SOCIETY OF ACTUARIES

Life Finance & Valuation - Canada

Exam ILA LFVC

MORNING SESSION

Date: Thursday, October 31, 2013

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 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 ILA LFVC.

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.

475 N. Martingale Road
Schaumburg, IL 60173-2226

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

1. (*9 points*) A five-year financial plan has been prepared for an insurer's current profit centers. You are given:

5-Year Financial Plan

Profit Center	Return on Equity	Beginning Equity	Ending Equity
A	15%	1,000	4,300
B	13%	2,000	2,500
C	8%	2,000	3,000
D	9%	1,000	800
Total Company	11%	6,000	10,600

- Risk Discount Rate = 12%
- No shareholder dividends

(a) (*4 points*)

(i) Determine whether each profit center creates or destroys embedded/economic value. Show all work.

(ii) Determine whether each profit center generates or consumes free cash flow. Show all work.

(iii) Rank the profit centers in the order of capital allocation to maximize the company's performance. Justify your answer.

(b) (*5 points*) A new profit center (Profit Center E) has been proposed with the following characteristics:

	Policy Year 1	Policy Year 2	Policy Year 3	Policy Year 4+
Profits per unit sold	-20	14	14	0

Year	2012	2013	2014	2015	2016
Expected Sales by Year (units)	100	300	0	0	0

1. Continued

You are given:

- All sales occur at the beginning of the year.
- All profits are calculated at end of the year.
- Profit Center E's equity growth rate = 0%
- There is a projected overhead expense of 1,446 which occurs at the end of 2012.

The following is a partially completed five-year financial plan:

Year	2012	2013	2014	2015	2016
Overhead expenses	-1,446	0	0	0	0
Profits from 2012 sales	-2,000				
Profits from 2013 sales	-				
Annual Profit	-3,446				

(i) Explain whether Profit Center E creates or destroys embedded/economic value. Show all work.

(ii) Explain whether Profit Center E generates or consumes free cash flow. Show all work.

(iii) Determine the maximum allowable 2012 overhead expenses to maintain the company's embedded/economic value when Profit Center E is added. Show all work.

2. (*8 points*)

(a) (*2 points*) You are given the following expected values (in millions) for a current in-force book of business:

Statutory Required Surplus	190
Statutory Benefit Reserve	100
Unamortized U. S. GAAP Deferred Acquisition Cost	7
U.S. GAAP Benefit Reserve	97
After Tax U.S. GAAP Earnings	22

(i) Calculate the after-tax U.S. GAAP return on equity (ROE).

(ii) Explain why the U.S. GAAP ROE may not correspond to the internal rate of return used in pricing.

(b) (*3 points*) Describe the components and uses of an actuarial appraisal.

(c) (*3 points*) Company ABC wishes to acquire Company DEF. You are provided with the following information of Company DEF:

	(in millions)
Solvency Reserves	1,950
Tax reserves	1,775
Pre-tax transaction costs	4
Required Capital	165
Assets transferred	1,860
Tax rate	30%

Calculate the embedded value for DEF as of the acquisition date assuming ABC will establish the same solvency reserves as DEF. Show all work.

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3. (*10 points*) Company BCD is implementing an Economic Capital (EC) framework to better assess the primary risk of its three business units (business's primary risk): investment products (equity), life insurance (mortality) and disability insurance (morbidity).

(a) (*4 points*) List and define the key aspects of Economic Capital.

(b) (*1 point*) Outline considerations for successfully implementing an Economic Capital framework as it pertains to the company's primary risks.

(c) (*2 points*) Its three main businesses are each recommending approaches to the framework, as follows:

		Business Unit Modeled Results		
	Recommendation	**CTE99 One Year**	**VaR 98 Lifetime**	**CTE95 Lifetime**
Investment Products with Equity Guarantees	CTE99 One-Year (stochastic)	950	350	600
Life Insurance	VaR 98 Lifetime (deterministic)	800	950	1200
Disability Insurance	CTE95 Lifetime (stochastic)	575	750	650

Outline the appropriateness of each approach from both a total company and business unit perspective.

(d) (*3 points*) Senior management decides to use the CTE99 One-Year EC calculations for its EC framework. Before communicating this decision to the businesses, the allocation method for post-diversified economic capital is to be finalized. Two allocation methods are being considered:

- Pro-rata: post-diversified EC is allocated proportionately to each business's pre-diversified EC.
- Marginal contribution: post-diversified EC is allocated proportionately to the marginal contribution of each business's EC to the total company's EC. For example, the increase in EC that Life Insurance generates when brought together with the combined post-diversified EC.

3. Continued

In addition to the information provided in part (c), you are provided the following information:

	Combined Diversified EC
Investment Products & Life Insurance	1,240
Investment Products & Disability Insurance	1,140
Life Insurance & Disability Insurance	1,280
Total Company	1,700

(i) Calculate the allocated post-diversified EC for each business using both allocation methods.

(ii) Using these results, provide a recommendation that takes into account the factors to consider in developing an EC Program.

4. (*7 points*) You are working for a large Canadian insurance company that is undergoing a demutualization process. With respect to existing participating accounts:

(a) (*2 points*) Explain the structure and rules for handling these accounts as per the OSFI guidelines.

(b) (*2 points*) Describe the mechanism and regulatory requirements for how the company will deal with gains and losses in these accounts after demutualization.

(c) (*3 points*) Outline the requirements of the annual report which must be sent to OSFI on these accounts on a going forward basis.

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5. (*11 points*)

(a) (*2 points*) List the considerations under IFRS 4, according to Committee on Life Insurance Financial Reporting (CLIFR), pertaining to the statement of gross liabilities and reinsurance recoverables.

(b) (*3 points*) You are given the following present values (PV):

	PV using scenario that reproduces CALM Gross Liability	**PV using scenario that reproduces CALM Net Liability**
Ceded cash flows with margins	3,000	3,200
Retained cash flows with margins	7,000	7,300
Ceded cash flows without margins	2,800	2,900
Retained cash flows without margins	6,200	6,300
Net incurred but not reported (IBNR) liability	200	200

(i) Determine the appropriate gross liability and reinsurance recoverable values, assuming the reinsurance contracts have been deemed to be insurance contracts according to IFRS 4.

(ii) One of the reinsurers has become impaired and an extra provision for this impairment of 500 has been calculated. Determine the new gross liability and reinsurance recoverable values.

(c) (*3 points*) Your company is developing a new annuity product with a significant investment component.

(i) Describe key considerations in determining whether the new product qualifies as an insurance contract under IFRS 4.

(ii) Explain any potential implications to company earnings if this product is classified as an investment contract as opposed to insurance contract under the current IFRS 4.

5. **Continued**

(d) (*3 points*) Your company is evaluating two business opportunities and has been provided the following information:

(millions)	Fair Value	PV of Fulfillment Cash Flows
Small Life Insurance Company	1.80	1.55
Portfolio of Life Contracts	2.10	1.90

(i) Explain the purpose of residual margin according to IFRS 4.

(ii) Evaluate which of the two potential opportunities is more attractive by calculating the initial residual margin for each. Show all work.

(iii) You have prepared a sensitivity run with the following two assumptions:

- The current present value of the fulfillment cash flows has increased by 20% from the time of purchase.
- Fewer contracts are inforce than originally expected.

Assess the impact on the residual margin.

6. (*15 points*)

(a) (*4 points*) Assess the appropriateness of each of the following statements in accordance with OSFI Guideline B-3 – Sound Reinsurance Practices and Procedures. Recommend any changes:

(i) The Reinsurance and Risk Management Policy (RRMP) must form part of the Federally Regulated Insurer's (FRI) risk management plan and requires the oversight of a member of the FRI's senior management team;

(ii) The RRMP must document the significant elements of the FRI's approach to managing risk including the practices and procedures for managing and controlling its reinsurance risk with any registered reinsurers;

(iii) The terms and conditions included within the binding summary documents must be formally finalized in writing with the reinsurer before the ceding company files its annual return with OSFI;

(iv) As part of its on-going due diligence, the ceding company may rely on external rating agencies to monitor and assess the risk of the reinsurer;

(b) (*6 points*) The following reinsurance arrangements are being considered for an inforce block of Whole Life business to strengthen the company capital position:

- YRT
- Coinsurance
- Modified coinsurance

(i) Comment on the effectiveness of using the above reinsurance arrangements for capital relief.

(ii) For each of the reinsurance arrangements, discuss the appropriateness of having an experience refund feature as part of the terms of the treaty.

(iii) List the advantages and disadvantages of using an unregistered reinsurer.

6. Continued

(c) (*5 points*) You are given the following information:

	Policy Year 1	Policy Year 2	Policy Year 3
Gross premiums	1000	950	900
Reinsurance premiums	200	320	400
Gross death benefits	300	420	450
Reinsurance allowance	50%	10%	10%

- 50% YRT reinsurance arrangement with no reserves
- Ceding company expense margin is 10%
- Reinsurer has no expenses
- Tax rate is 0%
- All transactions occur at end of year

Through the experience refund process, the reinsurer will:

- Return 20% of reinsurance gain, and
- Carry forward 20% of reinsurance loss at an interest rate of 4%

Calculate the ceding company's net income before the experience refund and the amount of experience refund it will receive from the reinsurer in all years. Show all work.

****END OF EXAMINATION****
Morning Session

USE THIS PAGE FOR YOUR SCRATCH WORK