

Exam ILALPM

AFTERNOON SESSION

Date: Tuesday, April 28, 2020

Time: 1:30 p.m. – 3:45 p.m.

INSTRUCTIONS TO CANDIDATES

General Instructions

1. This afternoon session consists of 4 questions numbered 7 through 10 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.

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 ILALPM.
6. Be sure your written-answer envelope is signed because if it is not, your examination will not be graded.

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****BEGINNING OF EXAMINATION****
Afternoon Session
Beginning with Question 7

7. (9 points) SEV Life is reviewing the investment strategy for the assets supporting its life insurance liability.

- (a) (2 points) Calculate the risk aversion value that would make SEV indifferent between the two portfolios in terms of risk-adjusted expected return. Show all work.

Portfolio	Expected Return	Standard Deviation of Return
A	10%	18%
B	8%	12%

- (b) (1 point) Due to the long duration of the liabilities, SEV has invested primarily in fixed income assets. Over the next quarter, equities are forecasted to significantly outperform fixed income investments and the CEO has asked the investment team to adjust their portfolio allocations.

Recommend how the investment team should respond to the CEO.

- (c) (2 points) SEV is anticipating a spike in mortality as a result of a pandemic impacting the regions where their policyholders are located.

Evaluate how this would impact the investment team's strategy and propose appropriate actions.

- (d) (4 points) Critique the following statements:

- A. *The fixed income portfolio manager should focus on maximizing returns in order to increase product competitiveness.*
- B. *To achieve immunization, the entire portfolio does not have to be turned over to rebalance. Furthermore, rebalancing need not be done on a daily basis.*
- C. *Use both effective duration and key rate duration to capture non-parallel shifts in the yield curve.*
- D. *SEV investing in coupon-paying bonds to support the liability of its life insurance product is appropriate.*

8. (9 points) You are the pricing actuary of a Universal Life (UL) product issued 2 years ago that is offered in New York. The product management team is modifying charges on this product to help recoup losses from higher operating costs in the first 2 years and you are tasked to review the implications of Insurance Regulation 210 (“Life Insurance and Annuity Non-Guaranteed Elements”).

- (a) (2 points) Explain why the regulation applies to this UL product and how it benefits both existing and new customers.
- (b) (1 point) List four criteria that an insurer should follow in assigning policies into classes of policies for the purpose of determining non-guaranteed elements.
- (c) (2 points) The product management team is proposing an increase in Cost of Insurance (COI) charges on existing policies from year 3 onwards, which leads to the updated projected profit margins as outlined in the table below:

Projected Profit Margins	Year 1	Year 2	Year 3	Year 4	Years 5+
Using original COIs	5.5%	4.0%	3.5%	3.0%	3.0%
Using revised COIs	5.5%	4.0%	4.0%	3.5%	3.5%

Evaluate their proposal and its compliance with Insurance Regulation 210.

8. Continued

(d) (4 points) Critique the following statements in accordance with Insurance Regulation 210:

- A. *Prior to implementing a COI increase, the product management team sent policy owners a document outlining the original and revised COI charges.*
- B. *The revised COI charges are approved by the Board of Directors and the filing is submitted to the Superintendent. No additional documentation is required from the product management team.*
- C. *The company's Board of Directors requires a reasonableness examination of anticipated experience factors and non-guaranteed elements to occur every four to six years.*
- D. *The product management team is considering proposing a decrease to its interest-crediting rate due to an increase in reinsurance costs.*

9. (12 points)

- (a) (3 points) You are given the following external cash flows and post-contribution account balances, recorded from the past month:

<u>Date</u>	<u>External Cash Inflow Amount</u> (beginning of day)
December 10, 2019	7,500
December 15, 2019	2,500

<u>Date</u>	<u>Account Balance</u> (end of day)
December 1, 2019	75,000
December 10, 2019	77,500
December 15, 2019	80,000
December 31, 2019	90,000

- (i) (2 points) Calculate the monthly time-weighted return. Show all work.
- (ii) (1 point) Explain why time-weighted return might be more appropriate than the money-weighted return.
- (b) (1 point) Explain the assumptions that support classical immunization theory.
- (c) (5 points) You have decided to pursue contingent immunization for a portfolio that is currently worth 100 million, with the following:
- A five-year investment horizon
 - Minimum acceptable return of 4%
 - Your firm can immunize its asset portfolio at 6%.

All yields provided in this question are quoted on a bond-equivalent yield basis.

- (i) (1 point) Describe how contingent immunization addresses a shortfall of the classical immunization approach.
- (ii) (2 points) Calculate the initial dollar safety margin. Show all work.

9. Continued

- (iii) (2 points) You decide to invest 100 million in 10-year 6% Treasury notes at par. The following present values of cash flows of the 10-year Treasury notes at different discount rates are provided:

Discount Rate	Present Value of Cash Flows
2%	136,091,106
4%	116,351,433
6%	100,000,000
8%	86,409,674
10%	75,075,579

Calculate the revised dollar safety margin if the yield to maturity suddenly increases to 10%. Show all work.

- (d) (3 points) Critique the following statements regarding immunization strategies:
- A. *The portfolio manager should strive to rebalance the portfolio more frequently to adjust its duration.*
 - B. *Dollar duration is a measure of the change in duration for a 0.1% change in market yields. Furthermore, a portfolio's dollar duration is a weighted average of the dollar durations of the component securities.*
 - C. *Regardless of the shape of the yield curve, the yield to maturity of a portfolio should roughly approximate the immunization target rate of return.*

- 10.** (10 points) You are given the following information about a fixed indexed annuity (FIA) product under development.

Interest credited rate method	One-year point-to-point return on the S&P 500 index
Interest credited rate floor	0.00%
Point-to-point cap	Set by the company each year based on a hedging budget that is 1.50% less than the net earned rate, with a guaranteed minimum cap of 2.00%
Participation rate	100%
Net earned rate	Calculated separately for each bond portfolio, with a new portfolio set up for each new issue year.
Hedging strategy	Static

- (a) (4 points)
- (i) Propose two different ways the product design could be modified to allow for a higher credited rate each year without increasing the hedging budget. Justify your answer.
 - (ii) Evaluate how the crediting rate would vary between the two proposals depending on the one-year index return.
- (b) (2 points) Identify an example of each of the following items defined in “ASOP 2: Non-guaranteed Charges or Benefits for Life Insurance Policies and Annuity Contracts” for a non-guaranteed benefit in the given FIA product information:
- (i) Determination Policy
 - (ii) Policy Factor
 - (iii) Policy Class

10. Continued

- (c) (4 points) Critique the following statements on the FIA pricing model with respect to the following actuarial standards of practice (ASOP):
- (i) ASOP 54: Pricing of Life and Annuity Products
 - (ii) Setting Assumptions, Exposure Draft, ASOP
 - A. *I set the net earned rate assumption based on data from the investment department. Their data showed the average yield of the bond investment portfolio over the past 5 years.*
 - B. *Since we can manage the cap to get the desired pricing spread, we can rely on a single pricing model run with our baseline pricing assumptions to understand the product's profitability.*
 - C. *I have applied the same lapse rate assumptions of an existing fixed annuity product to this FIA product because it is being sold by the same distribution channel.*
 - D. *I used the existing annuity maintenance expense assumption set by the Chief Actuary.*

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

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