Institute of Actuaries of Australia

2010 PART III EXAMINATIONS

Subject Title: **C2B**
Life Insurance

Date: **Thursday 29th April 2010**

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	21
4	19
5	20
Total	**100**

Candidates are required to answer ALL questions.

This paper has nine (9) pages (excluding this page and the blank back page).

INSTITUTE OF ACTUARIES OF AUSTRALIA

COURSE 2B LIFE INSURANCE **APRIL 2010 EXAMINATIONS**

Answer all 5 questions

QUESTION 1 **(21 Marks)**

You are the valuation actuary for a medium sized Australian life insurer. The insurer's flagship individual lump sum and disability risk products have been very successful in recent years, as have its group lump sum and group salary continuance business. The insurer's only other in force business is a significant book of CPI linked term certain annuities that have been in runoff for a number of years.

a) **Describe the key principles behind LPS1.04 Valuation of Policy Liabilities, including the methods for handling changes of assumptions for the projection method.** **(2 marks)**

b) **For each of the following two products:**
   Group salary continuance
   Term certain annuities

   i) **State whether the product should be classified as an Insurance Contract or an Investment Contract and explain why.** **(2 marks)**

   ii) **State whether you would use the accumulation or projection method and explain why.** **(2 marks)**

   iii) **List and briefly explain the components of the policy liability in light of your answer to part ii).** **(2 marks)**

c) **The recently appointed Chief Risk Officer (CRO) has been browsing through the draft accounts and has noticed that the policy liabilities represent large figures on the balance sheet, and feels she is unfamiliar with precisely where the figures come from. The CRO is interested in understanding the various risks associated with the policy liability valuation process, which ends with the actuarial notes in the financial statements.**

   i) **List the various risks associated with the policy liability valuation process.** **(5 marks)**

   ii) **Discuss the mitigation strategies that you would put in place for each risk in part i).** **(5 marks)**

d) **You are looking at an analysis of profit performed by one of your analysts on the term certain annuity portfolio and you notice that there is no experience item for inflation indexation. You check the RBA website and CPI inflation has been tracking at around 5% for the previous 12 months and you know that the previous year's assumption was 3%. The unexplained amount in the analysis of profit is immaterial.**

   Suggest some possible reasons why the unexplained amount appearing in the analyst's work is immaterial. **(3 marks)**

QUESTION 2 (19 Marks)

You are the Appointed Actuary for Long Life Ltd (LLL), an Australian Life Insurance Company. LLL sells a wide range of products including individual lump sum protection, group lump sum protection, group disability and individual investment linked business. LLL also has a block of traditional and investment account business, which are closed to new business.

Financial statements have just been completed for the 30/9/09 year end. LLL discloses profits to the market for the 31/3 and 30/9 half years.

The new CEO has only recently been appointed and is new to the Life Insurance Industry. The CEO has some basic knowledge of life insurance products, but little understanding of policy liabilities.

The CEO has asked you why changes in economic conditions have caused such volatile profits for the individual protection business. The CEO is also interested in your views on how management profits should be presented to address the volatility in protection profits.

To help you answer the question, you have extracted the following information:

- **Budgeted profit for the total protection business for the year ending 30/9/09 is $50m after tax.**
- **The individual lump protection business is valued using the projection method.**
- **Total individual protection lump sum policy liabilities at 30/9/09 = -$800m.**
- **For a 1% change in the discount rate, policy liabilities change by 8%.**
- **For a 1% change in the inflation rate, policy liabilities change by 2%.**
- **There was strong growth in the value of equities in the year 30/9/08 to 30/9/09.**
- **History of economic conditions over the last 3 years:**

Date	Discount Rate	Inflation rate
	%	%
30/9/09	6.33%	2.54%
31/3/09	5.20%	2.25%
30/9/08	6.19%	3.42%
31/3/08	6.83%	3.76%
30/9/07	6.95%	3.61%
31/3/07	6.67%	3.36%

a) **Draft a memo to the CEO discussing:**

i) **For the individual lump sum protection business, the nature of the policy liabilities (including how they are determined, the intended effect on profit, expected value over time) and why the changes in the discount rate and inflation rate would have had a volatile impact on the profit from this business. (6 marks)**

ii) A suggested alternative presentation of profits for management purposes, which allows for this volatility in individual lump sum protection profits. (5 marks)

The CEO has been reviewing the 30/9/09 financial statements and has a number of questions.

Discuss the points you would raise in answering the following questions from the CEO:

b) Provide reasons why the Present value of profit margins for individual protection business might have decreased from 30/9/08 to 30/9/09 when the business has grown. (1 mark)

c) Why would an increase in the lapse rate assumption for individual protection business not change the current year's profits and equity? (1 mark)

d) Why might the total Policy Liability have decreased from 30/9/08 to 30/9/09 when the business has grown? Your answer should include a discussion on each product line and on the total policy liability. (2 marks)

e) What are the typical guarantees for Traditional Business and Investment Account Business? (1 mark)

f) For traditional business:

i) Provide a definition of the best estimate bonus rate.

ii) How does the best estimate bonus rate differ from the declared bonus?

iii) Why may the best estimate bonus rate have increased from 30/9/08 to 30/9/09? (3 marks)

QUESTION 3 (21 Marks)

You are the valuation actuary for Company "XYZ", an Australian Life Insurance Company. There are two statutory Funds. Statutory Fund No.1 (SF 1) has two related product groups, Disability income (claims not in payment) and Disabled Lives Reserve (DLR) for disability claims in payment. Statutory Fund No.2 (SF 2) has single premium investment linked business (SP). The end of year valuation has been performed and it has been proposed that the following dividends are to be paid, $50m (SF1) and $100m (SF2).

You have been provided with the following information as at the end of year. All numbers are in $m.

	SF 1			SF2
	Active Lives	DLR	Total	SP
Policy Liabilities				
Best Estimate Liability	-2,300	100	-2,200	
PV profit Margins	2,000	0	2,000	
Policy Liability	-300	100	-200	1,800
Assets				
Cash			204	229
Fixed Interest			34	687
Indexed Bonds			84	0
Australian Equity			93	573
International Equity			65	458
Property			0	344
			480	2,290
Future Income Tax Benefit			70	0
Debtors			50	100
Total Assets			600	2,390
Liabilities				
Policy Liabilities			-200	1,800
Other Liabilities			150	100
			-50	1,900
Equity				
Share Capital			500	50
Shareholder Retained Profits			150	440
			650	490
Total Liabilities			600	2,390

	SF 1			SF2
	Active Lives	DLR	Total	SP
Expenses				
Acquisition Non-Fixed			100	50
Acquisition Fixed			130	100
Maintenance Non-Fixed			200	100
Maintenance Fixed			250	1,000
			680	1,250
Solvency Liability for DLR		120	120	
Capital Adequacy Liability for DLR		120	120	
Minimum Termination Value	100	100	200	2,000
Current Termination Value	100	100	200	2,000
Target Surplus (as a % of Capital Adequacy Requirement)			110%	105%

Notes:

1. Investment linked solvency margin = 0.25 %.
2. Investment linked capital adequacy margin = 1.5%.
3. International equities for SF1 include a $48m holding in Sparks Ltd.
4. Indexed bonds for SF1 include a holding of Mooney bonds with a $27m market value.
5. The Future Income Tax Benefit (FITB) is admissible for the Solvency Requirement and Capital Adequacy Requirement.
6. The $5m Expense Reserve Offset is available for SF1 only.
7. SF1 has a $100m New Business Reserves, whereas SF2 has no New Business Reserve as it can fund future new business from retained profits and capital.
8. For SF1 and SF2, Cash, Fixed Interest and Indexed Bonds are invested in the following proportions of credit rated securities: 20% AAA Govt, 20% AA Corporate, 30% AA- Corporate and 30% BB Corporate.
9. For calculating the Resilience Reserve for the Solvency Requirement, A''/A is 0.92 (SF1) and 0.88 (SF2). In addition, L'/L = 0.95 (SF1) and 1 (SF2).
10. For calculating the Resilience Reserve for the Capital Adequacy Requirement, A''/A is 0.84 (SF1) and 0.81 (SF2). In addition, L'/L =0.9 (SF1) and 1 (SF2).

a) Calculate the following for SF1 and SF2:

i) Solvency Requirement (5 Marks)

ii) Capital Adequacy Requirement and Target Surplus (5 Marks)

Show all the calculation steps.

b) Based on your calculations from part a):

i) Comment on the financial position of SF1 and SF2. (3 Marks)

ii) Describe any actions that could be taken as a result for SF1 and SF2. (8 Marks)

QUESTION 4 (19 Marks)

"ABC" is a medium-sized Australian life insurance company that is wholly owned by "Topco", a large diversified financial services group. ABC has a broad range of products across three statutory funds and reports its profit to Topco every month on a year-to-date basis. ABC uses Margin on Services (MoS) methodology to determine profits, with an approximate calculation of the policy liabilities throughout the year and a full valuation at year-end. ABC also prepares annual Budgets and Business Plans for the year ahead, with expected results for each month through the year. You are the Financial Reporting Actuary for ABC.

The Finance Director has concerns about the apparent disparities between the following:

- **the Business Plan comparison of actual to expected profit results**
- **the MoS analysis of profits. (6 marks)**

a) Discuss the possible reasons for the difference between these two views of the sources of profit.

b) The Finance Director has been talking to a CFO of another insurance company, which uses a traditional Appraisal Value to assist management in the reporting of profits. The Finance Director has asked you for more information on the Appraisal Value.

i) Describe the components of the Appraisal Value. (1 mark)

ii) Describe how the profit is calculated using the Appraisal Value approach. (1 mark)

iii) Discuss the differences between the Appraisal Value Profit and MOS Profit Reporting. (4 marks)

c) The Finance Director would like to introduce a separate Appraisal Value process for ABC involving a full accurate calculation twice a year (at the end of months 3 and 9 in the company year). Each of these results will be rolled forward to obtain estimated values at the end of months 6 and 12 respectively, corresponding to the half year and full year periods. Results are required by day 3 following half year end and full year end.

i) Describe in detail a suitable process for such a "roll-forward". (4 marks)

ii) Discuss any issues that may arise from using a roll-forward process. (3 marks)

QUESTION 5 (20 Marks)

MIRO is a listed Australian financial services holding company that has a life insurance subsidiary, MIRO Life. MIRO Life has two statutory funds. Statutory Fund No.1 comprises participating business, which has been closed since 1998. Statutory Fund No.2 comprises investment linked superannuation business, which is growing.

MIRO has recently launched a successful takeover bid for ALEC Life, a previously listed life insurance company. ALEC has three statutory funds. Statutory Fund No.1 comprises traditional participating business, Statutory Fund No.2 comprises non-participating risk business and Statutory Fund No.3 comprises investment linked superannuation business. Statutory Funds No.2 and No.3 are growing with strong new business sales. For the last couple of years there has been very little new business written in the participating fund.

You are the Appointed Actuary of MIRO reporting to the CFO who is new to the Life Insurance industry.

a) **The CFO has asked you to explain the role of the Appointed Actuary. Briefly describe the key responsibilities of the Appointed Actuary in providing advice to a life company. (3 marks)**

b) **The takeover envisages that both participating statutory funds will be merged. Discuss the issues that would need to be considered in an actuarial report on the merger. (5 marks)**

The participating business of MIRO provides both reversionary bonuses and terminal bonus (based on date of entry) to policyholders. The declared reversionary bonus rate has been stable at 5%. As Appointed Actuary you have actively managed the level of terminal bonus over recent years . Based on the recent valuation, there is a reasonable amount of retained profits in Statutory Fund No.1 of MIRO. The long term strategic asset mix is 10% Cash, 30% Fixed Interest, 30% Australian Equities, 20% International Equities and 10% Property.

Upon review of the ALEC participating business, you learn that it provides only reversionary bonus and has built up a significant level of retained profits. The declared reversionary bonus rate has been stable at 4%. The long term strategic asset mix is 10% Cash, 40% Fixed Interest, 20% Australian Equities, 20% International Equities and 10% Property.

c) The CFO would like to merge the participating business of MIRO and ALEC, with a single bonus policy going forward. You have been asked to propose a bonus policy for the combined fund.

i) Describe any information you would need and why; (3 marks)

ii) Discuss calculations you would perform and why; and (1 mark)

iii) Discuss your recommended principles in implementing the single bonus policy and give examples of how each principle might be applied. Give reasons for recommending the single bonus policy and state any qualifications you may need to make. (8 marks)

END OF PAPER