Actuaries Institute

2015 PART III EXAMINATIONS

Subject Title:	**C2B Life Insurance** (longer answer component)
Date:	**Wednesday, 29 April 2015**
Time:	**1:00 pm – 1:15 pm** (Reading Time) **1:15 pm- 4:15 pm** (Examination)
Time allowed:	Three (3) hours and fifteen (15) minutes including reading time.
Instructions:	Type your answers to the questions using Microsoft Word and ensure that there is no data linked to spreadsheets. You must submit your Excel answer file(s).
Number of Questions:	**Three** (3)

Question	Marks
1	22
2	20
3	18
Total	60

Candidates are required to answer **ALL** questions.
This paper has **six** (6) pages (excluding this page).

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COURSE 2B LIFE INSURANCE SEMESTER 1 2015 EXAMINATIONS

Answer THREE questions.

QUESTION 1 **(22 Marks)**

You are the life insurance valuation actuary of Great Life Insurance Company of Australia (Great Life). The company has a closed book of level premium term insurance business. Features of the product when it launched included:

- guaranteed premium rates
- automatic indexation of the sum insured each year at a guaranteed rate of 3%, irrespective of CPI movement
- level premium throughout the policy (i.e. the level premium rate at issue factors in the cost of the automatic future indexation)
- no rider benefits
- no surrender or maturity value
- term expires at age 65.

As at the valuation date, 31 December 2014, the size of the portfolio was:

- 100,000 policies
- $222,750,000 in force premium
- $45bn sum insured.

The policy liability which is negative at the valuation date is $(185,695,000).

Subject to a minimum value of 0, the Target Capital requirements of the company are:

120% of Present Value of Claims +
105% of Present Value of Non-premium related Expenses +
100% of Present Value of Premium related Expenses –
100% of Present Value of Premium.

The company has just hired a new CFO. Whilst being an experienced life insurance financial professional, they have never been exposed to a material block of level premium term insurance. The CFO has submitted to you a series of questions relating to this product.

In order to be able to answer these questions you have asked your actuarial analysts to pull together a spreadsheet model of this business. He has pulled together most of the model and you have reviewed his work and satisfied yourself that it is correct. His model can now be used to perform the additional analysis necessary to answer the CFO's questions. This spreadsheet is provided with the question.

The following assumptions apply (also provided in the spreadsheet).

Expense Assumptions

Renewal Commission	25%	of premium
Premium Expense	1.5%	of premium
Claim Expense	1.5%	of claims
Per Policy Expense	$120	per policy

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Economic Assumptions

Guaranteed SI Indexation	3%
Investment Income (pa)	3%
Risk Free Discount Rate	2.75%
Risk Discount Rate	12.5%
Expense Indexation (pa)	2.5%

Discontinuance Rates

2015 Claim Rate (qx)	0.10%
Annual Claim Rate Increase	7.5%
Lapse Rate	5%
Maturity/Expiry Rate	Provided in Spreadsheet

You should assume that:

- all premiums are paid at the start of each year;
- all claims are paid at the end of the year;
- per policy expenses are paid at the start of the year;
- all other expenses are incurred at the same time as their underlying driver.

a) The CFO's first set of questions relate to the reported profit generated by the book.

i) What is the BEL and the present value of profit margins at the valuation date?

(1 mark)

ii) What is the appropriate profit carrier to use, and why? What is the profit margin using this carrier?

(2 marks)

iii) Great Life takes a long-term view of its expected financial position. Provide a summary table of the premium and profit expected for the next 10 years, including commentary on the respective patterns.

Extend the table to include the following 10 years and comment on the resulting trend in premiums and profit.

(4 marks)

b) The CFO's second set of questions relate to the Target Capital requirement and the value of the book.

i) How much is the Target Capital requirement and the Value of the Inforce portfolio at the valuation date?

(1 mark)

ii) Explain how the value of inforce is impacted by the return of target capital held in the business. How much is the target capital contributing to the value of the inforce and explain why this outcome is unusual?

(3 marks)

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iii) How is the value of inforce expected to change over the next 10 years and what is the major driver of the change in value?

(2 marks)

iv) Based on this, comment upon the appropriateness of the Target Capital model including any shortcomings.

(3 marks)

c) The CFO is concerned about the deteriorating lapse rates being experienced across the industry. He has initiated a project to improve retention but does not expect any improvement until 2017 (3 years from now). In this year he expects the lapse rate will drop to 3%. He wants to know the impact on profit in 2018 from such an improvement in lapse rates and the main reason for such an impact.

Perform an analysis to calculate the change in profit in 2018 if the lapse rates dropped to 3% in 2017 and provide an explanation of this result. You will need to consider the impact of the reduced lapse rates on each component of cashflow.

(For years prior to 2017 you may assume the actual experience was identical to that assumed and that future assumptions remain unchanged. For calculation simplicity you may assume lapse rates return to 5% from 2018).

(6 marks)

Spreadsheet: 2B_Exam_2015_Sem_1_Q1

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QUESTION 2 **(20 Marks)**

You are the Appointed Actuary for Sunshine Life based in Australia, a subsidiary of a foreign insurer. Sunshine Life is an aggressive player in the Disability Income market with strong sales in the last year. It does not write any other types of business. The profitability of the Disability Income portfolio has declined significantly in the last two years.

The assets backing the Disabled Lives reserves are 60% corporate bonds, 20% cash and 20% indexed linked bonds. The Shareholder Retained profits are invested 20% in equities, 50% in short-term corporate bonds and 30% in cash. The government bond yield curve has reduced in the last year – particularly at the longer end of the curve – most dramatically in the last three months. Equities returns were positive over the last year.

Sunshine Life doesn't use any reinsurance as the parent company takes the view that they could step in if problems arose. No dividend has been paid to the parent for a couple of years.

Sunshine Life uses the Australian Margin on Services method to value its policy liabilities and complies with the Australian LAGIC requirements set out by APRA.

a) The Claims Manager, who is not an Actuary, doesn't understand why, since last quarter, the Disabled lives policy liabilities have increased despite the number of active claimants and total amount of monthly benefits payable reducing. She felt that she has done a good job recently in getting people off claim, and indeed also commented that the average duration of claimants has reduced slightly.

Draft a short email to send to the Claims Manager explaining why the liabilities have increased during the last quarter.

(2 marks)

b) The Claims Manager is under pressure to improve the claims experience of the Disability Income business. She has given each of her claims assessors a target decline rate and target number of claims closures each month.

List out the ways the valuation results may be affected by this initiative over the next year.

(4 marks)

c) You have observed a large reduction in the level of excess assets in the last year. You have put together some three-year projections of the Capital position and provided these to the Board. These projections show that the excess assets will fall below the Board's preferred lower limit within the next two years. The Board are clearly concerned.

i) Identify the likely reasons for the reduction in excess assets over the last year.

(4 marks)

ii) What actions could the company take to improve the capital position within the next two years, and what are the advantages and disadvantages of each?

(10 marks)

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QUESTION 3 **(18 Marks)**

You are the Appointed Actuary of Parloss, a life insurance company that has both participating and non-participating whole-of-life portfolios in its only statutory fund, both of which are open to new business. For a number of years, it has been struggling with its participating portfolio, with low level of profitability and volume of new business.

For the participating portfolio:

- bonus is only distributed through the compound reversionary bonus method
- a single declared bonus rate is applied to the whole portfolio
- Policy owners share 80% of the profit of the portfolio, while shareholders share the remaining 20%

Parloss uses the Australian Margin on Services method to value its policy liabilities.

One of your Actuarial Analysts has given you the following information in respect of the participating business. Assume that nil tax applies to the statutory fund.

All figures are in Thousands ('000)

31 December 2013 Valuation

Policy Liability	283,664
Cost of Declared Bonus	983

2014 Cashflows

Premiums	12,499
Death Claims	(8,744)
Surrender Claims	(30,779)
Maintenance Expenses	(3,037)
Investment earnings	6,336

Non-investment experience profits/losses

Deaths	(1,534)
Surrenders	642
Maintenance Expenses	(391)

Projection Results as at 31 December 2014

Present Value of Sum Insured and Previously Declared Bonus	361,602
Present Value of Expenses	30,248
Present Value of Premiums	137,491

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Bonus Rates	Current Year Bonus	Present Value of Future Year Bonuses
1.5%	869	6,952
2.5%	1,467	11,737
3.5%	2,073	16,583

a) Using the information provided by the Actuarial Analyst, calculate the Policy Liability as at 31 December 2014 of the participating business. **(4 marks)**

b) An internal audit has uncovered a systematic error in the way certain cash flows relating to claims are processed in the administration system, which in turn affects the general ledger. In particular, the claims arising from a particular non-participating product (that has its own product code in the administration system) have been misclassified as belonging to the participating product group.

This has resulted in some of the claims costs arising from the non-participating portfolio since the year 2011 being allocated to the participating portfolio instead in the administration system and the general ledger. The resulting overstatement in claims costs for the participating portfolio is displayed below.

($'000)

2011	2012	2013	2014
1,264	1,394	1,650	1,472

Parloss' Board of Directors have been informed of the error and have called for a special Board meeting in a week's time to discuss the issue.

Draft a Board paper that you will present to the special Board meeting, outlining, with reasons, the major issues that would arise from the error to Parloss' business. Also set out your recommendations to the Board, highlighting any shortcomings.

(14 marks)

END OF PAPER

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