

Exam ILALFMC

Life Financial Management - Canada AFTERNOON SESSION

Date: Wednesday, April 29, 2020

Time: 1:30 p.m. – 3:45 p.m.

INSTRUCTIONS TO CANDIDATES

General Instructions

1. This afternoon session consists of 4 questions numbered 8 through 11 for a total of 40 points. The points for each question are indicated at the beginning of the question.
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 ILALFMC.
6. Be sure your essay answer envelope is signed because if it is not, your examination will not be graded.

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****BEGINNING OF EXAMINATION****

Afternoon Session
Beginning with Question 8

- 8.** (11 points) You are an actuary at a consulting firm that has been hired by Company A to assist with a possible acquisition of Company B. Company B has performed an actuarial appraisal and has also hired an investment bank to assist in setting an offer price.
- (a) (2 points) Describe the three basic techniques used by investment bankers to value life insurance companies.
- (b) (2 points) Identify four components that are included in the determination of the Adjusted Book Value (ABV) of a company.

Company B has provided you with the information they used in their actuarial appraisal valuation.

Adjusted Book Value	40
Discount Rate	10%
Investment Earnings Rate	5%
Tax Rate	21%

	Year 1	Year 2	Year 3	Year 4
Current + New Business After Tax Book Profits	6	3	8	10
Required Capital	15	20	22	25

Company B assumed the following terminal valuations in Year 5:

- After-Tax Future Book Profits = 170
 - Cost of Required Capital = 30
- (c) (3 points) Determine the actuarial appraisal value of Company B using the assumptions above.

8. Continued

You note that:

- Company A and Company B sell different types of products, but both companies use the same administrative system vendor.
 - Company A has a larger distribution channel than Company B.
 - Company A and Company B have a similar capital structure, but Company A has a lower CAPM Beta.
- (d) *(3 points)* Recommend three adjustments Company A should consider making to the valuation of Company B in part (c). Justify your answer.
- (e) *(1 point)* Since Company B reports on U.S. GAAP, the investment bankers suggest that U.S. GAAP financials should be used in the actuarial appraisal. Critique this suggestion.

- 9.** (12 points) PCLC is a US life insurance company that sells primarily single premium immediate annuity (SPIA). PCLC uses only the statutory capital basis to manage the risk profile. You are the head of enterprise risk management (ERM) and are interested in using a principles-based economic capital approach for managing the risks.
- (a) (1 point) Assess the treatment of the key risks for SPIA under each of the following:
- (i) Economic capital
 - (ii) Statutory risk-based capital
- (b) (3 points) Critique the following statements related to the capital needed for PCLC's SPIA product:
- A. *VaR is preferable over CTE because it recognizes and allocates diversification benefits.*
 - B. *The liability runoff approach uses the preferred time horizon because of the importance of finding the amount of capital today that will provide sufficient protection for the lifetime of the portfolio.*
 - C. *The use of an economic valuation method provides the best assessment of risks across different companies and countries regardless of any regulatory or accounting framework.*
 - D. *If PCLC holds 400% of total RBC for its SPIA block the surplus will be sufficient to cover all the future benefits.*

9. Continued

The team provided you with the following information for the SPIA block:

Reserve and Capital	
Statutory Reserve	99
Statutory Capital for Asset Risk	2
Statutory Capital for Longevity Risk	1

Stochastic Simulation	Economic Liability discount at 5%	Economic Liability discount at 4.5%
1	109	111
2	108	110
3	107	109
4	106	108
5	105	107
6	100	102
7	101	103
8	102	104
9	103	105
10	104	106

- Stochastic mortality simulation is used for quantifying the longevity risk
- The economic reserve is the mean of all stochastic simulations
- Assets supporting SPIA earn the statutory interest rate of 5%
- PCLC enters into a total return swap that costs 0.5% to eliminate the asset risk
- The 90th percentile is the economic capital measure of the company
- Assume no correlation

(c) (5 points)

- (i) Calculate the economic capital for PCLC's asset and longevity risk. Show all work.
- (ii) Explain the relationship between the statutory capital and economic capital for asset risk.
- (iii) Explain the relationship between the statutory capital and economic capital for longevity risk.
- (iv) Recommend an appropriate risk capital approach using the total asset requirement for the SPIA product. Justify your response.

Question 9 continued on the next page.

9. Continued

(d) (3 points)

- (i) Construct a multi-tiered capital objective for PCLC assuming it takes a statutory view.
- (ii) Explain how the multi-tiered capital objective would be different if PCLC took an economic view.

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10. (10 points) XYZ Life sells both life insurance and annuity products. The company reinsures a portion of the mortality risk for each product. The company will be transitioning from IFRS 4 to IFRS 17.

- (a) (2 points) Describe the considerations in using the margin approach to determine the risk adjustment.
- (b) (2 points) Describe how the IFRS 17 disclosure requirements related to the confidence level of the risk adjustment may be satisfied under each of the following methods:
 - (i) Quantile technique
 - (ii) Cost-of-capital approach
- (c) (6 points) The valuation actuary in Company XYZ decides to use OSFI's Life Insurance Capital Adequacy Test (LICAT) framework as a calibration benchmark for the confidence level corresponding to the risk adjustment.

You are given the following:

Credit Risk Component	60
Operational Risk Component	80
Market Risk Component	40
Total Net Amount at Risk	2,000
Total Face Amount	3,500
Next year's expected claims	400
Standard deviation of next year's projected net death claims	38

10. Continued

PV of CFs for 10% increase in expense assumptions	110
PV of CFs for 20% increase in expense assumptions	125
PV of Registered annuity CFs for 20% reduction in mortality improvement	50
PV of Non-Registered annuity CFs for 20% reduction in mortality improvement	25
PV of Registered annuity CFs for 10% reduction in mortality improvement	40
PV of Non-Registered annuity CFs for 10% reduction in mortality improvement	15
PV of CFs for any 10% increase in mortality	113
PV of CFs for 75% reduction in future mortality improvement assumptions in the first 25 years	120
PV of CFs for 75% increase in future mortality improvement assumptions	125
PV of CFs with 1 per 1000 increase in deaths in the year following the reporting date	130

Assume the Lapse risk is immaterial.

	Best estimate liability	Risk Adjustment
Life Insurance	60	43
Annuities	40 (Registered annuity: 30 Non-registered annuity: 10)	16
Total	100	59

The following correlation matrix is used to determine diversification credit:

	Mortality	Longevity
Mortality	100%	-20%
Longevity	-20%	100%

Selected values from the standard normal distribution:

Confidence Level	70%	75%	80%	85%	90%
Standard Normal value	0.52	0.67	0.84	1.04	1.28

Calculate the confidence level corresponding to the risk adjustment to the nearest 5%. Show all work.

11. (7 points)

- (a) (1 point)
- (i) Explain why tax cash flows may differ from zero for a particular valuation scenario even if forecasted GAAP income before tax is zero.
 - (ii) Explain the distinction between permanent and temporary tax differences as determined for GAAP reporting purposes.
- (b) (1 point) State whether the following create a permanent or temporary tax difference.
- (i) Incurred but not reported reserves
 - (ii) Forward starting swaps
 - (iii) Investment income tax in Quebec
 - (iv) Reserves for a foreign subsidiary
- (c) (5 points) BDC Life is a Canadian insurance company. You are given the following information as of December 31, 2020:

Year End Values	2020 (Active)	2021 (Projected)	2022 (Projected)
Statutory Reserves	5,760	5,184	0
Maximum Tax Actuarial Reserves	5,000	4,500	0

- Corporate Tax Rate = 35%
- Discount Rate = 4%
- GAAP and Tax Asset values are the same

- (i) (4 points) Calculate the insurance contract liability after carve-out as at year-end 2020. Show all work.
- (ii) (1 point) Describe guidance provided in the CIA Standards of Practice with respect to projected tax savings which should reduce the insurance contract liability.

****END OF EXAMINATION****
Afternoon Session

USE THIS PAGE FOR YOUR SCRATCH WORK

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