
SOCIETY OF ACTUARIES
Strategic Decision Making Exam

Exam CFESDM

MORNING SESSION

Date: Thursday, October 29, 2015

Time: 8:30 a.m. – 11:45 a.m.

INSTRUCTIONS TO CANDIDATES

General Instructions

1. This examination has a total of 100 points. It consists of a morning session (worth 60 points) and an afternoon session (worth 40 points).
 - a) The morning session consists of 5 questions numbered 1 through 5.
 - b) The afternoon session consists of 4 questions numbered 6 through 9.

The points for each question are indicated at the beginning of the question. Questions 1, 4, 5, 7-9 pertain to the Case Study, which is enclosed inside the front cover of this exam booklet.

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

Written-Answer Instructions

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

Tournez le cahier d'examen pour la version française.

CASE STUDY INSTRUCTIONS

The case study will be used as a basis for some examination questions. Be sure to answer the question asked by referring to the case study. For example, when asked for advantages of a particular plan design to a company referenced in the case study, your response should be limited to that company. Other advantages should not be listed, as they are extraneous to the question and will result in no additional credit. Further, if they conflict with the applicable advantages, no credit will be given.

****BEGINNING OF EXAMINATION****
Morning Session

Question 1 pertains to the Case Study.
Each question should be answered independently.

1. (7 points)

- (a) (1 point) Outline the three major sections required in an Own Risk Solvency Assessment (ORSA) summary report.

Information on Darwin Life Insurance Company can be found in Section 7 of the Case Study.

The ORSA Guidance Manual was adopted at the National Association of Insurance Commissioners' (NAIC) spring 2012 meeting. Julia Reich, recently appointed Chief Risk Officer of RPPC Dynasty, is considering the implications for RPPC and its U.S. life insurance subsidiary, Darwin Life Insurance. Reich has developed a road map: a high level implementation plan of Dynasty's strategy regarding regulatory developments that she will be presenting to the CEO. The road map includes Darwin's implementation plan for ORSA.

When Julia Reich presented her road map to Brandon Kaladin, CEO of Darwin, he had the following response:

“Your road map is far too extensive and requires too much company time for its implementation. The ORSA reporting requirement is just another unreasonable regulatory hoop that we have to jump through that will not provide any benefit to our company. You need to scale back your plan to the minimum level of effort it will take to meet this new NAIC requirement.”

- (b) (3 points) Describe how the ORSA process and ORSA Summary Report creation will impact three operating areas within Darwin.
- (c) (3 points) Identify and describe three benefits to insurance companies that Reich can use to justify a more rigorous implementation of the ORSA reporting requirements.

2. (13 points) You have a model to determine corporate bond spreads.

(a) (2 points)

- (i) Identify four determinants for corporate bond spreads.
- (ii) Explain how each of these determinants impacts the bond spreads.

A discrete model is selected incorporating credit migration as well as defaults using a lattice or tree analysis. The model assumes three credit ratings: A, B, and D (default, an absorbing state). A bond with rating A can maintain its rating or be downgraded to ratings B and D. A bond with rating B can be upgraded to rating A, maintain its rating, or be downgraded to rating D. The following is the table of credit rating migration probabilities:

		Next Period Ratings		
		A	B	D
Current Period Ratings	A	0.85	0.1396	0.0104
	B	0.03	0.8920	0.0780

You are asked to price a \$100 two-year zero-coupon bond assuming that the bond has a B rating upon its origination and that it has a zero recovery rate upon default in a two-period model. The one-year risk-free spot rate is 3.0% per year and one-year risk-free forward rate is 4.2% per year. The CFO has challenged the transition probability that you created.

(b) (6 points)

- (i) Describe the underlying assumptions within the framework.
- (ii) Critique the framework.
- (iii) Sketch a lattice or tree showing the backwards recursion process used to price the bond with appropriate probabilities of credit rating migration at each node. Use labels as appropriate.
- (iv) Calculate the risk-neutral valuations of the A-rated and B-rated nodes in period 1, respectively.
- (v) Calculate the value of the bond at period 0.

2. Continued

The bond credit spread is defined to be a constant risk premium added to the risk-free rate to reflect the loan's risk exposure.

(c) (1 point) Verify the bond credit spread is about 0.0863.

Insurance LMN has developed a single premium pure endowment insurance product. This product pays \$100.00 if the insured is alive at the end of year two and pays nothing if the insured dies during the period. Insurance LMN is securitizing this product to the capital market. The one-year risk-free spot rate is 3% per year and the one-year risk-free forward rate is 4.2% per year. The price for this securitized product is \$70.00 at time zero.

(d) (2 points) Calculate the spread for LMN's securitized product. Show your work.

An investor is considering two investment alternatives:

1. the bond that you priced in part (b)
2. LMN's securitized product

(e) (2 points) Evaluate which investment the investor should buy.

3. (14 points)

(a) (2 points)

- (i) Identify one internal and three external stakeholders of economic capital.
- (ii) Describe how each stakeholder interprets economic capital.

XYZ is a U.S. based life insurance company. Currently, XYZ is considering launching two new products with similar risk profiles but different durations. It uses a stochastic model to estimate the stand-alone required economic capital of these two products. Economic capital is set equal to the 99.5th percentile.

XYZ wants to raise the additional required economic capital externally by either issuing equity or debt. The cost of debt is assumed to be the U.S. short term yield plus a margin of 0.5%, where U.S. short term yields are projected by the stochastic model.

The economic capital at time 0 (i.e., at the projection start date) under various funding strategies is estimated by the stochastic model. The actual capital backing the economic capital is allocated to cash. Therefore investment risk is ignored.

Economic Capital at Time 0 (in millions)		
Funding Strategy	Product A	Product B
100% Equity	A1 = \$120	B1 = \$85
100% Debt	A2	B2
75% Equity and 25% Debt	A3	B3
25% Equity and 75% Debt	A4	B4

(b) (3 points)

- (i) Identify which product has a longer duration.
- (ii) Rank the economic capital under different funding strategies for Product A.
- (iii) Rank the economic capital under different funding strategies for Product B.

Justify your answers.

3. Continued

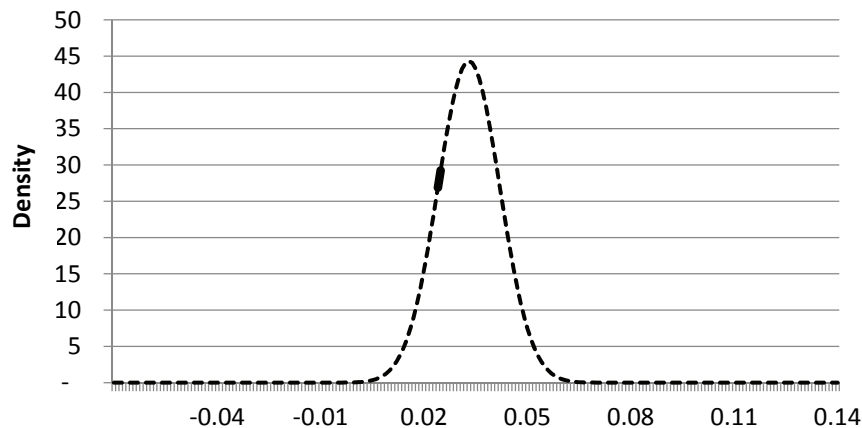
The table below lists the sensitivities on economic capital by moving from one funding strategy to another strategy.

Changes of Economic Capital at Time 0 (in millions)		
Funding Strategy	Product A	Product B
FROM 100% Debt TO 100% Equity	A2 – A1	B2 – B1
FROM 25% Equity and 75% Debt TO 75% Equity and 25% Debt	A4 – A3	B4 – B3

- (c) (2 points) Identify which change is the largest and which change is the smallest among all the sensitivities (A2-A1, B2-B1, A4-A3 and B4-B3). Justify your answers.

After comparing the different funding strategies, XYZ decides to fund the economic capital with 100% equity. Figure 1 graphs the return on economic capital of Product A, assuming 100% of economic capital is invested in cash.

Figure 1: Product A Risk adjusted return on Economic Capital Probability Density Function



Question 3 continued on next page

3. Continued

Revise Figure 1 by adding two additional sketches, and label each sketch in your revised Figure 1 clearly:

- (d) (4 points)
- (i) Sketch the risk adjusted return on Product A's economic capital investing actual capital in 100% risky equities.
 - (ii) Sketch the risk adjusted return on Product A's economic capital investing actual capital in 100% government bonds.
 - (iii) Explain the difference in risk adjusted returns between each of the three funding strategies (cash, risky equities and government bonds).

A graph similar to revised Figure 1 is created for Product B, illustrating the return on economic capital for the three funding strategies.

- (e) (3 points) Describe the differences in Product B's graph compared to your revised Figure 1 for Product A. Justify your answer.

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Question 4 pertains to the Case Study.
Each question should be answered independently.

4. (13 points) The following four elements of a basic banking model are:

- I. Leverage
- II. “Gap”
- III. Liquidity
- IV. Credit or default risks

(a) (2 points) Explain why the personal and commercial banking business has historically had stable revenue streams considering the elements I-IV.

Information on Big Ben Bank can be found in Section 6 of the Case Study.

Big Ben’s CEO, Adrian Roger, is reviewing his strategic vision about Big Ben’s four business divisions:

- A. Personal and commercial
- B. Wealth management
- C. Asset management
- D. Investment banking

(b) (4 points) Describe the impact on each business division, A-D, of European deleveraging and the sovereign debt crisis.

At the beginning of 2011, RPPC’s CRO, Julia Reich, discovered that 90% of Big Ben’s derivative transactions were done with Big Italian Bank’s investment banking division, which had substantial Italian government bond holdings on its balance sheet. Julia was worried about a counterparty default given the looming European sovereign crisis.

(c) (2 points) Recommend three ways to mitigate this counterparty risk. Justify your recommendations.

4. Continued

Big Ben's CRO, Maggie Crawley, is considering the following three methods used in measuring counterparty default risk:

- I. Current Exposure Method
 - II. Standardized Method
 - III. Internal Model Method
- (d) (2 points) Describe the netting exposure at default for each of the three methods I-III.
- (e) (3 points) Recommend a method for Big Ben to measure its counterparty default risk based on its existing business. Justify your recommendation.

***Question 5 pertains to the Case Study.
Each question should be answered independently.***

5. (13 points) Information on RPPC Dynasty Corporation and Frenz Corporation can be found in Sections 1 and 4 of the Case Study respectively.

(a) (1 point) Describe Mr. Ruiz's risk appetite and risk tolerance when he started the coffee shop business in 1985.

Four risk approaches are:

- I. Diversification
- II. Loss Controlling
- III. Risk Trading
- IV. Risk Steering

(b) (2 points) Describe each of the four risk approaches I-IV.

The risk perspectives of each Frenz risk committee member are:

Lamb: Freedom to react to the changing environment is very important.

Messy: Gains and losses alternate. A successful business anticipates sufficient rewards for the risks it takes.

Percy: Careful risk mitigation reduces the need to determine risk appetite.

Silvia: We should avoid risks that we don't fully understand.

Risk perspectives can be categorized as Conservators, Managers, Maximizers, and Pragmatists.

5. Continued

(c) (6 points)

- (i) Identify which risk perspective is not present in the risk committee members of Lamb, Messy, Percy, and Silvia.
- (ii) Identify which risk approach would likely be used by a person with the missing risk perspective identified in (i).

RPPC grew steadily in the early years 1985-1988.

- (iii) Critique the risk approach identified in (ii) if applied during the years 1985-1988.
- (iv) Recommend the best risk perspective and risk approach for the years 1985-1988.

Below are two statements about corporate culture:

X. Corporate culture tends to be self-perpetuating.

Y. Corporate culture usually adheres to a particular risk perspective.

(d) (4 points)

- (i) Describe two reasons for each statement X and Y.
- (ii) Identify an example relevant to Frenz Corporation for each statement X and Y.

****END OF EXAMINATION****
Morning Session

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