

Exam ILALFVC

Life Finance & Valuation - Canada MORNING SESSION

Date: Thursday, May 2, 2019

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 7 questions numbered 1 through 7.
 - b) The afternoon session consists of 4 questions numbered 8 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.

Recognized by the Canadian Institute of Actuaries.

Tournez le cahier d'examen pour la version française.

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

- 1.** (7 points) Critique the following statements regarding IFRS 17:
- A. *IFRS 17 affects the same population of contracts as IFRS 4: insurance contracts issued, reinsurance contracts held, and investment contracts with discretionary participation features issued.*
 - B. *All assumptions used to calculate fulfillment cash flows and the contractual service margin (CSM) are current assumptions. The cash flows and assumptions are updated at each reporting date, using current estimates.*
 - C. *There is no special treatment for contracts with a variable fee (compared to all other IFRS 17 applicable contracts) in recognizing fulfillment cash flows, changes due to discount rates and other financial variable changes.*
 - D. *In the event of non-economic assumption updates, changes that relate to current or past insurance coverage are recognized in profit or loss; changes that relate to future coverage are recognized by adjusting the CSM.*
 - E. *IFRS 17 helps to eliminate the economic mismatches between insurance contract liabilities and assets by using a discount rate based on the characteristics of the liability.*
 - F. *Under IFRS 17, a company can group contracts within a portfolio into: 1) those contracts that are onerous at initial recognition and 2) those contracts that are not onerous at initial recognition. In addition, a group of contracts cannot include contracts issued more than one year apart.*
 - G. *Under IFRS 17, a company can: 1) include an explicit, current risk adjustment in the measurement of insurance contracts; 2) use risk adjustment for some contract types but not for others; 3) use an implicit risk margin or allowance.*

THIS PAGE INTENTIONALLY LEFT BLANK

- 2.** (10 points) ABC is a public life insurance company subject to the financial reporting requirements of Section 404 of the Sarbanes-Oxley Act (SOX 404).
- (a) (2 points) Describe the four key risk areas impacting the processes for determining actuarial amounts in the financial statements.
- (b) (4 points) Critique the statements below from the Chief Financial Officer of ABC with regard to best practices for adherence to SOX 404:
- A. *Internal controls have no obvious benefit.*
 - B. *Only processes that directly support the compilation of GAAP reserves and DAC should be included in the company's internal controls, and there is no reason to include other processes at all.*
 - C. *Once the compilation task is peer reviewed, I will attest, and no further action will be necessary.*
 - D. *Our actuary will respond to auditor queries only pertaining to the appropriateness of the method of compilation.*

2. Continued

- (c) (4 points) You are given the following values on ABC's annual statements for two blocks of business:

Term Life	2016	2017	2018
Beginning Face Amount Inforce	51,143	52,643	Not Available
Ending Face Amount Inforce	52,643	Not Available	Not Available
Beginning Reserve	2,407	2,478	2,551
Ending Reserve	2,478	2,551	2,489
Valuation Net Premium	1,115	1,148	1,265
Tabular Interest	100	103	108
Reserve release by death	93	94	88
Reserve release by other terminations	62	63	56

Life Annuities (Payout Annuities)	2016	2017	2018
Beginning Reserve	512	479	437
Ending Reserve	479	437	426
Premiums	0	0	0
Tabular Interest	24.75	22.75	21.50
Reserves Released by Death	13	13	14
Payments to Annuitants	58	64	30

Evaluate the reasonableness of ABC's reported change in statutory reserves for the two blocks. Justify your answer with an appropriate formula ratio test. Show all work.

3. (10 points) You are given the following:

- OAP Insurance was formed in 1980, specializing in providing funeral insurance for pensioners in Canada. Funeral insurance generally has a low face amount.
- There is no underwriting required to attain the insurance, although there is a questionnaire.
- The products have traditionally been offered through senior's clubs and service organizations.
- In 2002, OAP began offering a simple annuity used to help cover long term care living costs.
- Recently, OAP reduced its costs by offshoring its data administration and by selling its products through the internet.
- OAP uses the same mortality assumption for the valuation of all products. This assumption varies by age and gender and has been developed based on the previous 10 years of experience on all products that OAP sells. Data used in the study is fully credible.

You have reviewed the mortality assumption and have suggested that there should be two separate mortality tables used for valuation, one for annuities and one for life.

(a) (4 points)

- (i) Describe the additional data parameters traditionally used as inputs when developing a life insurance mortality table.
- (ii) Recommend which of the inputs in (i) are appropriate to include when building the mortality table for OAP's funeral insurance product.
- (iii) Describe the additional data parameters traditionally used as inputs when developing an annuity mortality table.
- (iv) Recommend which of the inputs in (iii) are appropriate to include when building the mortality table for OAP's annuity product.
- (v) List two other concerns or considerations regarding data used when creating these new tables.

(b) (2 points) Determine an appropriate MfAD for both mortality tables. Justify your answer.

3. Continued

(c) (4 points)

- (i) Recommend if OAP should apply a diversification factor in its Future Mortality Improvement (FMI) Margin when determining its mortality tables. Justify your answer.
- (ii) You are given the following table showing the impact of applying the FMI margin without diversification to the base mortality improvement rates. Each impact on actuarial liabilities is the highest increase under the two mortality improvement scenarios.

	Funeral Insurance	Annuities
Ages 60-69	50	5
Ages 70-79	100	125
Ages 80+	20	75

Determine if a diversification factor of 0.30 is acceptable under the standards of practice for each age group. Show all work.

4. (7 points)

- (a) (3 points) You run a projection on a block of business assuming the entire block lapses in year 5:

	Projection Year					
	0	1	2	3	4	5+
After Tax Book Profit		100	90	95	103	0
Required Capital	50	48	46	44	42	0
Free Surplus	10	9	11	7	5	0

The model uses equity cost of capital as the risk discount rate, and the inputs below:

10 Year Treasury	2.90%
CAPM Beta for your company	1.3
Market Risk Premium over 10 Year Treasury	5%
After-tax Investment Return Rate	3.5%

Calculate the EV that should be produced by the model. Show all work.

- (b) (4 points) Critique each of the following statements related to EV methodology:
- A. *Since assets backing reserves include debt securities, the company should consider factoring in the cost of debt into the risk discount rate.*
 - B. *Assumptions that are considered sensitive should have a Provision for Adverse Deviation (PAD) in EV calculations.*
 - C. *Market Consistent Embedded Value (MCEV) would be a significant improvement over EV since it is easier to track changes over time, and it is easier to compare across companies.*
 - D. *Policyholder behavior should not be modeled when calculating the Time Value of Financial Options and Guarantees (TVFOG) because it cannot be accurately forecasted.*

5. (12 points)

(a) (7 points) DEF is a Canadian insurance company that sells a 2-year life insurance product to individuals above age 90. For a single premium of 100,000 paid at time of issue, the policyholder will be paid:

- 90,000 upon death
- 150,000 if the policyholder survives two years

Assume:

- $i = 0\%$
- $q_x = 20\%$
- $MI_x = 1\%$
- Present Value of Best Estimate Cashflows at issue = $-33,000$
- Deaths are assumed to occur at the end of the year

Calculate the LICAT Mortality Level Risk component at issue for this product, including a numerical demonstration of if the product is death supported. Show all work.

(b) (5 points) Assess the impacts on both the Core and Total LICAT ratios for each of the following changes:

- (i) Due to higher perceived lapse risk, increase lapse PfADs from 10% to 15% of best estimate lapses
- (ii) Strengthen mortality assumption which leads to a reserve increase (no change to mortality PfAD percentage)
- (iii) Due to some errors in claims last year, the claims system will be fully updated in order to reduce operational risk

6. (7 points)

(a) (4 points) The following method has been proposed for determining dividends for a group of participating policyholders:

- Dividend classes are to be determined each year for the participating block.
- Policyholders with similar characteristics are treated consistently.
- There should be no material, planned or systemic cross subsidization of one cohort by another.
- Dividend experience factors should be consistent with the associated underlying experience of each participating account.
- Materiality in dividend determination should be judged from the point of view of the total participating account or the company.
- Smoothing of dividends is not permitted.

Critique the method in terms of fairness, accuracy and completeness.

(b) (3 points) Describe the considerations involved in forming a fairness opinion regarding allocations of expenses and taxes to the Participating Account.

7. (7 points)

- (a) (1 point) Explain OSFI's objective in requiring a peer review of an Appointed Actuary's work.
- (b) (3 points) Identify considerations and assessments required in preparing a response as peer reviewer of an Appointed Actuary's work under the following circumstances:
- (i) Changes to the life insurance valuation assumptions for mortality, lapses and expenses, such that the net impact on valuation liabilities is immaterial.
 - (ii) A conversion from an in-house valuation system to a third-party commercially available valuation system.
 - (iii) An external audit finding that investment income during the year has been over-reported.
- (c) (3 points) The Appointed Actuary has determined that fair value reporting should be used for each of the following Universal Life features under IFRS (as per IASP 10):
- Adding a minimum credited rate of 0.5% per year to all fixed rate deposit accounts
 - Offering a "leveraged" credited rate of 2.5x market rate with a cap of 15%
 - A self-directed investment option for a fixed annual fee

Assume the current market interest rate is 1%.

Critique the appropriateness of the Appointed Actuary's determination for each feature from a peer reviewer's perspective.

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

USE THIS PAGE FOR YOUR SCRATCH WORK