
SOCIETY OF ACTUARIES
Life Finance & Valuation - Canada

Exam ILALFVC

AFTERNOON SESSION

Date: Friday, May 2, 2014

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.
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.

Written-Answer Instructions

1. Write your candidate number at the top of each sheet. Your name must not appear.
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****

**Afternoon Session
Beginning with Question 8**

8. (9 points) With respect to the 2012 CIA Educational Note on Future Income and Alternative Taxes:

(a) (3 points)

- (i) Explain the purpose of setting up future tax liabilities.
- (ii) Define the two classifications for differences in projected GAAP and Taxable income. Give three examples of each.

(b) (2 points) You are the actuary for a Canadian Life Insurance company where the tax reserves being reported are lower than the Maximum Tax Actuarial Reserve (MTAR). Describe two acceptable approaches for treating this difference for the purposes of calculating future tax liabilities as per the Educational Note.

(c) (4 points) You are given the following for a whole life block of business held by a Canadian Life Insurance Company:

	2012	2013
Insurance Cash Flows	2500	-100
Maximum Tax Actuarial Reserves (MTAR) at the end of calendar year	2100	1900
Insurance Contract Liability Ignoring Future Tax (ICLFT) at end of calendar year	2347	2200
Discounted Future Tax Provision (DFTP) at end of calendar year	-78	-100
Tax Rate	35%	35%
Investment Income	0	0

Assume that reported tax reserves are equal to the Maximum Tax Actuarial Reserve, and that the value of the assets backing the liabilities under the GAAP basis are the same as under the Tax basis. Calculate the following for the 2013 financial year:

- (i) Net Income After Tax
- (ii) Accounting balance sheet provision for future differences between GAAP and Tax income

Show all work.

9. (12 points)

- (a) (4 points) Compare the Bifurcated Approach and the Whole Contract Approach, commonly used to value policy liabilities for segregated funds, with regard to:
- (i) (2 points) The allocation of revenue.
 - (ii) (2 points) The write down of the allowance for acquisition expenses (AAE) and the change in policy liabilities as markets move down.
- (b) (4 points) You are given the following information about a portfolio of segregated fund policies:
- The best estimate is given by CTE(0) without margins
 - Policy liabilities are given by CTE(80) with margins
 - The recoverability testing for the AAE is done at CTE(60)
 - Liability for the guarantees at CTE (0) = -25
 - Liability for the guarantees at CTE (80) = 45
 - Liability for the AAE at CTE (0) = -50
 - Liability for the AAE at CTE (60) = -35

Calculate the additional margin embedded in the liability using the Bifurcated Approach. Show all work.

- (c) (4 points) You are given the following information about two cohorts of segregated fund policies.

Cohort 1	In the money 2 years left to maturity 1,000,000 to be paid in guarantee benefits at maturity Fee income of 100,000 at the start of each year for the guarantees
Cohort 2	Out of the money 3 years left to maturity Fee income of 350,000 at the start of each year for the guarantees

You are also given:

- The discount rate is 5%.
- No decrements or margins apply.

Calculate the time 0 aggregate liability for the guarantees using the recommended approach in the CIA Educational Note “Considerations in Valuation of Segregated Fund Products, November 2007.” Show all work.

10. (11 points)

- (a) (1 point) Describe three ways in which embedded value differs from actuarial appraisal value.
- (b) (10 points) BWF Life was in the process of purchasing DBM Life, when regulators shut down DBM for new business on 31 Dec 2012 and postponed the sale. BWF determined that the embedded value of DBM's inforce business was 5 billion at 31 Dec 2012. One year later, at 31 Dec 2013, the sale to BWF was allowed.

You are given:

- BWF and DBM are Canadian companies
- No distribution to shareholders occurred during 2013
- Actual terminations are equal to expected during 2013
- There is no debt backing required capital
- Risk Discount Rate is 15%
- After-tax rate of return on invested assets supporting surplus is 5%
- Assume all income items occur mid-year.

	Value at 31 Dec 2012 (millions)
Present Value of Book Profits	4,000
Required Capital	1,400
Free Surplus	500
Non-admitted Assets	100

- Non-admitted assets at 31 Dec 2013 are 100 million.

10. Continued

2013 Income Statement	(millions)	
	Expected *	Actual
Premiums	2,000	1,900
Investment Income	1,500	1,400
Interest on Capital	100	100
Claims	1,200	1,200
Expenses	300	400
Commissions	100	100
Increase in Statutory Reserves	600	500
Net Income Before Taxes	1,400	1,200
Taxes	400	400
After-tax Income	1,000	800
Increase in Required Capital	400	400
Distributable Earnings	600	400

* Using assumptions from the 31 Dec 2012 Embedded Value calculation

Assume no change in future assumptions.

- (i) (7 points) Determine the embedded value at 31 Dec 2013. Show your work.
- (ii) (3 points) Explain what the impact on Embedded Value might be with respect to each of the following events:
 - An increase in the target MCCR Ratio from 200% to 225% during 2013.
 - A valuation basis change to the mortality assumption which releases reserves.
 - A transaction which replaces some of the equity capital with debt capital paying 10%.

- 11.** (8 points) Determine which of the following products should be considered “adjustable” according to the terms of Bill C-57. Justify your responses.
- (i) A whole life policy whose policy loan interest rate changes quarterly, and is guaranteed never to exceed 90% of the Government of Canada 3-5 Year Bond Yield.
 - (ii) A Universal Life policy with three investment options: a daily interest account tied to 30-day T-Bill rates, an equity account tied to the TSX return, and a 5-year Guaranteed Investment Account whose credited rate is guaranteed to be at least equal to the company’s overall rate of return on AAA 5-Year Corporate Bonds less 2%.
 - (iii) A Universal Life policy with a death benefit that includes a Return of Premium whose mortality charges are guaranteed and whose expense charges may increase with the Consumer Price Index. Mortality charges are calculated by multiplying contractually guaranteed Yearly Renewable Term rates by the current net amount at risk.
 - (iv) A whole life policy where the contract allows the company to increase premiums in the event interest rates fall below a certain benchmark, but does not require the company to decrease premiums should interest rates remain above the same benchmark. Future premiums are guaranteed not to exceed 150% of the original premium.
 - (v) A segregated fund annuity contract that guarantees the death benefit will be 100% of deposits paid, and guarantees a maturity benefit of 90% of deposits paid. The Management Expense Ratio (MER) is guaranteed never to exceed 3%, and is currently at 2.50%.
 - (vi) A Universal Life policy whose cash value equals the policy account less a surrender charge in the first 10 years, and less a market value adjustment (MVA). The MVA is determined by comparing the current 5-Year GIC rate for new deposits to the rate being credited to the existing deposits.
 - (vii) A 10-Year Term policy whose annual premium increases at each 10th anniversary according to a schedule in the contract. Policyholders can qualify for a discount on these rates by providing satisfactory evidence of insurability, in which case the rate is never more than 95% of the rate for newly issued 10-Year Term policies.

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

USE THIS PAGE FOR YOUR SCRATCH WORK

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