
SOCIETY OF ACTUARIES
Individual Life & Annuities United States – Design & Pricing

Exam DP-IU

MORNING SESSION

Date: Thursday, April 26, 2012

Time: 8:30 a.m. – 11:45 a.m.

INSTRUCTIONS TO CANDIDATES

General Instructions

1. This examination has a total of 120 points. It consists of a morning session (worth 60 points) and an afternoon session (worth 60 points).
 - a) The morning session consists of 6 questions numbered 1 through 6.
 - b) The afternoon session consists of 9 questions numbered 7 through 15.

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 since 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 DP-IU.
6. Be sure your essay answer envelope is signed because if it is not, your examination will not be graded.

****BEGINNING OF EXAMINATION****
MORNING SESSION

- 1.** (10 points) Company DXM is a large company that primarily sells life insurance products. The company has scale and generates steady and predictable profits. Their biggest seller is a UL product with high cash surrender values.

Combination Long-term Care (LTC) products are gaining popularity in the market. There are only a few companies selling such a product.

DXM is pricing an LTC accelerated death benefit rider to add to its High Cash Surrender Value UL product.

- (a) (1 point) Define the following pricing strategies:
- (i) Cost-driven
 - (ii) Competition-driven
 - (iii) Customer-driven
- (b) (3 points) Recommend which pricing strategy DXM should use for the new LTC rider. Justify your recommendation.
- (c) (2 points)
- (i) Explain the Market Share/Market Growth Matrix.
 - (ii) Identify where this product would fall in the matrix. Justify your answer.
- (d) (3 points) Recommend changes to the following stand-alone pricing assumptions to reflect the addition of the LTC rider:
- (i) Lapse
 - (ii) Mortality
- (e) (1 point) Recommend a process for setting the morbidity pricing assumptions for the LTC rider.

2. (10 points) JJB Life will be losing a large proportion of its career agents to retirement in the near future. They are currently hiring and developing a group of new agents.
- (a) (1 point) Compare the types of agency distribution systems which would be most conducive to developing and maintaining a new group of career agents.
- (b) (2 points) JJB Life wants to ensure it recruits new agents who will succeed.
- (i) Explain why it is difficult for insurance companies to compete successfully against other industries for entry-level sales candidates.
- (ii) Explain the advantages and disadvantages of the four types of financing plans most often used for new agents.
- (c) (4 points) JJB Life is aware policy persistency typically increases with the length of service of agents. Given the large number of new agents, JJB will reevaluate persistency assumptions.
- (i) Categorize the factors affecting persistency and indicate their impact on persistency.
- (ii) Assess whether JJB Life should expect changes to the persistency of their products.
- (iii) Propose actions JJB Life could take to maintain its persistency given the turnover of their agents.
- (d) (3 points)
- (i) Contrast the types of distribution expenses that need to be considered for a career agency force with those of brokerage distribution.
- (ii) You are given:

Year	Validation Schedule	Subsidy %	Agent Attrition
1	20,000	120%	4%
2	25,000	110%	5%
3	30,000	80%	6%

Calculate the financing cost per agent during the first 3 contract years, assuming 4% interest and ignoring the impact of unvested recoveries.

THIS PAGE INTENTIONALLY LEFT BLANK

3. (12 points) ABC Life currently offers a Universal Life product with the following features:

- Minimum policy size = 10,000
- Back-end load surrender charges, grading to 0% in year 10
- Guaranteed level Cost of Insurance (COI) charges for the duration of the contract
- Monthly per policy charge of 6 deducted from the account value
- Ongoing expense charges equal to 2% of premium deducted from the account value
- A low minimum credited interest rate guarantee
- Underwriting increases with policy size

Assume:

Current Lapse Assumption		
Year	Male	Female
1	8%	7%
2	7%	6%
3-8	4%	3%
9	0.5%	0.5%
10	5%	6%
11+	1%	1%

In order to help increase sales and improve profitability, the following changes to the product design have been requested:

- Increasing minimum policy size to 25,000
- Modifying the surrender charge schedule to grade to 0% in year 7
- Increasing the minimum credited rate guarantee
- Introducing a no-lapse guarantee (with a shadow account)

- (a) (1 point) Define the no-lapse guarantee with shadow account design feature and explain its purpose.
- (b) (4 points) Explain how the requested design changes would impact the following UL pricing assumptions:
- Lapse
 - Mortality
 - Expenses
 - Premium Persistency

3. Continued

- (c) *(4 points)* Recommend an approach to reflect the pricing impact of the requested increase in the minimum credited rate guarantee. Explain the advantages and disadvantages of your recommendation.

- (d) *(3 points)* Your actuarial student has run the traditional best estimate pricing model using each of the recommended changes in isolation and added up the incremental costs of each feature to determine the overall cost of adding all the new features to the product.

Evaluate this pricing approach and recommend changes, where appropriate.

4. (9 points) BWF Life has traditionally sold fixed rate annuities and is considering launching its first equity indexed annuity (EIA).

(a) (6 points) The proposed product design is as follows:

Index Period	5 Years
Index Growth Method	Point to Point
Ratchet	Annual
Participation Rate	100%
Cap	Resets Annually
Year 1 Cap	5.0%
Minimum Cap	3.0%

You are given the following information for policy year 2:

	Risk Free Rate	Security Price	Index Volatility
Strike price = 100%	1.00%	100%	20%
Strike price = 105%	1.00%	100%	19.5%

d	$N(d)$
-0.30	0.382
-0.10	0.460
-0.05	0.480
0.15	0.560
0.25	0.599

- (i) Describe static hedging for this product design.
- (ii) Calculate the option price in policy year 2 based on a cap of 5.0% using the Black-Scholes method.
- (b) (3 points)
- (i) Compare the advantages and disadvantages of deterministic and stochastic pricing for this EIA product.
- (ii) Recommend whether this new product should be priced deterministically or stochastically. Justify your answer.

- 5.** (9 points) AEY Life currently sells various single life Universal Life (UL) products, and is developing a Joint Last Survivor UL product.
- (a) (4 points) In developing and pricing a Joint Last Survivor product:
- (i) Compare characteristics of a single-status and a dual-status product.
 - (ii) Outline considerations in determining which status to use in product design.
 - (iii) Explain the various approaches used to reflect the dual-status in the pricing of a Joint Last Survivor policy and outline the advantages and disadvantages of these approaches.
- (b) (2 points) Outline the special considerations in setting mortality assumptions for the new Joint Last Survivor product.
- (c) (3 points) Explain any hidden costs, other than administrative systems costs, incurred due to the new product.

6. (10 points) QRS Life is updating and repricing its term product with no change to the preferred classes.

- (a) (3 points) The career field force wants the ability to move any inforce client to the updated product at their attained age and the same preferred class, without underwriting.

Recommend whether QRS Life should accommodate this request. Justify your answer.

- (b) (3 points) QRS is planning to add a return of premium rider to the updated product.
- (i) Explain why the addition of this rider might improve the marketability of the product.
- (ii) Explain why the pricing assumptions that were used for the existing product might not be appropriate for the updated product.
- (iii) Explain how you would modify the pricing assumptions for the updated product.
- (c) (4 points) QRS is planning to add two options to the updated product: a Term Conversion Option to a special plan which is loaded for extra mortality, and a Guaranteed Insurability Option.
- (i) Explain the approach you would use to price each option. Justify your answer.
- (ii) Describe additional pricing factors needed for each option.

****END OF EXAMINATION****
MORNING SESSION

USE THIS PAGE FOR YOUR SCRATCH WORK

USE THIS PAGE FOR YOUR SCRATCH WORK

USE THIS PAGE FOR YOUR SCRATCH WORK

USE THIS PAGE FOR YOUR SCRATCH WORK