
SOCIETY OF ACTUARIES
Life Pricing

Exam ILALP

MORNING SESSION

Date: Wednesday, November 2, 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 4 questions numbered 7 through 10.

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 ILALP.
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.

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

1. (6 points) For a non-renewable 5-year term life insurance block, you are given:

- Level premiums are 7 per 1,000 of Net Amount at Risk (NAAR) per year
- Maintenance expenses are 0.10 per 1,000 of NAAR per year
- Acquisition expenses are 8 per 1,000 of face amount
- The face amount in force at time 0 is 1,000,000

Time	1	2	3	4	5
Claims	3,000	4,500	3,500	2,500	1,000
Solvency Reserves	15,000	25,000	20,000	10,000	5,000
Required Capital	8,000	10,000	10,000	5,000	3,000

Assume:

- No lapses
- An annual investment rate of 2.5%
- An annual discount rate of 3.0%
- Premiums and expenses at the beginning of the year
- All other cash flows occur at the end of year
- No taxes

Calculate the present value of profit as a % of premium using distributable earnings as the profit measure. Show all work.

2. (12 points) A large insurer is currently selling a variable annuity (VA) product with the following features:

- Minimum initial premium is 50,000
- Surrender charges for 7 years with the following pattern: 8%, 7%, 6%, 5%, 4%, 3%, 2%, 0% thereafter
- Free partial withdrawals of up to 5,000 per year
- Death benefit equal to the account value

(a) (4 points) Based on developments in the marketplace, the company is considering the following four changes to the current product design:

- A. Decreasing the minimum initial premium to 25,000
- B. Shortening the surrender charge schedule to 5 years at a level 6% rate, 0% thereafter
- C. Increasing the free partial withdrawal limit to 10,000 per year
- D. Introducing an optional Guaranteed Minimum Death Benefit (GMDB) rider equal to the single premium accumulated at 3% interest each year for an additional fee.

Assess how each of the four design changes may impact the following variable annuity pricing assumptions:

- Lapse
- Mortality
- Expense

2. Continued

- (b) (2 points) For the new GMDB rider, issued at age 55, you are given:

Survival	${}_1p_{55}^T = 0.9500$	${}_2p_{55}^T = 0.9000$
Mortality	${}_1q_{55}^d = 0.0030$	${}_1q_{56}^d = 0.0035$
Underlying value of index	$S_1 = 1.10$	$S_2 = 0.90$
Management fee	$m = 0.0075$	
Management fee on death benefit	$m_d = 0.0025$	
Guaranteed death benefit	$G_1 = 1,000$	$G_2 = 1,030$
Separate account value	$F_0 = 1,000$	

Calculate the liability cash flow in year two (per thousand) assuming decrements occur at the end of year. Show all work.

- (c) (6 points)
- Describe five risk management strategies commonly used to mitigate VA guarantee risk.
 - Recommend an appropriate risk management strategy for the new GMDB rider. Justify your answer.
 - Propose changes that the company could make to the product design to help manage the risks associated with the GMDB rider.

3. (11 points) You are given the following information for a flexible premium universal life policy:

- Face amount = 150,000
- Issue age = 50
- Expense load = 8% of premium
- Guaranteed interest rate = 3%

	Interest Rate	
	4%	6%
\ddot{a}_{50}	17.2930	13.9340
A_{50}	0.3349	0.2113
$\ddot{a}_{50:\overline{7} }$	6.1740	5.8540
$A_{50:\overline{7} }$	0.1127	0.0851

(a) (5 points) Calculate the following at issue:

- (i) Guideline Level Premium (GLP)
- (ii) Guideline Single Premium (GSP)
- (iii) 7-pay premium
- (iv) Cash Value Accumulation Test (CVAT) maximum cash surrender value

Show all work.

(b) (4 points) The death benefit is reduced to 100,000 at the end of year 10. The recalculated GLP is 1,100. A premium of 2,500 is paid annually for the first 10 years and then is reduced to 2,000 annually after the death benefit change.

Determine the number of years the annual premium of 2,000 can be paid and still be qualified as a life insurance contract under IRC 7702. Show all work.

3. Continued

(c) (2 points) Describe the effect the following riders have on the Guideline Premium Limits:

- Disability waiver benefit
- Qualified LTC rider
- Term coverage on a non-family member business partner

- 4.** (12 points) Your company is developing a new survivorship participating whole life product for the estate market.
- (a) (1 point) List the advantages of using the following:
- Single-status last survivor
 - Dual-status last survivor
- (b) (1 point) Describe how uninsurable lives impact the development of this product.
- (c) (4 points) For the following distribution channels:
- Call center- mediated direct response
 - Worksite
 - Multiple-line exclusive agent
 - Career agent
- (i) Describe each distribution channel.
- (ii) Explain the appropriateness of each distribution channel for this product.
- (d) (2 points) Explain four reasons your company might use reinsurance for this product.
- (e) (2 points) Recommend an appropriate method for determining nonforfeiture benefits for this product. Justify your answer.
- (f) (2 points) Recommend product design features that could be used to accomplish each of the following objectives. Justify your answers.
- (i) Minimize the premium while maintaining an expected level of death benefit coverage.
- (ii) Allow for full funding of the policy after the death of one of the insured lives.

5. (10 points) JBB company recently filed a new individual universal life policy form and rates in all 50 states. The policy form was approved by the Interstate Insurance Product Regulation Compact (Insurance Compact). However, two weeks later they received objections under Actuarial Guideline 49 from the Insurance Department in JBB's state of domicile.
- (a) (2 points) Explain why the domiciled Insurance Department may have an objection with the filing when it had been approved by the Insurance Compact.
- (b) (6 points) The following objections were received from the Insurance Department in JBB's domiciled state:
- A. *The use of a 6% earned interest rate assumption in the Illustration Disciplined Current Scale is not consistent with the cost of the hedging program (90bps) in combination with the general account investment of 5%.*
 - B. *The use of the assumed illustrated rate of 4.2% credited to the loan balance seems excessive when compared to the illustrated loan rate of 3%.*
 - C. *The filing should include more than one illustration scale.*

Assess the reasonability of each objection. Justify your answer.

- (c) (2 points) JBB wants to add a new application form and Long Term Care (LTC) rider to be marketed and sold only in states approved by the Insurance Compact. JBB committed to launching this product within four months of the product filing.

With respect to using the Insurance Compact for the new application and LTC rider forms:

- (i) Describe the benefits.
- (ii) Describe the potential approval issues.

6. (9 points) RFB Life is currently pricing its first participating universal life (UL) product to be sold with its other non-participating life insurance products.

You are given the following information relating to the new product:

- Level 1% surrender charge over first 5 years
 - 4% fixed loan rate
 - Guaranteed crediting rate of 3%
 - The assets backing the portfolio are equally invested between real estate and actively traded bonds
- (a) (2 points) Describe the conditions under which the following types of interest rate risks occur:
- (i) Disintermediation risk
 - (ii) Guarantee risk
 - (iii) Liquidity risk
- (b) (4 points) With regard to managing interest rate risk for the new product:
- (i) (3 points) Propose specific product design changes
 - (ii) (1 point) Propose other strategies not related to product design
- (c) (3 points) Assess whether each of the following statements is true or false for the new product. If a statement is false, justify your answer.
- A. *The dividend actuary, along with senior management, is responsible for setting the aggregate amount of dividends to be distributed. The annual dividend scale should vary in proportion to the major sources of earnings.*
 - B. *The goal of a dividend scale is to pay out all of the annual earnings to policyholders.*
 - C. *A fixed loan rate with direct recognition of loans should have a material impact on dividends as they are adjusted regularly with the new money rates.*
 - D. *All reinsurance should be reflected in the dividend formula.*
 - E. *It is acceptable for RFB to include its home office real estate in the portfolio used to back the UL product.*

****END OF EXAMINATION****

Morning Session

USE THIS PAGE FOR YOUR SCRATCH WORK

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