Institute of Actuaries of Australia

# 2011 PART III EXAMINATIONS

## Subject Title: **C2B**
## **Life Insurance**

Date: **Friday 29th April 2011**

Time**: 1:45 pm – 5:00 pm**

**Time allowed:** Three (3) hours plus fifteen (15) minutes of reading time

**Instructions:** Each new question (but not each section of a question) must be commenced in a new answer book.

**Number of Questions:** **Five** (5)

| Question | Marks |
|---|---|
| 1 | 21 |
| 2 | 19 |
| 3 | 19 |
| 4 | 21 |
| 5 | 20 |
| **Total** | **100** |

**Candidates are required to answer ALL questions.**

**This paper has nine (9) pages (excluding this page).**

**COURSE 2B LIFE INSURANCE** **APRIL 2011 EXAMINATIONS**

**Answer all 5 questions**

**QUESTION 1** **(21 Marks)**

You are the valuation actuary of a large Australian Life Insurance Company, which has a large block of non-par traditional business. This block of business is now closed to new business.

The traditional business is backed by fixed interest investments.

The CFO is examining the financial results and wants to compare actual versus expected profits for the year for the non-par traditional business. The following table shows the experience of the non-par traditional business over the current year:

| | **Actual** | **Expected** |
|---|---|---|
| | $000s | $000s |
| Premiums | 500 | 500 |
| Investment Income (including IORE*) | 147 | 168 |
| Expenses | -133 | -140 |
| Death Claims | -150 | -165 |
| Surrender Claims | -400 | -450 |
| Maturity Claims | -100 | -100 |
| Policy Liability (boy) | 3,500 | 3,500 |
| Retained Earnings (boy) | 200 | 200 |
| Total Assets (boy) | 3,700 | 3,700 |
| Policy Liability (eoy) | 3,273 | 3,205 |

* IORE is Interest on Retained Earnings

You can make the following assumptions:

- All cashflows are at the end of the year except for premiums which are at the start of the year.
- Tax can be ignored.
- There has been no change to the assumptions at end of year.
- Policy Liability released on death is the amount payable on death divided by 120%.
- Policy Liability released on surrender is the amount payable on surrender divided by 90%.
- Policy Liability released on maturity is the amount payable on maturity.

a) Calculate the actual and expected profit (showing all workings). (1 Mark)

b) Perform an analysis of profit for the year (showing all workings). (9 Marks)

c) The CFO has noticed that there were less surrenders than expected this year. He believes this should result in a profit for the company because everyone in the company is aware that retention of policies is a crucial issue.

   Provide an explanation to the CFO with regard to this issue covering:

   i) current profits (2 Marks)
   ii) future profits (3 Marks)

d) The CFO believes the poor actual investment return was one of the main reasons for not meeting the expected profit. The CFO suggests that more risk should be taken with the assets in terms of duration and volatility of assets (e.g. equities) in order to improve investment returns.

   Discuss the implications of such a move. (6 Marks)

**QUESTION 2** **(19 Marks)**

You are a consulting actuary, who has been engaged by an Australian life company BENLIFE, to provide advice on the purchase of a large block of retail business from a competitor AUSCO.

The AUSCO retail business comprises a large book of open non-par endowment business (providing death benefits only) and a large block of open unit-linked business.

BENLIFE, the potential purchaser, specialises in group business, providing lump sum death, TPD and salary continuance benefits via consulting tenders.

You decide you will use an Appraisal Value method to place a value on AUSCO's retail business.

a) In order for you to understand AUSCO's retail business under consideration, list 8 pieces of information you require. (2 Marks)

b) Explain how you would place a value on this business to be used as the basis for the purchase covering the following:

   i) assumptions (3 Marks)

   ii) capital requirements (2 Marks)

   iii) calculations (2 Marks)

c) Describe the checks you would perform to obtain comfort on the value you have placed on the business. (2 Marks)

d) You have just been advised that the block of retail business also includes an option for the maturing endowments to convert into life annuities.

   Describe how you would value this option covering the following:

   i) assumptions (1 Mark)

   ii) capital requirements and calculations (1 Mark)

e) The CEO of BENLIFE has asked you to explain what are the risks associated with purchasing this block of retail business.

   Discuss the key risks associated with the purchase. (6 Marks)

 

**QUESTION 3** **(19 Marks)**

You are the Appointed Actuary for a medium size Australian life insurer named AUSLIFE that has a portfolio dominated by an old block of participating endowment business and yearly renewable term (YRT) business. Both the participating endowment business and YRT business are open to new business.

Unit costs have been increasing due to the relatively low sales and the increase in lapses over the last few years on all portfolios. In addition the company has recently been going through a cost reduction program with a decrease in number of staff in the past 2 years.

The participating business has only a reversionary bonus with a 25% shareholder entitlement. Past declarations have been kept relatively stable.

The company was recently taken over by an Asian based insurance group named ASIANLIFE. The CEO of ASIANLIFE has experience of the net premium valuation method of setting reserves in his own country, but no experience of the Australian environment.

The CEO has been looking into the financial situation of AUSLIFE company and has some questions for you.

a) He has asked you to explain the differences between the margin on services (MOS) method of valuing the policy liabilities for the above products in AUSLIFE and the net premium valuation method (NPV) he is used to.

   Discuss the differences between MOS and the NPV method. (5 Marks)

b) He has noticed that you have just recommended an increase in the unit cost assumption. He is not happy with the impact of the increase in unit cost expense assumption as it seems to decrease the value of the company from what ASIANLIFE recently paid for it. He has told you that he is currently in discussion with the CEO of AUSLIFE and that he is going to insist on a further redundancy program in the company to decrease the expenses of the company over the next few years.

   He demands that you take into account this expense reduction plan in setting the expense assumption so that there is not a negative impact on the company's reported MOS profits and Appraisal Value.

   Draft a memo to him to explain your view on this in respect of:

   i) MOS profits (7 Marks)

   ii) Appraisal Value (1 Mark)

c) He has seen projections of your expected profits for the next few years. He wants to see higher reported profits coming out of the Australian company.

He notices the large amount of bonuses that are given to policyholders each year. He is interested in understanding the impact declaring policyholder bonuses has on profit and other issues.

He wonders if you could reduce the bonus declaration to the policyholders in order to increase both the current and future shareholder profits.

i) Describe the impact of reducing declared bonuses on current and future shareholder profits. (3 Marks)

ii) Discuss the other issues that arise from reducing bonuses declared to policyholders. (3 Marks)

**QUESTION 4** **(21 Marks)**

You are the capital actuary of a medium sized Australian life insurance company called LIFECO, which has a large block of yearly renewable term lump sum business (YRT) on its books. Sales of the YRT business have been strong over recent years, with increased sales growth expected in the future.

LIFECO is a subsidiary of an overseas bank (GLOBALBANK).

Regular and sizeable dividends have been paid by LIFECO to its parent company over a long period of time.

You have been given a memo from the Head office of the parent company stating that there is an urgent requirement for capital from all their subsidiaries due to the impact of the upcoming solvency II requirement and they are requiring an up-streaming of capital from your company to the group. They want to understand what the minimum capital requirement for your company is and what is the maximum possible amount of capital that can be released to the Group.

You have been provided with the following information on LIFECO as at the end of the year (31 December 2010). All numbers are in $m.

| | **Total** |
|---|---:|
| Solvency Liability | -550 |
| Capital Adequacy Liability | -420 |
| Minimum Termination Value | 120 |
| Current Termination Value | 120 |
| Expense Reserve (net of $5m offset) | 30 |
| New Business Reserve | 60 |
| Inadmissible Assets Reserve | 10 |
| Resilience Reserve (Solvency) | 16 |
| Resilience Reserve (Capital Adequacy) | 22 |
| | |
| <u>Assets</u> | |
| Australian Fixed Interest /Cash | 217 |
| Property | 0 |
| Australian Equities | 62 |
| International Equities | 31 |
| Total Assets | 310 |

| | |
|---|---|
| Liabilities | |
| Policy Liabilities | -600 |
| Other Liabilities | 10 |
| Total Liabilities | -590 |
| | |
| Net Assets | |
| Retained Profits | 100 |
| Capital | 800 |
| | 900 |

Target Surplus is set at a fixed $20m.

APRA, the regulator, is introducing new capital adequacy requirements for life companies at 31 December 2011. Preliminary calculations indicate that the total Capital Adequacy Requirement for LIFECO will increase by 5% based on the 31 December 2010 figures with Target Surplus still a fixed $20m.

a) The Head office wants to see the calculation of the Solvency Requirement and the Capital Adequacy Requirement for LIFECO.

   Calculate the following as at 31 December 2010 under the current standards (showing each step in your calculation and all workings):

   i) Solvency Requirement according to LPS2.04. (2 Marks)

   ii) Capital Adequacy Requirement according to LPS3.04. (2 Marks)

b) The Head office wants an understanding of Target Surplus.

   Describe what Target Surplus is and the purpose of Target Surplus. (2 Marks)

c) Head office has the view that the Solvency Requirement is the minimum capital requirement for LIFECO. Head Office is putting on pressure so that all excess capital above the Solvency Requirement is up-streamed to the group.

   Discuss the implications if you complied with this request. (4 Marks)

d) Recommend how much capital could be streamed up, including the reasons behind your recommendation. (4 Marks)

e) The Head office then requests that LIFECO reduce its capital requirement so that it would be in a position to up-stream more capital.

   Describe the options that are available to reduce the capital requirements of LIFECO. (7 Marks)

**QUESTION 5** **(20 Marks)**

You have just been appointed as the valuation actuary in an Eastern European life insurance company that specialises in participating traditional business.

The company has had a growing market share in the past 5 years as a result of successful sales of new business through their tied agency force.

The insurance company has performed well over many years, with substantial levels of policyholder retained earnings and shareholder retained earnings.

The insurance regulator in the Eastern European country enforces the same Solvency Requirement and Capital Adequacy Requirements as Australia on all insurance companies operating in the country.

All insurance companies in this Eastern European country only use reversionary bonuses to distribute profits.

The local insurance market is very competitive and the company has prided itself in the high reversionary bonuses that it has declared in the past 5 years of about 8%. It uses this fact strongly in its marketing and sales strategy and is seen as the key reason why the company has been very successful in growing its market share.

Despite the fact that only one bonus rate has been historically declared for all policies, the administration system has the capability to allow for multiple declared bonus rates to be used for different groups of policyholders.

In examining the method that was used in the past for setting the bonus rate, you realise that it has not been based on the supportable bonus concept but only on marketing arguments based on competitor bonus rates. Shareholders receive 25% of declared bonuses.

a) Describe the principles behind the concept of a supportable bonus. (3 Marks)

b) You have an actuarial student who will calculate the supportable bonus for inforce and new business.

Explain in detail the calculations the actuarial student will need to follow to determine the single supportable bonus for inforce business. (3 Marks)

The actuarial student has calculated the supportable bonus rates as follows:

| | Supportable bonus rate % * |
|---|---|
| Inforce Business | 6% |
| New Business | 4% |

* applied to current sums assured and accrued reversionary bonuses

Both inforce and new business have had the same premium rates for many years.

c) The CEO asks you for your opinion whether they could continue using the high declared rates as used in the past.

Discuss the issues the company faces if high bonus rates continue to be declared. (5 Marks)

d) You inform the CEO that you can recommend an alternative method (based on reversionary bonuses only) that addresses the issues raised about continuing to pay high declared rates.

i) Describe your recommended method. (2 Marks)

ii) Explain why your recommended method is appropriate. (4 Marks)

iii) Describe other strategies that could be adopted to help complement your recommended method. (3 Marks)

**END OF PAPER**

 