2018 PART III EXAMINATIONS

Subject Title: C2B Life Insurance

Date: Thursday, 11 October 2018

Time: 10:00am – 10:15am
(Planning Time)

10:15am – 1:15pm
(Examination)

Time allowed: Three (3) hours and fifteen (15) minutes including planning time.

Instructions: Type your answers to the questions using Microsoft Word and ensure that there are no links to spreadsheets.

In your answers, include your candidate number in the header and footer on each page of the document.

You must submit your Excel answer file(s) and save your work regularly.

Number of Questions: Three (3)

Question	Marks
1	32
2	29
3	29
Total	**90**

Candidates are required to answer ALL questions.
This paper has **NINE** (9) pages (including this page).

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QUESTION 1 (32 Marks)

You are a senior actuary working for a large actuarial consulting firm. You have been approached by the CEO of a small local financial services firm, FinServ Pty Ltd ("FinServ") in Australia. FinServ currently operate a business that performs the administration of Group Risk contracts for a range of insurance companies across the Australian market. FinServ now wish to grow their business by underwriting Group Risk business. They aim to establish a life insurance company that writes both Group Life (Death and Total & Permanent Disablement) as well as Group Salary Continuance.

Their strategy is to grow the life insurance business quickly with a view to listing the life company on the stock market after 10 years. FinServ have also been working with an overseas investment bank to raise the capital required to start the life company. FinServ hope to raise $20m externally, with $20m of the starting capital being provided by FinServ.

FinServ has obtained the assumptions that it will use in this projection from its reinsurer. FinServ plans to reinsure 60% of its business to one local reinsurer. As part of the licencing process with the prudential regulator, FinServ are required to produce financial projections of their business over the next 10 years. They have asked you to perform this piece of work.

Note: The accompanying spreadsheet is titled "C2B_Sem 2_2018_Q1_Spreadsheet.xlsx"

a) The accompanying spreadsheet contains assumptions for the business required to calculate the Profit and Loss Account, Balance Sheet and Capital Position over the next 10 years. These can be found on the "Assumptions" worksheet:

- Cells **C10:N14** contain product level assumptions such as sales volumes, loss ratios, expense margins and reinsurance terms.
- Cells **C22:D27** contain capital related assumptions such as the stress margins, the initial capital injection required and other parameters; and
- Cells **C34:D36** contain other parameters such as tax, project expenses and investment earnings.

Note the following in answering part a):

- You must use the template provided in the "Projection" worksheet as the basis for your calculations. Results from the "Projection" worksheet will automatically feed into the "Results" worksheet, which is protected.
- Your calculation results should be clearly shown in cells **C5:N19** of the "Results" worksheet for part (i) and cells **C21:N24** for part (ii).
- Your projection should assume yearly time steps.

i. Using the assumptions provided, prepare a projection of the Profit and Net Assets for the next 10 years. The projection is intended to represent a simplified version of what would be used for regulatory and statutory reporting. **(6 Marks)**

   Note the following:

   - Assume that all cashflows occur at the start of the year with the exception of tax which is assumed to occur at the end of the year;
   - You should assume that there are **no lapses** and the premium for each year of **new sales volume** is earned in each future year including the year of sale;
   - You should assume that all claims incurred in each projection year are **fully settled** in that year; and
   - FinServ intend to use the accumulation approach to determine its policy liabilities.

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ii. Using the assumptions provided, prepare a projection of the Excess Asset position of FinServ for the projection term of 10 years. The projection is intended to represent a simplified version of what would be used for regulatory and statutory reporting. **(9 Marks)**

Note the following:

- Assume that the Termination Value (as opposed to RFBEL) is used to determine capital requirements where required;
- Ignore any Deferred Tax Assets / Liabilities that may result from profits or losses;
- The Insurance Risk Charge (“IRC”) and Asset Risk Charge (“ARC”) should be determined **net of tax**;
- The Operational Risk Charge can be taken as 3% of the premium earned in the **next year**;
- The Asset Concentration Risk Charge can be assumed to be zero for all years;
- The Combined Stress Scenario Adjustment can be assumed to be the tax in the IRC, ARC and Aggregation Benefit; and
- Target Surplus is assumed to be 50% of the PCA.

b) The results of your projections have been presented to the Board of FinServ by the CEO. The Board of FinServ has raised questions which the CEO has asked for your assistance. The CEO has asked you to write a short memo to him, which addresses the following points:

i. The assumptions used in the projections were provided by the reinsurer. A Board member has asked what work you would have performed in order to get comfortable with these assumptions. The Board have specifically asked to focus on sales volumes, loss ratios and the capital stress margins; **(3 Marks)**

ii. Discuss one advantage and one disadvantage of the approach used to determine Target Surplus. In addition, you should present an alternative approach to calculate Target Surplus which addresses this disadvantage; **(3 Marks)**

iii. Discuss two reasons why the projection model in part a) would not be suitable for determining the policy liabilities for regulatory reporting; and **(2 Marks)**

iv. Discuss one major shortcoming from the current modelling approach and the potential implications for FinServ. **(2 Marks)**

c) FinServ’s objective is to list the company on the stock exchange after 10 years. The Executive Team (“ET”) at FinServ are keen to understand how the projections you have produced could be used to estimate the value of the life insurance business in 10 years’ time. The CEO has asked you to write a short memo to the ET which addresses the following points:

i. Based on the projections performed, describe how the Appraisal Value of the company could be calculated using Embedded Value techniques. Describe any further assumptions that would be required to perform this valuation; **(4 Marks)**

ii. Describe an alternative valuation approach; and **(1 Mark)**

iii. Suggest, with two reasons, why you would advocate the use of Embedded Value techniques as a valuation approach in this circumstance. **(2 Marks)**

END OF QUESTION 1

WZ CJW

QUESTION 2 (29 Marks)

You are the Appointed Actuary for a large Australian life insurer named AUSLIFE that has a portfolio dominated by yearly renewable term ("YRT") business with two main related product groups ("RPG") – disability income ("DI") and lump sum ("LS"). There is only one statutory fund for AUSLIFE. In recent years the experience on the DI business has been poor and deteriorating, whilst the experience on the LS business has been in line with assumptions. The LS book is profitable whilst the DI book is not.

At the 31 December 2017 year end, AUSLIFE announced loss recognition of $100m for the DI RPG. This resulted in the company receiving numerous complaints from shareholders (some with significant stakes in AUSLIFE) demanding that action be taken to reduce volatility of earnings and provide a higher and more stable return on equity. The CFO of AUSLIFE had the idea to reach out to a local reinsurer OZRE to seek information as to what options might be available to help address the shareholder demands.

The following is an excerpt from an email received from the CEO of OZRE

	RI Offer 1	**RI Offer 2**
Commencement date	1 January 2019	1 January 2019
In scope business	In force lump sum only	In force disability income only
Claims covered	All claims incurred on or after 1 January 2019	All claims paid on or after 1 January 2019
Nature of contract and amount reinsured	100% quota share	80% quota share up to a maximum reinsured monthly benefit of $50,000 per month
Up front terms	$0.8bn initial commission paid from OZRE to AUSLIFE	Zero commission, $0.4bn asset transfer from AUSLIFE to OZRE
Premiums	Office premiums as at commencement less a 25% expense allowance. Premiums can be increased by the reinsurer in case of adverse experience, with the extent of any increase to be agreed in good faith by both parties.	Locked in reinsurance premiums based on current office premiums less a 25% expense allowance.

The end of September quarter liabilities have now been finalised, with the following results forecast for AUSLIFE as at 31 December 2018:

	Lump sum	**Disability Active Lives**	**Disability Disabled Lives Reserve**
BEL	($1bn)	($0.2bn)	$0.5bn
PVPMs	$0.5bn	Nil	Nil

The Board is now evaluating whether to accept either of the two offers and have asked for the following information:

Note: There is no accompanying spreadsheet for this question.

WZ CJW

a) Calculate the forecast policy liability of AUSLIFE as at 31 December 2018 assuming no reinsurance offer is accepted. **(1 Mark)**

b) Calculate the net of reinsurance policy liability of AUSLIFE as at 31 December 2018 assuming RI Offer 1 is accepted and the commission has been paid. You have estimated that the reinsured BEL would be ($1bn). **(2 Marks)**

c) In the draft response to the Board, the CFO of AUSLIFE has emphasised the benefit of RI Offer 1 due to the high upfront commission which he sees as being a huge boost to the profit and return on equity of AUSLIFE for 2019. Explain the likely directional impacts of RI Offer 1 on the following:

i. 2019 profit **(2 Marks)**

ii. the Capital Base and Insurance Risk Charge **(3 Marks)**

Note: Assume the Adjusted Policy Liability is calculated on a Termination Value basis both before and after reinsurance.

d) The Board, being sensitive to the criticisms received, have requested the advantages and disadvantages of the two reinsurance options, purely from the perspective of delivering the requests of the shareholders of AUSLIFE, to assist them in choosing a reinsurance option. Draft your response. **(6 Marks)**

e) The CEO is aware there will be additional key reinsurance terms and conditions to be discussed and negotiated for RI Offer 2 before a final treaty can be agreed and signed. To compile a shortlist he is asking key executives to list their top two items, along with a brief description of each item and explanation as to why each item is important. Draft your response. **(4 Marks)**

f) To ensure he is adequately prepared for the board meeting, the CEO of AUSLIFE has asked whether a transfer of the lump sum portfolio to another primary insurer could be pursued rather than a reinsurance arrangement. Prepare a memo for the CEO setting out the following:

i. advantages and disadvantages of a transfer from the perspective of AUSLIFE shareholders **(3 Marks)**

ii. a high-level description of the process and timeframe required to affect a legal transfer of liabilities **(3 Marks)**

iii. the key challenge you feel needs to be addressed during the course of that process. **(2 Marks)**

g) Suppose that during the last quarter of 2018, the Australian regulator released a preliminary discussion draft outlining proposed changes to the capital standards. The most significant of the changes proposed is whereby a large portion of the embedded value of the business (using a risk free discount rate) would be eligible capital. Draft a response to the CFO on how this development might change the relative attractiveness of RI Offer 1. **(3 Marks)**

END OF QUESTION 2

WZ CJW

QUESTION 3 (29 Marks)

AOPLIFE is a medium-sized life insurance company in Australia. Facts relating to AOPLIFE include:

- AOPLIFE performs policy liability valuation on a projection basis, per the Margin on Services valuation approach under AASB1038 and LPS340.
- AOPLIFE has only three Related Product Groups (RPGs). The products included within each RPG and the relative size of each RPG are as follows:

RPG	Products Included in RPG	Annual Premium In-Force, Net of Reinsurance ($m)
Lump Sum Mortality	Standalone Death policies	500
Lump Sum Morbidity	Standalone Total & Permanent Disablement and Standalone Trauma policies	100
Income Protection	Income Protection policies with either 2-year or "to age 65" benefit periods	500

You have recently joined AOPLIFE as the Valuation Actuary. Your responsibilities include policy liability valuation, analysis of profit and assumption setting.

AOPLIFE's financial year-end is 31 December. It is now mid-October 2018 and the policy liability valuation as at 30/09/2018 has just been completed. You are now in the process of proposing the valuation assumptions which will be used in the policy liability valuation as at 31/12/2018. This assumption setting will be based on the results available up to 30/09/2018.

Your actuarial analysts have summarised the claims experience results from the experience investigation ("EI") and the 30/09/2018 year-to-date analysis of profit ("AoP"). Refer to **Tables 1 & 2** in the **Appendix** (on page 9) for the summary prepared by the analysts.

Note: There is no accompanying spreadsheet for this question.

a) You are performing a high-level review of the results in **Tables 1 & 2**, and your actuarial analysts have a number of questions on the results in these tables.

i. They are confused by the seemingly contradictory results presented by the AoP and EI for the first 9 months of 2018 for Lump Sum Morbidity RPG, where:

- The AoP results indicate a claims experience loss of $8m, (**Table 1**, item 2), i.e. claims experience was worse than expected.
- The EI results however suggest that claims experience was better than expected with an Actual-to-Expected ratio of 89% (**Table 2**).

Suggest **three** possible reasons for this outcome and explain whether these reasons would be expected to have less impact on the Lump Sum Mortality RPG (You should assume there are no errors within the analyses.) **(5 Marks)**

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ii. One of the analysts observed the following for the Income Protection RPG:

- The actual increase in the reported net-of-reinsurance CICP reserve over the first 9 months of 2018 was $65m, i.e. $15m higher than the $50m expected increase over the same period.
- The AoP results presented in Table 1 however indicated the CICP had an experience loss of $10m (Item 3d), which differs from the $15m above.

Suggest **two** reasons (other than calculation error) why the claims experience item in the AoP results does not fully account for the difference between the actual and expected movement in the CICP reserve. **(2 Marks)**

b) You are considering the assumption changes for the purpose of policy liability valuation for the Income Protection RPG.

i. Draft an e-mail to the CFO outlining your proposed changes (direction and magnitude) to the claims incidence and terminations assumptions, based solely on the information available in **Tables 1 & 2**. You should outline your justifications, making reference to both the AoP and EI results. **(7 Marks)**

ii. Making reference to the results in **Tables 1 & 2**, suggest **three** additional investigations that you would perform to further understand claims experience for this RPG. **(3 Marks)**

Note: No calculations are expected for part (b)(ii).

Having decided upon your proposed assumption changes, you want to assess the financial impacts before presenting the proposed changes to management.

You are provided (**Table 3** of the Appendix) with the forecast 31/12/2018 policy liability figures (net of reinsurance) for the Lump Sum Morbidity and Income Protection RPGs. These figures are after Basis 1 assumption changes but before Basis 2 assumption changes.

c) You have proposed to reduce the Lump Sum Morbidity claims assumption, which you note will reduce the level of expected claims by 10% for each year with immaterial impact on other Best Estimate Liability (“BEL”) components.

The profit carrier for this RPG is expected claims.

Using these figures, estimate the resulting impact of the assumption change on:

- the profit margin %;
- the 2018 reported profit and the 2019 planned annual profit; and
- the 2019 claims experience profit. **(4 Marks)**

You have proposed to increase the claims incidence assumption for Income Protection. This will result in a $20m increase in the policy liability in that RPG.

Reading through past valuation reports, you noticed that the Income Protection RPG went into loss recognition three years ago (with $50m loss capitalised at the time) as a result of significant assumption strengthening. In response, new business premiums were increased sufficiently for the new business to be considered profitable. Since then, there have been no other Basis 2 (non-economic) assumption changes.

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d) Based on past discussions with management, you are anticipating the following questions. Draft your response to management in the form of a memo.

i. If over the next few years the terminations assumption are changed, resulting in a reduction in policy liability of the same magnitude (of $20m) as the proposed assumption change, would the loss recognition position then be completely reversed (i.e. profit margins are reinstated in the Income Protection RPG for subsequent years)? Outline your reasoning. **(4 Marks)**

ii. One strategy under management consideration to control the loss is to increase premiums across all Income Protection policies. Assuming $20m of existing capitalised losses, what is the estimated % increase in premiums required to reverse the loss recognition position? **(1 Mark)**

Note: Base your estimation on the Information in ***Table 3*** *ignoring any impacts from potential increases to expenses, changes to policyholder behaviour on the level of lapses or reinsurers potentially increasing their premiums.*

iii. How would your recommended level of premium increase change if potential impacts from policyholder behaviour on the level of lapses are considered? **(3 Marks)**

END OF QUESTION 3

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Appendix: Question 3

Table 1: Summary of AoP Results in respect of Claims Experience (Net of Reinsurance)

Item #	AoP Item	Experience Profit over first 9 months of 2018 ($m)
1	**Lump Sum Mortality Claims**	**0**
2	**Lump Sum Morbidity Claims**	**-8**
3	**Income Protection Claims (further broken down as below)**	**-17**
3a	- Claims Paid and Claims Payable	+1
3b	- Incurred but Not Reported ("IBNR") Reserve as at 30/9/2018	+0
3c	- Reported but Not Admitted ("RBNA") Reserve as at 30/9/2018	-8
3d	- Claims in Course of Payment ("CICP") Reserve, relating to the following assumptions:	-10
3e	o Incidence Assumption	-15
3f	o Terminations Assumption	+25
3g	o Other Assumptions	-20

Table 2: Summary of EI Results in respect of Claims Experience (Gross of Reinsurance)

Assumptions	Actual-to-Expected Ratios (based on current valuation assumptions, on claim amount basis)											
	2015			2016			2017			2018 (first 9 months)		
	A $m	E $m	**A/E %**	A $m	E $m	**A/E %**	A $m	E $m	**A/E %**	A $m	E $m	**A/E %**
LS Mortality	180	180	**100**	199	201	**99**	221	223	**99**	191	188	**102**
LS Morbidity	39	34	**115**	45	41	**110**	49	46	**107**	34	38	**89**
IP Incidence	103	114	**90**	144	137	**105**	250	179	**140**	225	188	**120**
IP Terminations												
- 2-year BP	27	28	**96**	52	49	**106**	53	44	**120**	63	57	**111**
- To age 65 BP	105	111	**95**	94	92	**102**	99	104	**95**	107	93	**115**

Note: LS = Lump Sum, IP = Income Protection, A = Actual Claim Amount, E = Expected Claim Amount, BP = Benefit Period

Table 3: Forecast 31/12/2018 Policy Liability Information (Net of Reinsurance), after Basis 1 assumption changes but before Basis 2 assumption changes

	Lump Sum Morbidity RPG ($m)	Income Protection RPG ($m)
PV Premiums	1,500	5,000
PV Expenses	300	1,500
PV Claims	750	4,000
PV Profit Margins	112.5	-
Expected annual claims for each of years 2018 and 2019	50	n/a

END OF EXAMINATION

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