
SOCIETY OF ACTUARIES
Life Finance & Valuation - Canada

Exam ILALFVC

MORNING SESSION

Date: Thursday, May 5, 2016

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 6 questions numbered 1 through 6.
 - b) The afternoon session consists of 5 questions numbered 7 through 11.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 ILALFVC.
6. Be sure your essay answer envelope is signed because if it is not, your examination will not be graded.

Tournez le cahier d'examen pour la version française.

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

- 1.** (10 points) Assess the accuracy of each of the following statements with regard to the use of performance metrics for value-based management of insurance business. Include any necessary recommendations to correct the statements.
- A. *Economic value added (EVA) and risk-adjusted return on capital (RAROC) are good performance metrics for life insurance.*
 - B. *There is an important connection between the cost of capital and solid enterprise risk management (ERM).*
 - C. *The cost of capital can be interpreted as the minimum rate of return on equity capital that is required by the shareholders to make it worthwhile to invest in a company. The correct cost of capital rate is essential to measuring performance.*
 - D. *Traditional accounting-based performance measures such as return on equity (ROE) or return on investment (ROI) evaluate performance and provide good indications for relative performance measurement and value creation.*
 - E. *Businesses should distinguish forward-looking objectives, such as target setting and decision making, from backward-looking objectives, such as performance evaluation and compensation schemes.*
 - F. *Market-based measures of return are superior to accounting-based measures of return.*
 - G. *The market consistent embedded value (MCEV) corresponds to the value of the business at one specific point in time and is a good measure for managerial performance.*
 - H. *For operating variances there is no need to separate between experience variances and assumption changes. The MCEV methodology makes implicit allowances for change in all assumptions as it is based on market consistent values.*
 - I. *The total MCEV earnings should be used for managerial performance evaluation.*
 - J. *In order to measure the true value creation of MCEV earnings, the unwinding of the inforce business needs to be included since there is no additional value creation by the expected business contribution.*

2. (10 points)

- (a) (2 points) Explain how an insurance company can use reinsurance on an inforce block as part of its financial strategy.
- (b) (2 points)
- (i) Describe the characteristics of modified coinsurance (mod-co).
- (ii) List two advantages and two disadvantages of mod-co.
- (c) (4 points) JZ Life has a large inforce block of universal life (UL) business, which it plans to cede to CM Re in the form of mod-co. The UL block has a total net amount at risk (NAAR) of 50 billion and total annual premiums of 200 million. The block is closed to new business.

Assume the following for the inforce mod-co reinsurance transaction:

- Quota share arrangement of 90%
- NAAR stays constant
- Taxes, investment income and maintenance expenses are ignored
- CM Re pays JZ Life an allowance of 10% of ceded premiums
- JZ Life pays CM Re a risk charge of 5% of the capital relief based on 200% of required capital
- This block will be recaptured at the end of year 3.

Projected cash flows (before reinsurance) are as follows (in millions):

Base Scenario

	Total Premiums	Total Claims	100% Required Capital
2017	200	140	50
2018	210	147	52
2019	200	140	50

2. Continued

Catastrophe Scenario

	Total Premiums	Total Claims	100% Required Capital
2017	200	200	52
2018	180	230	56
2019	160	280	60

Calculate the following for each year:

- (i) Gain or loss to JZ Life each year under the base scenario.
- (ii) Gain or loss to CM Re each year under the catastrophe scenario.

Show all work.

- (d) (2 points) The catastrophe scenario in part (c) excludes the following:
 - 40% of the policies of this block are eligible for non-forfeiture options.
 - Policyholders are eligible to take policy loans, and the utilization has been volatile over the years.
- (i) Assess how these exclusions affect the mortality risk to CM Re.
- (ii) Describe how these exclusions would be handled in a reinsurance transaction.

3. (9 points)

- (a) (3 points) Assess the accuracy of each of the following statements with regards to tentative decisions made by the IASB during its re-deliberations on the IFRS for insurance contracts. Include any necessary recommendations to correct the statements.
- A. *Changes in the discount rate are presented in other comprehensive income (OCI).*
 - B. *Investment components are excluded from revenue.*
 - C. *Premiums written are presented in the income statement.*
 - D. *The day one locked-in discount rates are used to accrete interest on the contractual service margin (CSM) and calculate the subsequent adjustments that unlock the CSM.*
- (b) (6 points) The IASB continues to discuss a number of matters surrounding the treatment of participating insurance contracts under IFRS.
- (i) Describe the five key areas under discussion.
 - (ii) Describe any concerns an insurance company may have with the IASB's proposals regarding these five key areas.

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- 4.** (11 points) LifeCo is a Canadian life insurer that sells both participating (par) and non-participating (non-par) life insurance. LifeCo determines dividends using the contribution principle.
- (a) (2.5 points) Describe the relevant experience factors considered in the determination of dividends for LifeCo's par product.
- (b) (1.5 points) Determine whether the following dividend practices are fair. Justify your answers.
- A. *Dividend policy indicates that investment experience is smoothed in over 5 years. The actuary decides that to increase dividends this year, investment gains will be smoothed in over 2 years instead.*
- B. *Tax legislation is such that one cohort of policies is subject to additional taxes. This cohort is managed with a lower dividend scale.*
- (c) (2 points) The dividend actuary for LifeCo reviews past experience on the par product and notes the following:
- Investment performance has been poor over the last 10 years, with a significant loss in the most recent year.
 - All other experience has emerged as expected.
 - No dividend scale changes have been made in the last 10 years.
 - Client illustrations at the time of sale show current dividend scales only.

Based on the experience, the dividend actuary proposes a reduction in the dividend scale to recover past investment losses.

- (i) Critique the dividend actuary's proposal with regards to policyholders' reasonable expectations and LifeCo's practices.
- (ii) Assess whether LifeCo's block of par policies would qualify under MCCSR guidelines for reduced risk factors.

4. Continued

- (d) (2 points) Describe four methods that can be used to allocate investment experience between the par and non-par blocks of business.
- (e) (3 points) You are given the following:

As at December 31, 2016	Non-Par	Par
Best Estimate Reserves	12	5
Interest PfAD	3	1
Best Estimate Reserve Sensitivities		
Maintenance Expenses: +10%	12.2	5.2
Mortality Rates: +5/ e_x	12.5	5.3
Lapse Rates: +15%	11	7
Lapse Rates: -15%	13	4

- LifeCo estimates the total reserve with PfAD using the data above.
- The non-par and par reserves are backed by a shared pool of assets, which earned investment income of 2 in 2016. The investment income is allocated using the mean-fund approach.

Calculate the investment income allocated to the par fund in 2016. Show all work.

5. (10 points) XYZ Life sells whole life insurance and single premium deferred annuities (SPDA).

You are given the following expense information for XYZ:

Expenses for 2016 (millions)	Whole Life	SPDA	Capital & Surplus	Total
Commission – New Sales	150	20	0	170
Commission – Renewal	250	0	0	250
Product Pricing & Development	5	1	0	6
Marketing	10	2.5	0	12.5
Distribution	25	5	0	30
Finance & Accounting	7.5	1.5	0.5	9.5
Human Resources, Legal Services & Regulatory	2.5	0.5	0	3
Underwriting	25	1	0	26
IT Costs for Administration Systems & Applications	30	5	0	35
Benefit Processing	2.5	1	0	3.5
Project Expense # 1 – Implementing New Privacy Legislation	1.5	0.5	0	2
Project Expense # 2 – Back-Office Administration System Upgrade (Not Capitalized)	0.8	0.2	0	1
Customer Support – Policy Issuance	4	0.5	0	4.5
Customer Support – Policy Administration	31	6	0	37
Annual Depreciation Expenses (excluding Project # 2)	6.2	0.8	0	7
Claims Litigation Expenses	0.5	0	0	0.5
Premium Tax	12	0.5	0	12.5
Corporate Executive Oversight	15	2	1	18

5. Continued

This year the company spent 7 million on a significant back-office administration system with an expected payback period of three years. The company capitalized 6 million of the expenditure, amortized linearly over the payback period. The appointed actuary believes with confidence that the administration project will improve maintenance expenses by 4 per policy for the whole life product and 2 per policy for the SPDA product.

You are also provided with the following information:

	Whole Life	SPDA	Total
Annual Premium (Policies in Force at End of 2016)	600,000,000		
Number of New Policies Sold in 2016	100,000	5,000	105,000
Number of Policies in Force (End of 2016)	1,000,000	100,000	1,100,000
Number of Death Claims and Annuity Payments Processed in 2016	1,500	4,000	5,500
Budgeted Long Term Non-recurring Expenses Including Depreciation for Project # 2	3.00 per policy	1.00 per policy	

Assume zero inflation.

- (2 points) Identify the expenses to include when calculating the CALM reserve for XYZ Life.
- (1 point) List the methods which may be used to allocate corporate and overhead expenses to expense classes.
- (4 points) Determine the best estimate maintenance expense per policy and benefit expense per claim.
- (2 points) Recommend the maintenance expense margin for adverse deviation (MfAD). Justify your answer.
- (1 point) Determine the provision for adverse deviation (PfAD) for the premium tax on the whole life product as at the end of 2016.

6. (10 points) Company Alpha is reviewing its valuation investment assumptions for its universal life (UL) product.

(a) (2 points) Describe four risks to Alpha if it were to back its UL product with an investment in equities.

(b) (2 points) For the UL block, you are given:

Projection Year	19	20	21
Claims	100	200	300
Expenses	10	10	10
Premiums	200	200	200
Spot rate	3.1%	3.3%	3.4%

Calculate the maximum non-fixed income assets allowed to be held at the start of projection year 19 according to the '20-20-75 limit' rule. Show all work.

(c) (4 points)

The current asset allocation backing the UL product is 80% long-term Government of Canada (GOC) bonds and 20% TSX (Toronto Stock Exchange) composite index. The investment manager has recommended changing the allocation to 75% long-term GOC bonds, 20% TSX composite index, and 5% Hang Seng (Hong Kong) index.

For this recommended allocation:

(i) Identify any concerns.

(ii) Describe the method to determine an appropriate foreign exchange rate assumption.

(iii) Propose an appropriate foreign exchange rate MfAD. Justify your proposal.

(d) (2 points) The Hang Seng Index has dropped significantly below average values and the investment manager feels it is due for a rebound. The actuary uses this assertion when determining the investment return assumption.

Assess the appropriateness of the investment return assumption.

****END OF EXAMINATION****

Morning Session

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