

# ILA LFVC Model Solutions

## Fall 2015

### 1. Learning Objectives:

1. The candidate will understand financial statements and reports of U.S. life insurance companies and be able to analyze the data in them.

### Learning Outcomes:

- (1e) Describe, use and recommend methods for performing reviews of reserves.

### Sources:

LFV-102-09: Actuarial Review of Reserves and Other Annual Statement Liabilities

### Commentary on Question:

*Commentary listed underneath question component.*

### Solution:

- (a) List six general principles to follow in performing a satisfactory audit of reserves.

### Commentary on Question:

*Many candidates answered this question with a detailed description of recalculating the reserve and the reasonableness of the numbers. Many also focused on the detail of sampling principles. Those who focused on the high level principles scored best (9 are stated in the solution below, though only 6 needed to be stated to receive full credit).*

- Understand the purpose/objective of the person requesting the audit
- Plan the audit, scope and timing in advance
- When documenting the findings, provide a description of the review and give the customer the opportunity to provide feedback
- If the review is sufficiently large, have one actuary as point of reference to funnel all questions
- Ensure that all questions that come up during the audit are answered and resolved by the end of the audit
- When choosing samples for testing, pay attention to new plans or benefits and any changes to assumptions or systems
- Have all items or documents that the actuary is “checking to” on hand so that there is no “moving target”
- Leave no links untested
- Reference the prior review if the audit is periodic to serve as a guide and ensure corrective action taken on past errors

# 1. Continued

- (b) Evaluate the reasonableness of the reserves by analyzing the trend in the average tabular mortality rate. Justify your answer. Show all work.

**Commentary on Question:**

*Most candidates understood the overall idea of what the question was asking. Some based their answers on the formula  $(C-I)/(M+1/2 P)$  which was not the appropriate approach to the question. Many had minor errors in their answers but were able to derive the general direction of the numbers. Many did not subtract the reserve from the face amount when calculating the average amount at risk. Conclusions varied from very thorough to a simple summation. Many did not calculate the actual percentage of increase in mortality, but reasoned why the mortality rate might rise or not.*

$$M(0) + P + I - C - VD - VT = M(1)$$

$$C = M(0) + P + I - (VD + VT) - M(1)$$

$$2012: C = 1,412 + 654 + 60 - 91 - 1,483 = 552$$

$$2013: C = 1,483 + 687 + 63 - 94 - 1,556 = 583$$

$$2014: C = 1,556 + 704 + 65 - 100 - 1,594 = 631$$

$$\text{ATMR} = \text{Average Tabular Mortality Rate} = C / \text{Average Amount at Risk} = C / \text{AAR}$$

$$\text{AAR} = \frac{1}{2} ((\text{Face amount at beginning of year} - \text{reserve at beginning of year}) + (\text{Face amount at the end of year} - \text{reserve at end of year}))$$

$$2012: \text{ATMR} = 552 / (((30,000 - 1,412) + (31,500 - 1,483)) / 2) = 0.018838$$

$$2013: \text{ATMR} = 583 / (((31,500 - 1,483) + (33,075 - 1,556)) / 2) = 0.018948$$

$$2014: \text{ATMR} = 631 / (((33,075 - 1,556) + (33,900 - 1,594)) / 2) = 0.019773$$

From 2012 to 2013, ATMR increased  $.018948/.018838 - 1 = 0.6\%$

From 2013 to 2014, ATMR increased  $.019773/.018948 - 1 = 4.4\%$

ATMR experiences a big jump in 2014, so there may be a problem with the reserves

- (c) Evaluate the reasonableness of the reserves using the roll forward approach. Justify your answer. Show all work.

## 1. Continued

### Commentary on Question:

*Candidates approached this question using a variety of approaches. Some did the calculations as shown in the solution below, but many were able to rationalize the change in reserve by looking at the average interest rate (4%) or by looking at the upper and lower bound of possible interest rates. Very few calculated the Average Credited Interest Rate correctly, possibly because the term was never defined or used in an example in the syllabus material. Most who knew to calculate an average did not subtract the credited interest amount from the denominator, but most were able to reason that the resulting number should be in the 3.5% – 4.5% range in order for reserves to be reasonable.*

$$AV(0) + DNFEL + CI - COIC - EC - AVREL = AV(1)$$

$$CI = AV(1) - AV(0) - DNFEL + COIC + EC + AVREL$$

$$2012: CI = 174 - 75 - 125 + 10 + 1 + 19 = 4$$

$$2013: CI = 260 - 174 - 113 + 9 + 1 + 28 = 11$$

$$2014: CI = 328 - 260 - 101 + 8 + 1 + 36 = 12$$

$$ACIR = \text{Average Credited Interest Rate} = (2 \times CI) / (AV(0) + AV(1) - CI)$$

$$2012: ACIR = (2 \times 4) / (75 + 174 - 4) = 3.3\%$$

$$2013: ACIR = (2 \times 11) / (174 + 260 - 11) = 5.2\%$$

$$2014: ACIR = (2 \times 12) / (260 + 328 - 12) = 4.2\%$$

ACIR should be within 20 to 30 basis points of actual credited interest rates

ACIR for 2012 is just below the 3.5% minimum rate but within 20 to 30 basis points; change in reserve during 2012 may be ok, but further investigation would be prudent

Change in reserve during 2013 does not appear reasonable since ACIR is significantly more than 4.5%

Change in reserve during 2014 appears reasonable since ACIR falls within the 3.5% to 4.5% range

## 2. Learning Objectives:

1. The candidate will understand financial statements and reports of Canada life insurance companies and be able to analyze the data in them.

### Learning Outcomes:

- (1a) Construct the basic financial statement or its components for a life insurance company.

### Sources:

CIA Educational Note on IFRS: Measurement of Investment Contracts and Service Contracts under IFRS (IASP 4)

### Commentary on Question:

*Commentary listed underneath question component.*

### Solution:

- (a)
  - (i) Define transaction costs.
  - (ii) Describe the transaction costs for each of the following:
    - Financial instruments
    - Service contracts

### Commentary on Question:

*Most candidates did not fully understand part( ii) of the question that asked the candidates to describe transaction costs for these 2 items after they have defined what transaction costs are in part (i) – the intention is to test candidates’ understanding of treatment of transaction costs for specific items, especially from the angle of whether it can be deferred, which was not explicitly indicated in the question, but candidates are expected to understand the implication - instead, many people focused on definitions of financial instruments and service contracts without describing the treatment differences of the transaction costs for the financial instruments and service contract.*

- (i) Transaction costs are the incremental costs directly attributable to acquisition or disposal of financial asset or liability. It may not include debt premiums or discounts, financing costs, or internal admin costs
- (ii) For financial instruments: IAS 39 prohibits the deferral and amortization of transaction costs in the financial statements through the concept of DAC asset

## 2. Continued

For service contract:

- IFRS permits transaction costs for the service element to be deferred to match related fees
- Need to determine if expenses are truly incremental and eligible for deferral
- Transaction costs are incremental costs directly attributable to securing investment management contract, and recognized as an asset if they can be identified separately and measured reliably, and it is probable that they will be recovered
- Would not have been incurred if the entity had not secured the investment management contract

(b) Critique the above implementation. Recommend changes where appropriate.

1. Cash flows typically would be developed based on expected surrenders; Margins for risk and uncertainty are not included in cash flows. The IFRSs provide that the cash payments used in the determination of amortized cost would be the cash flows over the relevant period of the financial instrument.
2. Administrative costs are not included in projected cash flows. However cash flows consider all contractual terms of the financial instrument. Hence, contractual loadings and fees are included
3. To create an appropriate amortization schedule initially, an effective interest rate is determined. The IFRSs indicate that the practitioner should know (or estimate):
  - a. The initial measurement of the financial asset or financial liability, which in accordance with IFRSs would be fair value subject to any requirements under IFRSs (or the accounting value at repricing);
  - b. Original transaction costs incurred (or transaction costs incurred at repricing); and
  - c. Estimated amount and timing of future cash flows relating to the contract Using this information for each contract, the effective interest rate would be the internal rate of return for the period to maturity or to the next repricing date. An amortization schedule can then be derived.

The difference typically is amortized by the application of the effective interest method, which is normally a roll-forward of the initial value to the maturity value using the effective interest rate

## 2. Continued

4. The IFRSs indicate that in the event the surrender value is more than the amortized cost of the liability and the surrender value is more than the fair value of the benefit at maturity, the reporting entity should measure the investor's option to surrender at the expected surrender value.
    - This would be an embedded derivative and would be measured as such.
    - This also would provide an effective minimum floor for financial instruments on an amortized cost measurement.
  5. Financial assets and financial liabilities typically are established without regard to profit (income) taxes, because a separate provision is recognized on the balance sheet (see IAS 12, Income Taxes). However, certain taxes are similar to expenses and are normally excluded from cash flows and implicitly reflected in the interest rate - premium taxes in some countries are examples. A tax on the amount of investment income attributed to the financial liability could be another.
  6. Once determined, the effective interest rate does not change. If estimates of payments or receipts change, then carrying amount is recalculated. And adjustment is recognized as income or expense
- (c) Determine the amortized cost of the liability at the end of years 1, 2 and 3. Show all work.

### **Commentary on Question:**

*The intention is to test candidates' ability to identify only the direct costs to be recognized in the transaction costs and to use cash flows without margin to do the calculation. The common mistakes are failing to identify the direct costs or using the cash flows with margin.*

Determine transaction costs to be amortized: Only those items that are directly related to acquisition and would not have been incurred otherwise

Advisor comp = 200  
Underwriting = 50  
Issue Expenses = 100  
Total = 350

In order to get a zero as a PV, you need PV of cash flows to be 9,650  
Must use cash flows without margins and so 6% is interest rate  
Starting amortized cost = 10,000 - 350 = 9,650  
Each year is past year accumulated at 6% and subtract cash flow (without margins)

## 2. Continued

$$\text{Year 1} = 9,650 * 1.06 - 3,000 = 7,229$$

$$\text{Year 2} = 7,229 * 1.06 - 3,900 = 3,763$$

$$\text{Year 3} = 3,763 * 1.06 - 3,989 = -0.5 \text{ or } 0 \text{ (rounding because of PV of cash flows rounding)}$$

### **3. Learning Objectives:**

2. The candidate will be able to understand and apply valuation principles of individual life insurance and annuity products issued by Canadian life insurance companies.

#### **Learning Outcomes:**

- (2a) Describe valuation methods.

#### **Sources:**

LFV-634-14: CIA Standards of Practice: Practice-Specific Standards for Insurers (Sections 2100, 2300, 2500) (January 1, 2014)

#### **Commentary on Question:**

*This question tested candidates' knowledge of the standards of practice for Dynamic Capital Adequacy Testing and their ability to evaluate the process for appropriateness. Candidates were expected to critique each statement, recommend changes if necessary and provide justifications. Candidates who did well identified both correct and incorrect aspects of each statement and provided sufficient justification.*

#### **Solution:**

Critique each section of the DCAT process document. Recommend changes where appropriate.

#### **Commentary on Question:**

*Candidates generally did well on Sections 1, 2 and 3.*

*Section 4: Most candidates identified that testing one scenario was insufficient. Additional credit was given for analyzing the severity of the scenario and whether it qualified as adverse. Few candidates recognized the scenario as an integrated scenario and provided considerations for ripple effects.*

*Section 5: Candidates generally did not identify the different capital restraints for the adverse scenario.*

*Section 6: Candidates generally did not show sufficient knowledge with the conditions for inclusion of Management Actions in the DCAT report. Most candidates identified the one year reprice as being aggressive, however did not provide sufficient justification.*

#### **Section 1**

- It is correct to include new business
- It is incorrect to exclude segregated funds because it has volatile financials



### 3. Continued

#### Section 2

- The financial position at the end of 2012, 2013 & 2014 should be reviewed (2 years is not enough)
- The projection period for a life insurer should be at least five years (starts in 2015 and end at 2019 at the earliest)

#### Section 3

- The base scenario is normally consistent with the life insurer's business plan, unless assumptions are so inconsistent or unrealistic that the resulting report becomes misleading
- The statement says the scenario is "adjusted for conservatism", indicating the business plan was not used for the base scenario
- The actuary would report any material inconsistency between the base scenario and the business plan

#### Section 4

- A plausible adverse scenario would be a scenario of adverse, but plausible assumptions of which the insurer's financial condition is sensitive to
- Only one adverse scenario was included, however, three plausible adverse scenarios should be included
- An integrated scenario should be included, if it is determined to be one of the three most adverse scenarios. The "Government Deficit Ceiling Scenario" is an integrated plausible scenario
- In assuring consistency within each scenario, the actuary would consider ripple effects. Many different ripple effects are included, for example, higher inflation, government austerity impacts on lapses

#### Section 5

- Only the supervisory target must be met under the base scenario, not internal target
- Test for supervisory or internal capital target is not required under the adverse scenario; must test for assets exceeding liabilities throughout forecast period

#### Section 6

- Management Actions only need to be considered if the adverse scenario results in a threat to the satisfactory financial condition. The actuary would identify possible corrective management actions that would lessen the likelihood of that threat
- Reprice one year after the shock seems very aggressive given that it may take time to realize the impact from the shock, and longer to see material change in lapse rates to merit a reprice

#### **4. Learning Objectives:**

7. The candidate will understand the professional standards addressing financial reporting and valuation

#### **Learning Outcomes:**

- (7c) Identify and apply actuarial standards of practice relevant to financial reporting and valuation.

#### **Sources:**

LFV-635-13: Participating account management and disclosure to par policyholders

Reinsurance: Chapter 4: Basic Methods of Reinsurance

LFV-606-13: OSFI: Guideline Minimum Continuing Capital and Surplus Requirements for Life Insurance Companies 1-5, 8-9 (2014)

#### **Commentary on Question:**

*This question tested the candidate's understanding of Canadian Standards of Practice and basic reinsurance concepts.*

#### **Solution:**

- (a) The student makes the following recommendations:
- (i) *Merge open and closed participation blocks to:*
    - *Increase credibility*
    - *Support dividend payment on new business*
  - (ii) *Smooth dividends paid so they are not significantly different from previous years*
  - (iii) *A dividend payout of 5% of the participating accounts to all policyholders*
  - (iv) *A 15% payment to the shareholders from the participating accounts*
  - (v) *An increase to the dividend stabilization reserve to support growth*

Critique the above recommendations.

#### **Commentary on Question:**

*Candidates that did well in this part were able to provide justification for their critiques by drawing a direct link between their commentary and relevant sections of the OSFI guidelines. Most candidates received partial marks for their responses as they did not provide justification or if they did, it was not aligned with the correct standards of practice or guideline.*

## 4. Continued

- (i) It is appropriate to merge the two participating blocks when it is no longer practical to maintain separately
  - Must apply to OSFI and receive permission to merge the blocks
  - An independent actuary must opine on the merger
  - Must conform to the relevant provisions of the demutualization plan and closed block operating rules
  - Dividend classes/cohorts should be established at issue
  - There should be no material, planned, or systemic cross-subsidization of one cohort by another
  - Materiality in dividend determination should be judged from the point-of-view of the par policyholders, even if it only applies to a small group of policies
  
- (ii) Smoothing of dividends should be allowed, and even may be desirable, but should not result in cross-subsidization of one cohort by another
  - Smoothing should be used to avoid undue yearly fluctuations in the dividend scale and the method used should be reasonably justifiable and documented
  - However, a policy should be established in advanced
  
- (iii) Method for determining dividends should be objective, unbiased, impartial
  - Dividend experience factors should be consistent with underlying experience of each participating account
  - dividend payments requires Appointed Actuary's opinion
  - Appointed Actuary must report to board on fairness of dividend and methods used
  
- (iv) A 15% payment exceeds guidelines
  - Companies are only allowed to transfer between 2.5% - 10% from the par account to the shareholder account, including closed blocks
  - Closed blocks operate under rules set out at the time of demutualization which do not allow payments to shareholders
  
- (v) OSFI expects each company to manage its closed blocks so as to avoid the development of material excess or deficit positions with respect to a closed block's assets over liabilities
  - In order to avoid a tontine effect, the DSR (positive or negative) should not continue to grow for an extended period
  - OSFI expects that at least the amounts in excess of the max DSR defined by the company will be distributed in a timely manner to policyholders

## 4. Continued

(b) Contrast the following:

- Principles for deciding on fairness for changes made to adjustable policies
- Principles for deciding on fairness for participating dividends

### **Commentary on Question:**

*Candidates who did well in this section contrasted the appropriate sets of principles. It was not sufficient to list out one set of principles and note what was different. The differences required explanation. Most candidates failed to contrast the two sets of principles, focusing only on one set of principles.*

### **Adjustable Policies**

- The changes to adjustable policies include projected future expectations
- Except as explicitly provided for in the adjustable policy contract or in documented sales disclosure material, future adjustments should not permit recovery of past insured losses
- If the company decides to not make unfavorable adjustments to some policy cohorts, even though actual underlying experience would permit such changes, this should not be considered to be unfair to policyholders because management can decide on reasonable implementation costs for such a change
- If the company decides to not make favorable adjustments to some policy cohorts, even though actual underlying experience would permit such changes, this would normally be considered to be unfair to policyholders

### **Participating Policies**

- Materiality in dividend determination should be judged from the point of view of the par policyholder, even if it only applies to a small block of policies
- The actual dividends paid should be kept up to date so as to maintain equity between generations of policyholders
- Smoothing of dividends is allowed, but should only be used to avoid undue yearly fluctuations in the dividend scale and the method should be reasonable

(c) Explain why reinsurers do not share in policyholder dividends paid on participating policies.

### **Commentary on Question:**

*Candidates who did well in this section provided sufficient details. Most candidates did not provide enough valid detail in their explanation and only received partial credit.*

## **4. Continued**

- Reinsurer will provide additional allowances in lieu of dividends
- Results for retained and reinsured business may differ dramatically, but dividend results tend to reflect results on retained
- Dividend formulas include ceding company's investment and expense results
- Formulas include experience on all business, including that not pertinent to reinsurance

## 5. Learning Objectives:

5. The candidate will understand the Risk Based Capital (RBC) regulatory framework and the principles underlying the determination of Regulatory RBC and Economic Capital.

### Learning Outcomes:

- (5b) Compute MCCR for a life insurance company, including:
- (i) Identification of significant risk components
  - (ii) Identification of specialized product MCCR requirements
  - (iii) Interpreting results from a regulatory perspective
- (5c) Explain and apply the concepts, approaches and method for determining Economic Capital
- (i) Identification of the significant risk components
  - (ii) Selecting calculation methods appropriate to stakeholder's perspectives

### Sources:

LFV-606-13: OSFI Guideline – Minimum Continuing Capital and Surplus Requirements (MCCR) For Life Insurance Companies, Sections 1 – 5, 8 – 9, January 1, 2014

### Commentary on Question:

*Commentary listed underneath question component.*

### Solution:

- (a) Calculate the mortality risk volatility component under MCCR at December 31, 2014. Show all work.

### Commentary on Question:

*Most candidates did well on the second part of this question, but for the first part, almost nobody recognized the need to add MfAD to qx for the information given.*

In this question, qx is a flat rate of 0.01, which means it doesn't have a secular trend, and based on the CIA guideline, the total margin would include both the reversal of the secular trend and the selected constant divided by the life expectancy; as a result, the total margin may very well exceed the high margin in the absence of a secular trend. Candidates would get full credit for this part if they chose the maximum MfAD.

$$\begin{aligned} \text{MfAD} &= 15/\text{ex}/1000 \\ &= 15/12/1000=0.00125 \\ \text{qx}' &= \text{qx} + \text{MfAD} = 0.01 + 0.00125 = 0.01125 \end{aligned}$$

$$A = [\text{qx}(1-\text{qx})b^2]^{0.5} = [0.01125 \times (1-0.01125) \times (2)^2]^{0.5} = 0.211$$

Macaulay duration is 1 since only cashflow is at end of year

## 5. Continued

- (b) Your company has purchased a block of index-linked UL products.
- (i) Describe the differences in the determination of the Asset Default (C-1) MCCR capital factor for index-linked UL products compared to non-index-linked UL products.
  - (ii) List the conditions your company must adhere to when managing the assets for this block of business.
  - (iii) Calculate the December 31, 2014 Asset Default (C-1) MCCR required capital factor applicable to this product. Show all work.

### **Commentary on Question:**

*For part (i), most candidates recognized that main difference and did well. For (ii) many candidates were able to touch on at least part of the conditions but very few provided enough content to warrant full credits. For the calculation part (iii), candidates either knew what to do and received most of the credits, or didn't seem to be prepared for this material at all, and received little to no credits.*

- (i) All assets backing index-linked products must be segmented and included in the index-linked form, and will attract capital factors based on the correlation factor applicable to a particular subgroup of assets.

To determine the capital factor applicable to a particular subgroup of assets, a correlation factor (CF) must be calculated.

For non-index linked UL products there is no correlation factor applied. Factors are applied directly to assets.

- (ii) All supporting assets must be segmented into asset subgroups.

A separate asset subgroup must be maintained for each index referred to in the products

The return (on market basis) of each asset group must be tracked

Any transfers into or out of the asset subgroup must be at market

## 5. Continued

- (iii) Calculate the correlation factor for 2014 Q1 using formula  $CF = A \times (B/C)$   
A: historical correlation between returns credited to the funds and the returns on the subgroup's assets  
B:  $\min(\text{std of asset returns, std of returns credited to PH funds})$   
C:  $\max(\text{std of asset returns, std of returns credited to PH funds})$   
 $CF = 0.99 \times (0.118/0.124) = 0.9421$   
capital factor for MCCSR:  $1 - \text{MIN}(CF \text{ of last 4 quarter}) =$   
 $1 - \min(94.21\%, 94.24\%, 94.46\%, 94.75\%)$   
 $1 - 94.21\% = 5.79\%$



## **6. Learning Objectives:**

5. The candidate will understand the Risk Based Capital (RBC) regulatory framework and the principles underlying the determination of Regulatory RBC and Economic Capital.

### **Learning Outcomes:**

- (5b) Describe the U.S. Risk Based Capital (RBC) regulatory framework and the principles underlying the determination of Regulatory RBC, and be able to compute RBC for a U.S. life insurance company including:
  - (iv) Identification of significant risk components
  - (v) Identification of specialized product RBC requirements
  - (vi) Interpreting results from a regulatory perspective
  - (vii) Implementation under U.S. principle-based approach
- (5c) Explain and describe the concept and roles of Economic Capital including:
  - (iii) Identification of the significant risk components
  - (iv) Selecting calculation methods appropriate to stakeholder's perspectives
  - (iii) Describing how a company would implement an Economic Capital Program

### **Sources:**

Valuation of Liabilities, Ch. 16 Risk-Based Capital (exclude section 16.6)

Economic Capital Overview; U.S. Insurance Regulation Solvency Framework and Current Topics

### **Commentary on Question:**

*Commentary listed underneath question component.*

### **Solution:**

- (a) Identify the approach in developing the economic capital model and the resulting outcome if EL's only concern is:
  - (i) U.S. statutory reporting
  - (ii) Solvency II
  - (iii) Embedded value (EV)

## 6. Continued

### Commentary on Question:

*The question is testing the candidates' understanding of the underlying principle of determination of EC framework. It requires the candidates to understand the different approaches and resulting outcomes in developing the economic capital model under different legislations/situations*

*Some candidates misunderstood the question by focusing on model implementation consideration (e.g. term of projection, CET method etc.). To get full mark, the candidate must reasonably explain the appropriate method of projection and the output of capital needs under each requirement.*

- i) The approach in this situation would be to look at projections of the statutory balance sheet and focus on any changes from the starting point. The starting surplus should be zero and the time horizon used in the projection should be carefully considered. The outcome is defined as maintaining a positive surplus position; any negative surplus over the projection would indicate a need for capital.
  - ii) The approach in this situation would be to look at projections of market value surplus, which is market value of assets minus market value of liabilities. Market value of assets can be relatively easy to calculate, however it can be difficult to obtain market value of liabilities since they are not traded in an open marketplace. There are numerous approaches to calculate the liabilities, but in general the method should discount expected cash flows plus some margin for risk. The outcome is defined as the change in the market value of surplus over the desired time frame.
  - iii) The approach in this situation would be to project future distributable earnings and discount them back at a hurdle rate. For each scenario, you would look at the difference between the expected embedded value and the calculated embedded value. This difference would be the capital requirement. The outcome is defined as maintaining the expected embedded value of the organization over the desired timeframe. Over time, the embedded value of an organization will change even if all risks materialize as expected; therefore this method calculated the additional assets needed to at least maintain the expected EV.
- (b) Describe the U.S. regulatory consequences of:
- (i) YNK's current capital position.
  - (ii) YNK's resulting capital position if they sell the current bond portfolio for statement value and reinvest the proceeds in 100 issuers of Class 3 bonds.

Show all work.

## 6. Continued

### **Commentary on Question:**

*Par b is testing the candidates' understanding of RBC framework through identifying the significant risk components and specialized product RBC requirements and interpreting of results from a regulatory perspective.*

*Candidates performed well on the first part of question. Almost all the candidates receive full mark on the first question by correctly commenting on an RBC plan to the commissioner of the state of domicile.*

*Majority of the candidates got partial points on the second part of question by correctly writing down the risk based capital formula. A lot of Candidates applied incorrect risk category amount in the formula. Most of candidates were able to calculate the new factor and new asset risk other amount. A lot of candidates forgot to comment on RNK's new capital position.*

*To achieve the full marks, the candidates have to demonstrate full understanding of the formula with right calculation.*

- i. Ratio level mandates certain actions on part of authorities; the company must prepare and submit an RBC plan to the commissioner of the state of domicile.
- ii. Ratio = 175% = Total adjusted Capital/Risk Based Capital  
Total adjusted capital will not change  
Current Risk Based Capital =  $((\text{asset risk-other} + \text{interest risk})^2 + \text{asset risk-stock}^2 + \text{insurance risk}^2)^{.5}$   
 $= ((100+50)^2 + 100^2 + 20^2)^{.5} = 181.38$   
New factor for 100 issuers =  $(50 \times 2.5 + 50 \times 1.3) / 100 = 1.9$   
New asset risk other amount =  $100 * (0.046 * 1.9) / (0.1 * 2.5) = 34.96$   
Nw Ratio =  $175\% \times 181.38 / 132.73 = 239\%$

The Improvement in the RBC ratio gets YNK out of Company Action (or RBC plan range); however, the company must still perform trend tests.

- (c) Describe current solvency framework initiatives in the U.S. that would impact EL's decision.

### **Commentary on Question:**

*Part c is testing the candidates' understanding of RBC framework by comparing its significant risk components with MCCSR*

## 6. Continued

*Majority of the candidates received most of the points on C-1 and C-2. Some candidates misunderstood the question by focusing on different risk factors calculation under RBC and MCCSR instead of comparing the different risks covered with c-1, c-2 and c-3 between MCCSR and RBC*

*To achieve the full marks, the candidates have to list the key component differences (e.g what type of risks are covered under each risk category) for c-1, c-2 and c-3 risks between MCCSR and RBC.*

C1: assets default risk

Both RBC and MCCSR define C1 as asset default risk and require holding capital on the asset default risk

RBC and MCCSR apply different factor on the asset class

C2: insurance risk

RBC C2 risk covers risks for underestimating liabilities on business already

underwritten or inadequate pricing on business to be written in the coming year

MCCSR does not have the general term referring to insurance risk, instead, it has a specific section to report required capital for mortality, morbidity and lapse risk

C3 Interest rate risk, health risk and market risk

RBC C3 risk covers interest rate risk, health risk and market risk

MCCSR C3 risk only covers the interest rate risk, Health risk is not specified in MCCSR

Market risk for RBC covers risk of loss on variable product with guarantee due to change in market returns

MCCSR has a specific section with specific SFG capital calculation requirement

## 7. Learning Objectives:

6. The candidate will be able to evaluate various forms of reinsurance, the financial impact of each form, and the circumstances that would make each type of reinsurance appropriate.

### Learning Outcomes:

- (6a) Describe the considerations and evaluate the appropriate form of reinsurance from the ceding and assuming company perspectives.
- (6b) Explain the consequences and evaluate the effect on both ceding and assuming companies with respect to:
- (i) Risk transfer
  - (ii) Cash flow
  - (iii) Financial statements
  - (iv) Reserve credit requirements

### Sources:

Life, Health and Annuity Reinsurance, Tiller, 3rd Edition, Ch. 4-6

### Commentary on Question:

*The question tested the candidates understanding of the reinsurance and the concept of Letter of Credit.*

### Solution:

- (a) Calculate the net amount payable in the second policy year by Vega to Supra for this policy under these reinsurance agreements. Show all work.

### Commentary on Question:

*Most candidates made errors in their calculations and, thus, did not receive full credit for this part. Common mistakes made by candidates include:*

- *Not calculating the premium tax impact.*
- *Not calculating a correct Cash Value of the ceded amount in year 2.*

*Where candidates did well:*

- *Calculating the YRT rate.*
- *Calculating the reinsurance premium on the WP rider, including the 10% allowance.*
- *Calculating the premiums for both the base plan and the WP rider.*

*Note: for the premium tax reimbursement, it is acceptable to use the first year premium tax for the YRT portion. If so, the candidate would have to calculate first year premium for the YRT rates. The first year premium tax for the coinsurance is the same.*

## 7. Continued

### Steps of calculation:

Risk sharing =  $(500,000 \text{ FA} - 100,000 \text{ retention}) * 50\% = 200,000$

Cash Value of the ceded amount in year 10 =  $47 / 1000 * 200,000 = 9,400$

NAR year 2 =  $\text{FA} - \text{Cash Value year 2} = 200,000 - 9,400/9 = 198,955.56$

YRT rates =  $0.45 * 0.59 \text{ (IA 45 duration 2)} / 1000 = 0.2655 / 1000$

Reinsurance premium on the base plan =  $198,955.56 * 0.2655 / 1000 = 52.82$

Premium tax =  $5\% * 52.82 = 2.64$

Net payment is  $52.82 - 2.64 = 50.18$

Reinsurance premium on the WP rider =  $75\% * 50 * (1-10\% \text{ allowance in the second year}) = 33.75$

Premium tax =  $5\% * 33.75 = 1.69$

Net payment =  $33.75 - 1.69 = 32.06$

Total reinsurance premium in year 2 =  $50.18 + 32.06 = 82.24$

- (b) Supra is not licensed in Vega's state of domicile. Recommend a solution that would allow Vega to claim a reserve credit on its statutory statement.

### **Commentary on Question:**

*Most candidates did not receive full credit for this part. Candidates received partial credit for demonstrating knowledge of the benefits of Letter of Credits.*

*Candidates could receive partial credit if recommendation is to use a trust/escrow account and justification was provided.*

Best option: Letter of Credit

YRT is not a significant source of reserve relief

The amount of reserve credit can be quite small in relation to the base product for whole life

Since YRT reserves are small, YRT is not a significant source of reserve relief to ceding company

Modco cannot be used since it is a YRT arrangement.

Trust is an option but expensive for the limited reserve relief

Since the benefit is small, best to minimize the costs associated with the solution  
Recommend using Letter of Credit:

- A letter of credit is obtained from a financial institution and provides that the ceding company may draw the funds on demand.
- Cost efficient (can be obtained for a nominal fee)
- Little administration needed

## 8. Learning Objectives:

2. The candidate will be able to understand and apply valuation principles of individual life insurance and annuity products issued by Canadian life insurance companies.

### Learning Outcomes:

- (2a) Describe valuation methods.
- (2b) Recommend appropriate valuation assumptions.
- (2c) Calculate liabilities for life and annuity products and their associated riders.

### Sources:

Report on the Task Force on Segregated Fund Liability and Capital Methodologies (Aug 2010)

CIA Educational Note: Reflection of Hedging in Segregated Fund Valuation (May 2012)

CIA Educational Note: Considerations in Valuation of Segregated Fund Products (Nov 2007)

### Commentary on Question:

*This question tests the candidate's knowledge of segregated fund hedging and valuation concepts*

### Solution:

- (a) Explain the relationship between the CALM and Risk-Neutral Methods of valuing segregated fund guarantees as described by the Canadian Institute of Actuaries' Task Force on Segregated Fund Liability and Capital Methodologies.

### Commentary on Question:

*Most candidates understood the general concepts and relationships between the two methods but did not provide enough detail to receive full credit. Candidates who described the variations of CALM and Risk Neutral runs without explaining the relationship between the two methods did not receive credit.*

- If company does not hedge its guarantee or if its hedging program has a target different from the risk-neutral value, it results in an important difference between the CALM and Risk-Neutral methods
- The Risk-Neutral method estimates the cost of implementing a hedging strategy with the risk-neutral value as hedge target
- CALM is an estimate of an amount required to support future claims with a high confidence level
- If a company hedges its guarantees with the risk neutral value as the hedge target, the difference between CALM and the Risk Neutral method become blurred

## 8. Continued

- If the same parameter is used for the two methods then both methods will yield the same result
- (b) Critique each of the valuation actuary's statements.

### **Commentary on Question:**

*Most candidates did well with critiquing the second statement but did not perform as well with the first and third statements.*

#### Statement 1

- Under the hedge cost method, real-world scenarios with poor investment returns will result in adverse outcomes similar to those without hedging.
- The hedge cost method allows hedging imperfection by allowing a portion of the guarantee benefits to not be covered by hedging.
- Under a typical delta hedging strategy, scenarios resulting in adverse outcomes are not necessarily those of poor investment returns.
- There is no assurance that the PfAD provided by the hedge cost method is proportionate to the risk for which a provision should be established.

#### Statement 2

- The practical difficulties in using such approximation methods for multi-faceted guarantees offered in most segregated fund products are significant
- With the many policyholder options, economic factors and long time-frames often involved, the necessary functions or grids are likely to be quite complex
- Extensive testing would be required to confirm that these types of approximation methods are sufficiently robust to respond realistically in the wide range of potential environments represented by the outer real-world stochastic loops
- It may be more practical to use these approximation methods for shorter-term guarantees with limited optionality

#### Statement 3

- Adaptations may be required if aspects of the risk-neutral liability are not hedged (e.g., if fees are not hedged)
- Adaptations may also be required to reflect imperfect policyholder behaviour
- Other adaptations that may be required from a pure risk-neutral approach could include use of a discount rate that exceeds the risk-free interest.
- Margins would be required on these real-world assumptions.



## 8. Continued

- (c) Calculate the total initial reserve under CALM if this hedging program is implemented. Show all work.

### Commentary on Question:

*The model solution uses hedge assets equal to the GMMB Market Value of \$100,000 (100 futures contract of 1000 each). Most candidates received partial credit for their response as many did not correctly project hedge cashflows.*

State – Up

$$MV(0) = \$100,000$$

$$MV(1) = \$100,000 \times 1.2 = \$120,000$$

$$\text{Claims} = \text{Max}(0, \text{GV} - \text{MV}(1)) = \text{Max}(0, \$105,000 - \$120,000) = 0$$

$$\begin{aligned} \text{Hedge Payoff} &= \# \text{ Contracts} \times (\text{Index}(0) \times (1+i) - \text{Index}(1)) \\ &= 100 \times (\$1,000 \times 1.05 - \$1,200) = -\$15,000 \end{aligned}$$

$$\text{CF}(1) = \text{Claims} + \text{Hedge Payoff} = 0 + -\$15,000 = -\$15,000$$

$$\text{PV}(\text{CF}(1)) = -\$15,000/1.05 = -\$14,286$$

$$\text{Premium}(0) = \$5,000$$

$$\text{Reserve (Up)} = \$14,286 - \$5,000 = \$9,286$$

State – Down

$$MV(0) = \$100,000$$

$$MV(1) = \$100,000 \times 0.8 = \$80,000$$

$$\text{Claims} = -\text{Max}(0, \text{GV} - \text{MV}(1)) = -\text{Max}(0, \$105,000 - \$80,000) = -\$25,000$$

$$\begin{aligned} \text{Hedge Payoff} &= \# \text{ Contracts} \times (\text{Index}(0) \times (1+i) - \text{Index}(1)) \\ &= 100 \times (\$1,000 \times 1.05 - \$800) = \$25,000 \end{aligned}$$

$$\text{CF}(1) = \text{Claims} + \text{Hedge Payoff} = -\$25,000 + \$25,000 = \$0$$

$$\text{PV}(\text{CF}(1)) = \$0/1.05 = \$0$$

$$\text{Premium}(0) = \$5,000$$

$$\text{Reserve(Down)} = \$0 - \$5,000 = -\$5,000$$

$$\begin{aligned} \text{Reserve} &= \text{Prob (Up)} \times \text{Reserve (Up)} + \text{Prob (Down)} \times \text{Reserve (Down)} \\ &= 62.5\% \times \$9,286 + 37.5\% \times -\$5,000 = \$3,929 \end{aligned}$$

## 9. Learning Objectives:

2. The candidate will be able to understand and apply valuation principles of individual life insurance and annuity products issued by Canadian life insurance companies.

### Learning Outcomes:

- (2a) Describe valuation methods.
- (2b) Recommend appropriate valuation assumptions.
- (2c) Calculate liabilities for life and annuity products and their associated riders.

### Sources:

CIA Educational Note: Best Estimates Assumptions for Expenses (November 2006)

CIA Educational Note: Margins for Adverse Deviations (MfAD) (November 2006)

CIA Educational Note: Valuation of Universal Life Policy Liabilities (February 2012)

### Commentary on Question:

*This question tested the candidates' understanding of how product features and design determine valuation assumptions. Candidates were expected to identify product features and designs that drive change in policyholder behavior, recommend appropriate margins for adverse deviation for key valuation assumptions and provide justifications.*

### Solution:

- (a) Describe considerations in setting the base valuation assumptions under Canadian GAAP for the following policyholder options.

#### Commentary on Question:

*Many candidates described similar considerations, which did not earn additional credit.*

#### Premium Persistency

- How product is being marketed (e.g. emphasis on premium flexibility and minimum funding could result in lower premium persistency)
- Presence of lump sum payments
- Relationship of the crediting rate to external interest rates
- Preauthorized payments
- Emphasis on tax advantages, crediting rates and savings
- Presence of persistency bonus leads to higher premium persistency
- Policyholder behavior affected by guarantees inherent in product design (no lapse guarantees, market interest rates, exempt testing)

## 9. Continued

### Partial Withdrawals

- Considerations for choosing partial withdrawal assumptions are similar to the considerations for choosing premium persistency assumptions
- Tax impact on disposition of proceeds and on death benefits for level face and indexed designs

### Lapse

- Policy design features (surrender charges, bonuses, access to cash value)
- Taxation aspects of the policy
- Economic scenarios
- How policy is being marketed
- Form of agent compensation
- Heavy back-end surrender charges or persistency bonus may cause a cash value cliff
- Ability to defer tax by overfunding and by the reluctance to pay tax on surrender of the policy
- The degree of lapse support within the UL portfolio
- Relationship of the crediting rate to external interest rates

- (b) Recommend an appropriate margin for adverse deviation (MfAD) for the following valuation assumptions

### **Commentary on Question:**

*Candidates did generally well in recommending MfADs for parts (i) and (ii). Candidates generally struggled with part (iii), not recognizing the interest rate assumption is scenario tested using CALM. Partial credit was given to candidates that discussed CALM. Candidates that provided additional considerations of the CALM process received full credit.*

### Premium persistency and partial withdrawals

- Reasonable to assume a margin in the 5% to 20% range of the best estimate option utilization assumption
- Direction of the MfAD may vary by scenario, age, policy duration in order to ensure an increase in policy liabilities

### Significant considerations:

- Low credibility: new product and company has no internal experience
- Future experience difficult to estimate: potential anti-selection through partial withdrawals
- Possible anti-selection due to minimum interest guarantee

## 9. Continued

More than one significant consideration exists, margin should be at least the average of the high and low margins; recommend a MfAD close to the upper bound: +/-15% ~ 20%

### Expense

- Low and high margins for adverse deviations are respectively 2.5% and 10% of best estimate expense including inflation thereof
- Inflation assumption consistent with interest rate scenario, no additional margin on inflation required

Significant considerations:

- Future experience difficult to estimate
- UL is a complex product that is complicated to administer with high maintenance expenses
- Future reductions in unit expenses (before inflation) are assumed
- Volume of new business may be unstable which could impact unit costs

More than one significant consideration exists, margin should be at least the average of the high and low margins; recommend an MfAD of +7% ~ 10%

### Interest rate

- Scenario tested assumption in applying CALM
- Determine assumptions and policy components consistent with expected (base) interest rate scenario without MfADs
- Apply MfADs to expected assumptions (except interest) and policy components, where applicable, to determine valuation assumptions
- Determine the assumptions for each interest rate scenario
- Policyholder behavior can vary with the assumptions in each scenario
- Revise the valuation assumptions to be consistent with the interest rate scenario
- Starting with current policy fund balance, current assets, valuation policy components & assumptions, project future policy elements and future asset and liability cash flows. Process may need to be performed on duration-by-duration basis rather than policy-by-policy.
- Process may be iterative due to interdependence of policy components with the interest rate scenario
- Using asset and liability cash flows, determine the liability amount for each scenario
- Provision for adverse deviations is the difference between a scenario whose policy liabilities are relatively high and the base scenario

## 9. Continued

- (c)
- (i) Calculate the expense overrun in 2015 assuming an inflation rate of 2% per year. Show all work.
- (ii) Explain why each expense from the expense study was included or excluded in the calculation in (i).

### Commentary on Question:

*Most candidates demonstrated knowledge of the concept of expense overrun but had difficulty distinguishing which expenses to include in the calculation of total maintenance expenses. Most candidates did not include capitalized portion of system upgrade in the calculation and did not amortized the capitalized amount. Most of the candidates applied inflation adjustment to the 2019 unit expense cost. Partial credit was given if candidates did not include all relevant expenses in total maintenance expense calculation.*

- (i) Temporary expense overrun exists when total current maintenance expenses exceed the long-term best estimate unit expense levels.

2015 Total Maintenance Expenses:

$$\begin{aligned} &= \$8,000,000 / 4 \text{ (amortize the capitalized portion of system upgrade)} + \\ &\$500,000 \text{ (Financial reporting)} + \$1,000,000 \text{ (Direct legal)} + \$10,000 \\ &\text{(Policyholder statement mailing)} \\ &= \$3,510,000 \end{aligned}$$

2019 Total Maintenance Expenses (Projected Unit expense):

$$\begin{aligned} &= \$0 + \$450,000 + \$1,000,000 + \$50,000 \\ &= \$1,500,000 \end{aligned}$$

2019 Unit cost:

$$\begin{aligned} &= \$1,500,000 / 12,500 \text{ policies} \\ &= \$120 / \text{policy} \end{aligned}$$

Discounted by 4 years of inflation (Long-term best estimate unit expense):

$$\begin{aligned} &= \$120 / (1.02^4) \\ &= \$111 / \text{policy} \end{aligned}$$

Expense overrun in 2015:

$$\begin{aligned} &= \$3,510,000 - \$111 \times 351 \text{ policies} \\ &= \$3,470,000 \end{aligned}$$

## 9. Continued

(ii) Included

- Capitalized portion of system upgrade - depreciation expenses from past capitalized expense is included; this approach leads to more stable and explainable unit costs
- Financial reporting - portion of overhead that is policy-related
- Direct legal - direct policy-related expenses (e.g. claim litigation etc..)
- Policyholder statement mailing - expense associated with maintaining policies

Not included

- Upgrading administrative system - large system expenditure; the one-time cost is capitalized and not included
- IT personnel - appears to be a one-time expense and non-recurring
- Marketing - marketing expenses are usually considered to be acquisition related and not included in the valuation maintenance assumption
- Senior management (overhead) - portion of overhead that is not directly policy-related

(d)

Calculate the impact on both the income statement and balance sheet of the system upgrade in 2015. Show all work.

**Commentary on Question:**

*Few candidates were able to calculate the impact on balance sheet and income statement from the system upgrade. Partial credit was given for using the PV ratios to determine the impact on liabilities.*

GAAP liabilities impact from non-recurring costs:  $\$20,000,000 * (\$2.5 / \$10) = \$5,000,000$

GAAP liabilities impact from recognizing productivity gain:  $\$20,000,000 * (\$7.5 / \$10) = \$15,000,000$

Impact on assets (Balance sheet)

Initial investment plus capitalized portion =  $-\$10,000,000 + \$8,000,000 = -\$2,000,000$

Impact on liabilities (Balance sheet)

Non-recurring cost impact plus gains from productivity improvement =  $\$5,000,000 - \$15,000,000 = -\$10,000,000$

## 9. Continued

### Impact on Income statement

Total investment - portion capitalized + impact on GAAP liabilities of non-recurring costs - impact of recognizing productivity improvement

$$= -\$10,000,000 + \$8,000,000 - \$5,000,000 + \$15,000,000 = \$8,000,000$$

## 10. Learning Objectives:

4. The candidate will be able to explain and apply the methods, approaches and tools of financial management and value creation in a life insurance company context.

### Learning Outcomes:

- (4d) Apply methods of valuation to business and asset acquisitions and sales. This includes explaining and applying the methods and principles of embedded value.

### Sources:

LFV-106-07: Chapter 4 of Insurance Industry Mergers & Acquisitions (Sections 4.1-4.6)

Embedded Value: Practice and Theory

### Commentary on Question:

*Commentary listed underneath question component.*

### Solution:

- (a) Calculate the actuarial appraisal value at December 31, 2015 using Green's assumptions, ignoring all cashflows after 2017. Show all work.

#### Commentary on Question:

*Most candidates were able to calculate the pre-tax statutory earnings and demonstrate their understanding of actuarial appraisal value. Few candidates were able to determine the income tax on pre-tax earnings. In particular, candidates did not include the change in tax reserves nor the change in DAC assets. Few candidates used the target capital ratio to determine the required capital for each year.*

Actuarial Appraisal Value = Adjusted Book Value + NPV (Distributable Earnings), where:

NPV (Distributable Earnings) = NPV (Premium and Investment Income - Benefits - Expenses - Unallocated Expenses - Increase in Statutory Reserves - Taxes - Increase in Capital + Investment Income on Capital)

#### Required Capital (t)

= Minimum Required Capital (t-1) × Target Capital Ratio

- Year 2015 =  $40 \times 300\% = 120$
- Year 2016 =  $45 \times 300\% = 135$
- Year 2017 =  $49 \times 300\% = 147$

#### Interest on Required Capital (t)

= Required Capital (t-1) × Interest on Capital

- Year 2016 =  $120 \times 4\% = 4.8$
- Year 2017 = 5.4



## 10. Continued

### Increase in Required Capital (t)

= Required Capital (t) - Required Capital (t-1)

- Year 2016 = 135-120 = 15
- Year 2017 = 147-135 = 12

### Pre-Tax Statutory Earnings

= Premium and Investment Income – Benefits – Expenses – Unallocated Expense  
- Change in Statutory Reserve + Interest on Required Capital

- Year 2016 = 210 - 17 - 10 - 7.2 - 50 + 4.8 = 130.6
- Year 2017 = 235 - 18 - 12 - 2.3 - 20 + 5.4 = 188.1

### After-Tax Earnings = Pre-Tax Earnings - Income Tax

Income Tax = (Pre-Tax Statutory Earnings + Increase in Statutory Reserve -  
Increase in Tax Reserve + Increase in Proxy DAC Tax Asset - Existing Proxy  
DAC Tax Asset Runoff) × Tax rate

- Year 2016: Income Tax = (130.6 + 50 - 40 + 3 - 10) × 20% = 133.6 × 20% = 26.7;  
After-Tax Earnings = 130.6 - 26.7 = 103.9
- Year 2017: Income Tax = (188.1 + 20 - 40 + 3 - 10) × 20% = 161.1 × 20%  
= 37.6 ; After Tax Earnings = 188.1 - 37.6 = 155.9

### Distributable Earnings

= After-Tax Earnings – Increase in Required Capital

- Year 2016 = 103.9 - 15 = 88.9
- Year 2017 = 155.9 - 12 = 143.9

Discount using CAPM:

$$r = r(f) + B \times [r(m) - r(f)] = 2\% + 1.25 \times (10\% - 2\%) = 12\%$$

### Actuarial Appraisal Value

= Adjusted Book Value + NPV (Distributable Earnings)

$$= 65 + 88.9 \div 1.12 + 143.9 \div 1.12^2 = 259.06$$

Alternatively, “Cost of Capital” could be calculated using the following formula:

Cost of Capital (t) = Required Capital (t-1) × (RDR - i), where RDR = 12% and i = 4%

- (b) Describe the possible impact on the actuarial appraisal value based on each of Blue’s observations. Justify your answer.

## 10. Continued

### **Commentary on Question:**

*Most candidates were able to describe the possible impact on the actuarial appraisal value if Green is overly optimistic on the market return. For the second part, some candidates did not fully describe the impact of excessive capital on actuarial appraisal value.*

Green is overly optimistic on the market return:

- Blue will lower the expected market rate of return, which reduces the discount rate
- The NPV of distributable earnings will then be higher, so the appraisal value would be higher

Green is holding excessive capital for this block:

- Blue will lower the capital target ratio and the required capital will be reduced
- The interest on required capital will be reduced, which lowers earnings
- The capital will be released earlier during the life time of the block and the increase in capital would be lower
- The distributable earning would be higher if after tax earnings are not reduced to offset the reduction in increased capital; or could be lower otherwise.

Alternatively, candidates can provide justifications using cost of capital:

- Blue will lower the capital target ratio, reducing the required capital
- The cost of capital will then be reduced, leading to higher appraisal value

- (c) Identify differences between actuarial appraisal value and embedded value calculations. No calculations are required.

### **Commentary on Question:**

*Candidates did relatively well on this part. Most candidates were able to identify the differences between actuarial appraisal value and embedded value calculations.*

- Actuarial Appraisal Value typically assign a value to the contribution of future new business whereas Embedded Value does not
- Actuarial Appraisal Value is typically calculated using higher discount rates than Embedded Value
- Expense assumptions used in calculating Embedded Value are typically more company specific than those used in Actuarial Appraisal Value which tend to be more reflective of the prevailing market sentiment

## 11. Learning Objectives:

3. The candidate will be able to understand and analyze the implications of emerging financial and valuation standards.

### Learning Outcomes:

- (3a) Describe emerging developments impacting Canadian valuation and International Financial Reporting frameworks, and assess their impact on the valuation of reserves and financial statements.

### Sources:

LFV-641-14: OSFI: Own Risk and Solvency Assessment (E-19) January 2014

### Commentary on Question:

*The question tests the Candidate's understanding of the new ORSA rule that is going to be implemented by OSFI.*

### Solution:

- (a) Describe considerations in setting internal targets for Own Risk and Solvency Assessment (ORSA).

### Commentary on Question:

*This part is to test candidates' thorough understanding about the new ORSA that is going to be implemented in Canada by OSFI.*

*To receive maximum points in part a, candidates need to list the type of considerations that ORSA recommends when setting internal target for insurance companies. Most of the candidates do not understand this internal target setting requirement by ORSA; they mistake it by answering general internal target setting for an insurance company. Only a couple of candidates can list a few points about this consideration. No one can get full credit on this part.*

- Need to compare own capital needs determination against external or 3rd party expectations
- Look at impact of range of adverse scenarios; scenarios should be of varying nature and severity. The company can incorporate other scenario stress testing, including OSFI Guideline E-18: Stress Testing and Dynamic Capital Adequacy Testing (DCAT)
- Assess company's ability to avoid supervisory interventions after the scenario's impact

## 11. Continued

- Company should determine an Internal Target for both total capital and core capital
  - Core capital should serve to reduce insolvency risk, both in normal times and when the insurer is under stress. Core capital should have only high quality capital elements or at least its mix and assessment should form part of the assessment.
  - For Canadian branches of foreign insurers, may be different considerations if the branch does not raise capital in Canada. ORSA for Canadian branches of foreign insurers should include many of the same considerations with respect to the asset quality vested in trust in Canada or supporting Canadian liabilities.
  - Determine an appropriate normal operating range of capitalization above Internal Targets by considering a series of varying adverse scenarios and, at a certain operating capital level, assessing the insurer's ability to continue normal operations
  - Consider other future planned, foreseen, or potential changes to risk profile due to changes in business strategy, operations or operating environment
- (b) TKT Life, a Canadian insurer, is developing its ORSA. The following statements were made by TKT's Chief Risk Officer (CRO) in describing some of TKT's key decisions and principles:
- A. *“As our ORSA goal is to comply with OSFI's expectations, we shall include known and reasonably foreseeable risks from our MCCSR submissions, where those risks can be easily quantified.”*
  - B. *“A number of non-material individual risks have been identified through sensitivity testing and discarded as they have little impact on the company's current operations. For these non-material risks, internal targets have been calculated with a floor of 125% of the relevant supervisory targets.”*
  - C. *“We have also considered our likely potential entry into other markets. Since we plan to enter the segregated fund market in the next 12 months, we have reflected the risks associated with that market in developing our internal targets.”*
  - D. *“Our bi-annual report to senior management and OSFI will demonstrate that the overall results confirm the position relative to supervisory targets.”*
  - E. *“We want to avoid a supervisory review by OSFI as that leads to prescribed methods and uses of our ORSA.”*

## 11. Continued

*F. “TKT’s ORSA, including each ORSA report that goes to the Board will be reviewed by the Board’s audit committee, which includes the CRO.”*

Critique the above statements.

### **Commentary on Question:**

*This second part question test candidates’ ORSA knowledge by asking them to justify different ORSA scenarios for an insurance company.*

*To get maximum credit, candidates need to justify all the actions described in each sub-section, and explain why. Most candidates can get around 50% of credit on this part. They score better in (A) and (C), OK in (D) and (F), not so good in (B) and (E).*

A)

- Goal should not be restricted to OSFI expectations, should be consistent with insurer's strategic planning
- Should be consistent with and feed into company decision making, ERM or other management processes
- Goal is to assess own capital needs
- Must include known, reasonable foreseeable and emerging risks that may have impact on company's ability to continue operations
- Not enough to include just those risks covered in MCCSR
- Risks that are more difficult to quantify should also be considered (anything that can affect ability to continue operations)

B)

- Should look at non-material risks that when combined with other non-material risks can become material
- Should not be undue reliance on OSFI's minimums
- Do not add a margin to Supervisory targets
- Sensitivity testing is a discrete method and therefore may not show dependencies with other risks
- Non-discrete methods should be used (e.g. stochastic models) to uncover potential impacts

C)

- Yes ABC should consider the risks with entry into Seg Fund Market
- ORSA is a forward-looking process that looks to incorporate changes over its planning horizon (3-5 years)
- Should consider any changes in business strategy, operating environment, growth, capital ...

## 11. Continued

D)

- Report is to the Board - not senior management
- Should include confirmation of Internal Targets and not Supervisory Targets
- Report only goes to OSFI upon request, not on a scheduled frequency
- If it does OSFI is also checking for consistency with company's risk profile
- The ORSA report to the Board should be at least annually and more often if circumstances warrant

E)

- Supervisory review is not intended to prescribe how to perform or use ORSA
- Review allows for dialogue on OSFI's assessment of
- Inherent risk, capital and Composite Risk Rating (CRR)
- ORSA is a process and tool used to support insurers risk targets

F)

- ORSA and ORSA report is subject to periodic objective review, each report does not require review.
- OK to be reviewed by members' of the board.
- Not OK to include the CRO since CRO was actively involved in preparing report