
SOCIETY OF ACTUARIES
Life Finance & Valuation – U.S.

Exam ILALFVU

MORNING SESSION

Date: Thursday, April 30, 2015

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 5 questions numbered 8 through 12.

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 ILALFVU.
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) SJG is a U.S. life insurance company offering a variety of individual life and annuity products. SJG's asset portfolio consists of equity securities, debt securities and unsecuritized loans. The company prepares its financial statements in accordance with U.S. GAAP.

(a) (2 points) Describe how SJG's assets are to be classified and accounted for under SFAS 115.

(b) (4 points) As of December 31, 2014, SJG's asset portfolio includes a 5 year noncallable bond with the following characteristics:

- Purchase date: 12/31/2011
- Maturity date: 12/31/2016
- Purchase price: 95,670.52
- Par value: 100,000
- Coupon rate: 4% payable annually
- Yield rate at purchase: 5%
- Amortized cost as of 12/31/2013: 97,276.75
- Fair value as of 12/31/2013: 101,000
- Fair value as of 12/31/2014: 100,500
- SFAS 115 category: Held to Maturity

Calculate the following for calendar year 2014 for this asset:

(i) Year-end holding value

(ii) Investment income

Show all work.

1. Continued

- (c) (4 points) You are given the following information for a cohort of SJG's participating traditional life business:

In Millions	At Issue	12/31/2014
Present value of future estimated gross margins	150	30
Present value of future deferrable costs	60	4
Unrealized holding gain on Available for Sale assets	0	5

Assume:

- DAC is amortized over the lifetime of the cohort
- Realization of investment gain and loss is a profit-neutral event over the amortization period
- The updated amortization factor, k-factor, as of 12/31/2014 is identical to the initial k-factor calculated at issue
- Federal income tax rate is 35%

Calculate the following as of 12/31/2014 for this cohort:

- (i) DAC asset
- (ii) Shadow DAC adjustment
- (iii) Other comprehensive income component of shareholder equity

Show all work.

2. (10 points)

- (a) (2 points) List the eight characteristics of an acceptable minimum guaranteed death benefit (MGDB) reserve system according to Actuarial Guideline 37 (AG 37) for a variable life insurance policy with an MGDB.
- (b) (3 points) For each of the following independent events:
- (i) The variable fund drops 10%.
 - (ii) The policyholder deposits additional premium into the variable fund.
 - (iii) The insurance company increases cost of insurance (COI) rates up to the guaranteed maximum.
 - (iv) The policyholder transfers half of the variable fund to the fixed fund.

Explain how the AG 37 MGDB reserve for a variable life insurance policy with an MGDB would be impacted if the event occurred immediately before the valuation date. Justify your explanation. No calculations are required.

- (c) (5 points) You are given the following information for a flexible premium variable universal life policy that provides an MGDB equal to the face amount for the first 15 policy years:

- Face amount is 150,000
- Valuation interest rate is 4%
- AG 37 Attained Age Level Reserve (AALR) at end of policy year 10 is 1,200

Policy year	11	12	13	14	15
Valuation mortality rates	0.003	0.004	0.005	0.006	0.007

	Policy Year 11
Excess death benefit payable during year	0
Fixed fund value at end of year	0
Variable fund value at end of year	800
Present value at end of year of future excess death benefits using valuation interest and mortality	1,677

2. Continued

Assume the excess death benefit payable during policy year 12 would be 150,000 if the variable fund value at the end of policy year 11 were to depreciate by one-third and then appreciate thereafter at the assumed investment rate.

Calculate the MGDB reserve at the end of policy year 11 according to AG 37. Show all work.

- 3.** (9 points) Critique the following statements made by the actuary for JJB Life, a U.S. insurance company, with respect to the IFRS 4 Phase II exposure draft on insurance contracts:
- A. *“IFRS may have an impact on the reporting for our SuperVUL, a variable universal life product that has a separate account investment option that guarantees 95% return of deposits on death.”*
 - B. *“The profitability of our SuperTerm, a term life insurance product, won’t be affected. New SuperTerm sales will continue to add to our bottom line at issue. For instance, take a hypothetical SuperTerm policy with a present value of cash inflow of 20,000, a present value of cash outflow of 12,000 and a total margin for uncertainty of 5,000. This policy will produce a 3,000 gain at issue since there is a liability at initial recognition of -3,000. This will allow the SuperTerm business to continue to offset the loss at issue from our disability income business.”*
 - C. *“Updates for current estimates and for current market rates will impact our financial reporting in the same way.”*
 - D. *“Net income will be more volatile.”*
 - E. *“Insurers may become more aware of the costs and risks of embedded options and guarantees.”*
 - F. *“The current accounting mismatch will increase due to valuing assets and liabilities on different bases.”*
 - G. *“Costs will increase as insurance companies move to more market-value management reporting and providing more information to investors.”*

4. (6 points) With respect to the fair value of insurance contracts:

(a) (2 points) Describe the three levels of fair value inputs as categorized in SFAS 157.

(b) (4 points) You are given:

- A 3-year term life insurance contract with the following cash flow patterns:

Policy Year	Expected Premium	Expected Benefits
1	500	100
2	300	250
3	110	450

- Credit spread (related to non-performance risk) is 0.4%
- Risk premium is 12%
- The risk premium is not updated and there is no change in the issuer's credit standing
- Spot rates are 3.50% for all durations

Calculate the fair value liability of this contract in the second policy year using the Total Return Swap approach, as proposed by Gutterman, et al. Show all work.

5. (9 points)

- (a) (2 points) Describe how you would determine the discount rate for each of the following:
- (i) Actuarial Appraisal Value
 - (ii) Embedded Value
- (b) (4 points) Recommend using either Embedded Value or Actuarial Appraisal Value for each of the following circumstances:
- (i) Your company wants to determine the value of a company that it is acquiring.
 - (ii) Your company is valuing some stocks and other assets that it is selling.
 - (iii) Your company wants to distinguish movements from economic earnings in values.
 - (iv) You want to determine the value of a company as a "going concern."

Justify your recommendation.

- (c) (3 points) You are given the following for a block of variable annuities with guaranteed minimum income benefits:

Required capital	100
Free surplus	150
Present Value (PV) of after-tax statutory book profits	2,000
PV of cost of capital	500
Value of future new business	300

For the guaranteed minimum income benefit:

Mean of PV of distributable earnings for a set of stochastic scenarios	1,300
PV of distributable earnings for a single deterministic scenario	900

Calculate the Embedded Value and Actuarial Appraisal Value. Show all work.

THIS PAGE INTENTIONALLY LEFT BLANK

- 6.** (10 points) Your company is reviewing its level of capital relative to its target surplus. Target surplus is three times the Risk Based Capital (RBC) requirement.
- (a) (1 point) Describe the actions the company might take if its capital level is below its target surplus goal.
 - (b) (3 points) Explain possible reactions that various stakeholders might have to the company holding capital below its target surplus goal.
 - (c) (3 points) Your company is considering reinsuring a large block of its term insurance.

Assess the validity of the following statements:

- (i) *“Yearly Renewable Term (YRT) reinsurance will not serve to improve the surplus position.”*
- (ii) *“If we use YRT reinsurance for our level term policies, the net amount at risk for all years would simply be the initial reinsured face amount.”*
- (iii) *“Funds Withheld Coinsurance is the same as Modified Coinsurance.”*
- (iv) *“Coinsurance is not a good option for term insurance because assets must be transferred.”*

Justify your response.

6. Continued

(d) (3 points) You are given:

Bonds	Number of Issuers	Annual Statement Value	RBC Factor
Class 1	200	100,000,000	0.0040
Class 2	400	200,000,000	0.0130
Class 3	100	100,000,000	0.0460
Class 4	0	0	0.1000
Class 5	0	0	0.2300
Class 6	100	2,000,000	0.3000

Bond Size Factors

First 50 issuers	2.500
Next 50	1.300
Next 300	1.000
Over 400	0.900

Calculate the change in the Risk Based Capital amount for bonds if the company were to sell all of its Class 6 bonds and not reinvest the proceeds in bonds. Show all work.

7. (6 points) LEO is a U.S. life insurance company offering a wide variety of individual life and annuity products. On May 14, 2014, LEO received a letter from its domiciliary state insurance commissioner regarding the company's year-end 2013 Actuarial Opinion and Memorandum. The letter was addressed to LEO's Appointed Actuary and requested a response within 30 days. After reviewing the letter, the Appointed Actuary gave it to his assistant actuary and asked him to reply. Due to other demands on his time, the assistant actuary set the letter aside for several months. Finally, at the end of September, the assistant actuary responded to the insurance commissioner with the following letter:

September 30, 2014

Dear Insurance Commissioner,

Following is a response to your letter dated May 14, 2014:

- (i) *Cash flow testing was the method used to analyze asset adequacy for all business except our block of family term riders. This block was not analyzed due to data challenges. The block is very small, and the assumptions in the reserves are very conservative relative to historical experience. Given the small size and historical experience of this block, we have no concerns regarding the adequacy of the assets supporting the block's reserves.*
- (ii) *In performing the analysis, we relied upon several individuals for data and certain assumptions, but we did not include reliance statements in the opinion because these individuals think the statements are not necessary and are unwilling to sign them.*
- (iii) *All assumptions in the analysis were set on a best estimate basis, taking into consideration recent experience. We did not explicitly document the assumptions in order to keep the size of the memorandum reasonable.*
- (iv) *The stochastic scenarios used in the analysis were created using an economic scenario generator that I developed. We believe the scenarios are appropriate for asset adequacy testing. We did not explicitly discuss the generator in the memorandum because, due to its proprietary nature, we do not discuss the generator with anyone outside of the company.*

7. Continued

- (v) *We consider the assets supporting the reserves to be adequate if, in the aggregate, projected statutory surplus and projected market value surplus are positive throughout the entire projection period for at least 85% of the stochastic scenarios. As shown in the memorandum, projected surplus is positive throughout the projection period for over 90% of the scenarios, so we consider the assets to be adequate.*

We will make sure to incorporate the above responses into future memoranda.

If you have further questions, please contact our Appointed Actuary.

Sincerely,

*Assistant Actuary
LEO Life Insurance Company*

- (a) (3 points) Identify any deficiencies in the letter relative to the general requirements for actuarial communications contained in Actuarial Standard of Practice No. 41.
- (b) (3 points) Critique the adequacy of the assistant actuary's response to the insurance commissioner relative to the requirements of the Actuarial Opinion and Memorandum Model Regulation.

****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