2018 PART III EXAMINATIONS

Subject Title: C2B Life Insurance

Date: Monday, 30 April 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.

There is **one** spreadsheet accompanying this exam. It is to be used for Question 1 and is named "C2B_Sem_1_2018_Q1.xlsx".

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	**30**
2	**30**
3	**30**
Total	**90**

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

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QUESTION 1 (30 Marks)

You are a Capital Management Actuary for a small Australian life insurer named ABC Life which is owned by an unlisted holding company (which is in turn owned by some direct investors and some small institutional investors). ABC Life has the following business in its one and only Statutory Fund:

- Direct level premium business (offers a fixed death benefit to cover funeral expenses).
  - Premiums payable by the policyholder are level but are not guaranteed. They are paid monthly in advance on the first of every month.
  - ABC Life's market share for this business has increased over the last two years and sales are projected to continue to grow over the next two years.
  - This is 60% reinsured with Global Re Australia (rated "AA" by Standard & Poor's).
- Group Life business.
  - ABC Life was a mid-tier player in the Group Life market, but over the last three years, did not seek to retain any group scheme at their renewal dates.
  - As a result, ABC Life currently has no in-force premium for this business but still manages a large block of Incurred But Not Reported (IBNR) claim reserves in respect of death and TPD benefits.
  - This business is not reinsured.

Apart from the Direct level premium business, ABC Life has no plans to write any other business in the short-term. In addition:

- The business in the Statutory Fund is backed by a mix of Australian Government bonds (which are not index-linked) and Australian listed equities.
- ABC Life's adjusted policy liability is based on the Termination Value of the business which is equal to the value of the IBNR claim reserves (which are calculated using a flat risk-free discount rate of 2.5% p.a., based on Australian Government bond yields).

Note: The accompanying spreadsheet for this question is named "**C2B_Sem_1_2018_Q1.xlsx**" and contains a single worksheet "**Q1**".

- **Cells B5:C39** contain certain assets and liabilities of the Statutory Fund of ABC Life at the most recent month-end, to be used in calculating the Asset Risk Charge (ARC).
- **Cells F17:G34 and J17:K25** contain details to be used in calculating the Default Stress component of the ARC.
- **Cells E7:K13** provide the correlation matrix to be used in calculating the total ARC.

a) Using the information provided for the Statutory Fund, calculate the following components **(net of tax)** of the ARC:

i) The **Equity Stress component** of the ARC. **(2 Marks)**

Note: *Ensure your final answer is linked into **cell N8** of the worksheet "Q1".*

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ii) The **Real Interest Rate Stress component** of the ARC. **(4 Marks)**

Note: *This should be calculated for both an increase and decrease in the real interest rate; ensure your final answer for each is linked into* ***cells N11*** *and* ***N12*** *(respectively) of the worksheet "Q1".*

iii) The **Expected Inflation Stress component** of the ARC. **(4 Marks)**

Note: *This should be calculated for both an increase and decrease in the inflation rate; ensure your final answer for each is linked into* ***cells N15*** *and* ***N16*** *(respectively) of the worksheet "Q1".*

iv) The **Default Stress component** of the ARC. **(3 Marks)**

Note: *Ensure your final answer is linked into* ***cell N19*** *of the worksheet "Q1".*

v) The total **ARC**, assuming the "**Up/Up**" (i.e. real interest rate up, inflation rate up) scenario dominates. **(3 Marks)**

Note: *Ensure your final answer is linked into* ***cell N22*** *of the worksheet "Q1".*

b) The CFO is concerned about the impact that the current strategy of exiting the group market and growing the Direct level premium business will have on the level of Surplus Assets (Capital Base less the Prescribed Capital Amount) over the short to medium term.

Outline **three** factors that could drive a change in ABC Life's Surplus Assets over the short to medium term and the likely directional impact of these factors on the Surplus Assets. **(6 marks)**

c) The new chair of the Board Risk Committee of ABC Life has raised concerns around the volatility of the capital position to changes in financial markets. She is considering a new investment strategy, reallocating the entire Australian listed equity holdings to Australian Government bonds (not index-linked), such that the duration of these bonds would match the duration of the current IBNR claim reserves.

Prior to recommending the new strategy, she has requested your advice. Draft a brief internal file note in which you outline the following:

i) The implications of the strategy on the Prescribed Capital Amount of ABC Life (based on the current capital position). **(4 marks)**

ii) The implications of the strategy on the **amount** and **volatility** of profit expected for ABC Life over the next year. **(2 marks)**

iii) How the strategy should be managed to reflect the run-off of the group portfolio and the growth of the Direct level premium portfolio. **(2 marks)**

END OF QUESTION 1

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QUESTION 2 (30 Marks)

You are a Business Planning Actuary working for Safe4Life, a medium-sized life insurer which has a portfolio consisting solely of highly profitable retail stepped yearly renewable term business (covering both lump sum death and disability income). Safe4Life operates in a country called **ChangeLand**, which:

- Currently adopts the same method for the valuation of policy liabilities as used in Australia (as specified in AASB 1038 and LPS 340), but is considering introducing modifications to this approach.
- Currently adopts the same prudential capital standards as used in Australia, and has no intention of changing this approach.
- Has a corporate tax rate of 30% of profits, and positive interest rates.

An Exposure Draft (ED) of a new Accounting Standard related to the valuation of policy liabilities has just been released, and the regulator has asked for comments from insurers. The ED outlines **three alternative modifications** to the existing approach to the valuation of policy liabilities being considered, as outlined in the following table.

Alternative	**Modification to existing approach (AASB 1038/LPS 340)**
A. Profit Carrier change	The (present value of the) profit carrier is mandated to be **the (present value of the) expected number of policies in force in the middle of each period.**
B. Replace BEL with CEL	The Best Estimate Liability (BEL) is replaced by a **"Conservatively Estimated Liability"** or **CEL**, which is defined as: *the BEL plus a provision for adverse deviation, such that the present value of claims and expenses (excluding commissions) are at a 75% probability of adequacy. The present value of premiums remains at best estimate*. In addition, Present Value of Future best estimate shareholder Profits (PVFP) is replaced by **"Present Value of Future Conservative shareholder Profits"** or **PVFCP**, which is calculated as: *the amount above the CEL such that there remains zero profit at inception of a policy (for new business), and also zero profit on transition to the revised standard (for business already inforce), albeit any losses on inception or transition must be recognised immediately.*
C. Expense treatment change	For new business written after transition to the revised standard, **for the sole purpose of determining the PVFP at inception (in calculating the profit margin)** the **BELExAcq** is used, where: *BELExAcq is the BEL calculated without allowing for acquisition costs.* In all other respects, the BEL is used as per the current standard.

Selected valuation information for Safe4Life under the **current standard** is provided below.

Valuation Information (at 31 December 2017)	**Death**	**Disability Income – Active Lives**	**Disability Income – Disabled Lives**
Related Product Group (RPG)	Lump Sum	Disability Income	
Profit Carrier	Claims	Claims	
BEL	($1.0bn)	($0.6bn)	$0.6bn
PVFP	$0.5bn	$0.3bn	
Present Value of expected future premiums, **net of commissions**	$3.0bn	$2.0bn	

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a) Calculate the reported policy liability at 31 December 2017. **(2 Marks)**

b) The CFO has noted that the 3-year business plan for Safe4Life has been completed based on the current standard and assumptions as at 31 December 2017. In reviewing the ED, she has asked the following questions in respect of **Alternative A.**

i) If implemented, would you expect Alternative A to lead to a faster or slower emergence of profit on a new policy compared to the current standard? Explain why this would be the case. **(3 Marks)**

Note: *It is not necessary to perform any calculations.*

ii) Based on your answer to part i), what direction (if any) do you expect the traditional Embedded Value of Safe4Life to move following implementation of Alternative A? And why would this be the case? **(3 Marks)**

c) Under **Alternative B**, it has been determined that the claims cost and expense levels corresponding to a 75% probability of adequacy are each **10% higher** than those corresponding to the best estimate (i.e. 1.1 times best estimate).

i) Calculate what the CEL and PVFCP for the Lump Sum RPG would be at 31 December 2017. **(4 Marks)**

ii) Based on your answer to part i), the CFO is concerned that the reported profit will be significantly lower than previously expected for the 3-year plan period under Alternative B (compared to under the current standard). Prepare a **memo** to the CFO explaining whether you agree with her concern that profitability will be lower because of the change, explaining your rationale. **(6 Marks)**

Note: *It is not necessary to perform any calculations.*

d) In examining **Alternative C** of the ED, Safe4Life has estimated that $100m of acquisition costs will be incurred in 2018 in writing new Disability Income business.

i) For simplicity, if the valuation were to assume all policies in 2018 commence at the same time, calculate the policy liability under Alternative C for the Disability Income RPG in **2018** in respect of the **new business <u>only</u>, immediately <u>after</u> acquisition costs have been incurred but <u>before</u> all other cash flows**. **(2 Marks)**

ii) If implemented, would you expect Alternative C to lead to a faster or a slower emergence of profit on a new policy compared to the current standard? And why would this be the case? **(3 Marks)**

Note: *It is not necessary to perform any calculations.*

iii) The CFO needs to provide comments into an industry forum regarding Alternative C, which will be passed onto the regulator. Draft a response for her covering:

- The impact on overall profit emerging over the lifetime of a policy.
- **One advantage** and **two disadvantages** of Alternative C from the perspective of Safe4Life. **(7 Marks)**

END OF QUESTION 2

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QUESTION 3 (30 Marks)

You are a junior valuation actuary of a small Australian life insurer named SYD Life, the smallest entity of a financial services company listed on the Australian Securities Exchange.

A number of years ago, SYD Life closed both its conventional participating and YRT Retail Risk products to new business.

- The only conventional participating product sold was an Endowment Assurance maturing at age 65, which was written in Statutory Fund 1 (SF1) with 80% of profits allocated to policyholders. This business only pays bonuses on maturity, of which there have been none in the last two years.
- The Retail Lump Sum (LS) business continues to be profitable but the Retail Disability Income (DI) business is in loss recognition. This business is in Statutory Fund 2 (SF2).

At the same time SYD Life switched its focus to Direct business (lump sum YRT products only, written in SF2) and has been very successful over the past few years.

The Finance team is currently preparing the year-end financial statements, which incorporates key actuarial input you have prepared. The initial results (before allowance for tax, at this stage) are **provided as Tables in the Appendix to this exam paper**, namely:

- **Table 1:** A Balance Sheet, with prior year comparatives.
- **Table 2:** A breakdown of the policy liabilities in SF2 by Related Product Group (RPG).
- **Table 3:** A Profit & Loss (P&L) Statement.
- **Table 4:** A preliminary Analysis of Profit (AoP) for SF2.

a) Your manager has now commenced his review of the initial financial statements and has some questions that you are required to respond to. Draft your responses.

i) What are the **key factors** driving the increase in Policy Owners Retained Profits in SF1, from $25m to $27m over the year (per Table 1)? **(3 Marks)**

ii) The increase in Net Assets in SF2 over the year (from $125.450m to $162.013m, per Table 1) is greater than the shareholder profit earned ($21.563m per Table 3).

- Identify the **first two** pieces of information that you would investigate in order to supply an answer to the auditor to explain the difference.
- Outline why for SYD Life it is reasonable to expect the increase in Net Assets in SF2 to be ***greater than*** (as opposed to ***less than***) profit earned.

(4 Marks)

b) The Head of Investor Relations (HIR) has seen the preliminary AoP for SF2 (Table 4). Over recent years, financial analysts have focused on the performance of the Retail business. He is keen to understand the drivers of the performance for the current year, in order to be able to answer questions from analysts.

i) You have told the HIR that, in respect of the **Retail DI business**, the claims experience has been unfavourable but this has been completely offset by favourable lapse experience as a result of more people lapsing than expected. He has asked you to explain why an increase in lapses is favourable. Outline the points you would make to explain this dynamic. **(3 Marks)**

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ii) The HIR believes he has found an inconsistency between the AoP and the P&L Statement for SF2, pointing out: "The total earnings on shareholder capital and retained profits for the current year was $3.449m in the AoP (Table 4). However, the total investment income (Unrealised Gains/Losses plus Other Investment Revenue) was $2.063m in the P&L (Table 3). Is there an error in the P&L and/or AoP?"

Outline **four key points** you would make in replying to the HIR. **(6 Marks)**

Note: *It is not necessary to perform any calculations.*

iii) At the results presentation to investors last year, based on your team's advice, the HIR stated that the Retail DI book was in loss recognition and no more profits or losses were expected to come through on this book if the assumptions eventuated each year. Given there were no non-economic experience profits or losses this year (per Table 4), he wants to know why more losses occurred this year and how they can be avoided/reduced in future years.

Explain how the losses occurred this year and outline **one** strategy that could be employed to reduce losses in future years. **(5 Marks)**

c) In performing their review of modelling changes, the auditors have found that there is a material error present with respect to the Retail business in SF2 for the current year. In particular, they have discovered that a complex change to the valuation model for the **Retail LS RPG** was not implemented correctly.

Your team has just prepared a high-level impact assessment of the error (net of reinsurance) at the recent balance date, as outlined in the following table. You know that SYD Life incorporates model changes as the last step in determining the final policy liability (i.e. occurs after all assumption changes have been made).

Retail LS RPG	**Current Model**	**Corrected Model**
Best Estimate Liability (BEL)	($100m)	($90m)
Present Value of Future Profit Margins	$41.8m	To be determined

Draft a brief file note that sets out the following:

i) The impact of the error on the **profit for the current year** and **components of the policy liabilities for the current year** after the model correction. **(3 marks)**

ii) The expected directional impact on the traditional Embedded Value, and whether the magnitude of the impact will be larger or smaller than the impact on the BEL. **(3 marks)**

Note: *you may assume the traditional Embedded Value is determined using the same model outputs as used for financial reporting.*

iii) How the profit in the current period would be impacted if there was a similar model error relating to the active lives portion of the Retail DI book. **(3 marks)**

Note: *you may assume that the model correction would have the same directional impact on BEL as it did for Retail LS.*

END OF QUESTION 3

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This page has been left blank intentionally.

The Appendix for Question 3 may be found on the next page (so you can detach it from the exam paper if you wish).

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Appendix: Question 3 Initial Financial Statements and Breakdowns for SYD Life (in $m)

Table 1: Balance Sheet $m, as at end of:	SF1		SF2	
	Current Year	Prior Year	Current Year	Prior Year
Cash	32.121	30.000	78.913	45.000
Fixed Interest^	179.650	170.025	26.500	25.000
Reinsured Policy Liabilities	-	-	(53.567)	(50.050)
Total Assets	**211.771**	**200.025**	**51.846**	**19.950**
Gross Policy Liabilities	159.246	150.000	(110.167)	(105.500)
Policy Owner Retained Profits	27.000	25.000	-	-
Total Liabilities	**186.246**	**175.000**	**(110.167)**	**(105.500)**
Net Assets	**25.525**	**25.025**	**162.013**	**125.450**

^No fixed interest securities were purchased during the current year.

Table 2: Breakdown of SF2 Policy Liabilities, $m		Gross of Reinsurance		Reinsured	
		Current Year	Prior Year	Current	Prior Year
RPG	**Split**				
Retail LS	All	(97.000)	(95.000)	(38.800)	(38.000)
Retail DI	Active Lives	30.000	40.000	12.000	16.000
	Disabled Lives	51.833	28.000	20.733	11.200
Direct	All	(95.000)	(78.500)	(47.500)	(39.250)
Total Policy Liability		**(110.167)**	**(105.500)**	**(53.567)**	**(50.050)**

Table 3: Profit & Loss (P&L) Statement $m	Current Year	
	SF1	SF2
Gross Premiums	9.500	90.000
Reinsurance Premiums	-	(28.000)
Realised Gains/Losses	-	-
Unrealised Gains/Losses	9.625	1.500
Other Investment Revenue	0.371	0.563
Total Revenue	**19.496**	**64.063**
(Claims)	(6.000)	(45.000)
(Reinsurance Recoveries)	-	19.600
(Acquisition Expenses)	-	(5.000)
(Maintenance Expenses)	(1.750)	(13.250)
(Change in Net Policy Liability)	(9.246)	1.150
(Change in Policy Owners Retained Profits)	(2.000)	-
(Total Expenses)	**(18.996)**	**(42.500)**
Shareholder Profit Before Tax	**0.500**	**21.563**

Table 4: Preliminary Analysis of Profit (AoP) for SF2, $m	Current Year			
	Direct	Retail LS	Retail DI	Total SF2
Planned Profit Margins	6.300	5.000	-	**11.300**
Non-Economic Experience Profits/(Losses)	0.391	0.370	-	**0.761**
Discount Rate Impact on Policy Liability	3.533	4.560	(2.040)	**6.053**
Capitalized (Losses)/Reversals	-	-	-	**-**
Earnings on Shareholder Capital and Retained Profits	1.113	1.616	0.720	**3.449**
Total Profit	**11.337**	**11.546**	**(1.320)**	**21.563**

END OF APPENDIX

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