using CVA would be to also incorporate Credit Limits, which essentially act at the portfolio level by limiting exposures to avoid undesirable concentrations. For example, in the case of Bank XYZ, Credit Limits in theory would have prevented the overexposure to the Canadian mining industry.

Therefore, it is recommended that Bank XYZ consider the use of Credit Limits as a complement to the existing CVA methodology. CVA and Credit Limits act well together in the aim of controlling and quantifying counterparty risk.