Actuaries Institute

# *2016 PART III EXAMINATIONS*

Subject Title: **C2B Life Insurance**

Date: **Monday, 17 October 2016**

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

**10:15 am- 1:15 pm**
(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 is no data linked to spreadsheets.

You must submit your Excel answer file(s).

**Number of Questions:** **Three** (3)

| Question | Marks |
|---|---|
| 1 | 29 |
| 2 | 34 |
| 3 | 27 |
| **Total** | **90** |

Candidates are required to answer **ALL** questions. This paper has **seven** (7) pages (including this page).

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COURSE C2B LIFE INSURANCE SEMESTER 2 2016 EXAMINATIONS

## QUESTION 1 (29 Marks)

You are the Valuation and Capital Actuary for AUSLIFE, a medium-sized Australian life insurer. AUSLIFE has two statutory funds:

- Statutory Fund 1 (SF1), which consists of an old block of investment-linked business that is closed to new business and is running off, albeit very slowly.
- Statutory Fund 2 (SF2), which is empty and has been dormant since the sale of a small block of annuities many years ago.

AUSLIFE currently has total shareholders' equity of $100m which is fully utilised to support the capital requirements of SF1 (which is expected to remain stable). The investment-linked business is expected to generate a $20m profit after tax over the next year.

AUSLIFE was recently taken over by ASIANLIFE, an Asian-based insurance group which has large growth ambitions for AUSLIFE. More specifically, the CEO of ASIANLIFE is keen for AUSLIFE to enter the lump sum Yearly Renewable Term (YRT) protection market in Australia.

As a result, a new distribution agreement is close to being finalised with a local distribution partner to be effective from 1 January the following year with the following terms:

- Up front commission equal to 125% of the first year premiums.
- Renewal commission equal to 20% of subsequent premiums.

(**Note:** *in this question you may ignore proposed changes to commission rules in Australia*)

The distribution channel will target young professionals, and will be structured such that the sum insured varies with age so that the premium remains constant.

It is estimated that an annual new business sales target of $40m in Annual Premium Income is achievable, with:

- A lapse rate of 10% p.a.
- A claims ratio of 40%.
- An expense ratio (excluding commissions) of 60% in the first year, and 10% thereafter.

You may assume that:

- All lives insured are aged 25 initially, with a policy term of 45 years.
- Interest and inflation rates are zero.
- Sales occur at the beginning of the year, with premiums paid annually in advance.
- Lapses occur at the end of the year.
- The reduction in premium from policies that claim is negligible.
- There is no claims reporting delay.

a) Calculate the expected BEL and policy liability at the end of the first year of the distribution agreement in respect of the YRT business, in accordance with Australian accounting standards. Give your answer to the **nearest $100,000**.

   ***Note:*** *ensure all relevant information and output from your calculation is contained in the Word document.* **(5 marks)**



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b)

i) The ASIANLIFE CEO has noticed that the expected policy liability figure in part a) is a negative number and feels there must be some mistake, exclaiming "It can't be right that policyholders have an obligation to pay the insurance company money". Write a response to the CEO explaining the figure in part a). **(3 marks)**

ii) Calculate how much additional Margin on Services (MoS) profit net of tax is expected to be earned by AUSLIFE during the first year of the distribution agreement, assuming experience is in line with expectations. **(1 mark)**

iii) Explain why the negative policy liability is not allowed to be recognised as part of the capital base of AUSLIFE. **(2 marks)**

iv) Explain why the AUSLIFE Appointed Actuary might consider increasing target surplus as a result of introducing the YRT business. **(2 marks)**

c) The ASIANLIFE CEO is delighted with the extra profit forecast and is looking forward to the $20m of profit from the old business, plus the profit amount calculated in part b) ii), to be repatriated back to ASIANLIFE in the form of a dividend to be paid shortly after completion of the year.

i) Estimate the minimum amount of net assets required in SF2 at the end of the first year to ensure AUSLIFE satisfies the regulatory capital requirements at this time.

You may assume there is no insurance risk charge, asset risk charge or asset concentration risk charge related to the YRT business, which has been written in SF2. Show your working and state any additional assumptions made. **(3 marks)**

ii) Explain why it is possible that the insurance risk charge on YRT business is zero. **(2 marks)**

iii) In light of the amount in part c) i), estimate what the dividend capacity of AUSLIFE will be at the end of the first year of new business, and describe briefly what drives any difference to the ASIANLIFE CEO's expectations. **(2 marks)**

d) The ASIANLIFE CEO is now concerned about the Return on Equity (ROE) of AUSLIFE, and whether it will meet ASIANLIFE's target of 12% p.a. (ASIANLIFE define ROE for a given year as MoS profit after tax divided by the shareholders' equity at the **end of the year**.) Write a memo to the CEO where you:

i) Calculate the expected ROE of AUSLIFE in the first year, both with and without the new insurance distribution agreement, and comment on whether these meet the target. **(3 marks)**

ii) Offer two suggestions in order to enhance the ROE of AUSLIFE in the short term whilst continuing to write the YRT business under the existing structure. For each suggestion:

– Explain why the ROE might be expected to improve.

– List one advantage and two disadvantages.

***Note:*** *It is not necessary to perform any further calculations.* **(6 marks)**

**END OF QUESTION 1**



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## QUESTION 2 (34 Marks)

You are the Appointed Actuary for a large Australian life insurance company called DIVERSIFIEDLIFE. DIVERSIFIEDLIFE has a large portfolio of group business and yearly renewable term/disability income business and is considering the purchase of ANNUITYLIFE.

ANNUITYLIFE is an Australian life insurer, with a portfolio of non-participating lifetime annuities. The annuities have been in loss recognition for some time and despite all management actions are expected to remain in loss recognition. ANNUITYLIFE is closed to new business and currently has no plans, nor viable distribution channels, to recommence writing new business.

The sale process for ANNUITYLIFE is expected to be competitive.

a) Based on the information in the **accompanying spreadsheet**, calculate the traditional Embedded Value (EV) of ANNUITYLIFE as at **31 December 2016** by completing the worksheet named “Model (a)”.

   Assume that there are no regulatory adjustments to net assets, and ANNUITYLIFE management do not feel it necessary to hold target surplus.

   Your final result should be split into the following components and disclosed in the Word document, with all working performed in the worksheet named “Model (a)”:

   i) Adjusted Net Worth (ANW). **(5 marks)**

   ii) Value of Inforce Business (VIF). **(5 marks)**

   ***Note:*** *The spreadsheet contains details on the assumptions and timing to use.*

b) The CEO of DIVERSIFIEDLIFE is surprised by the size of the EV, particularly given the business is in loss recognition.

   i) Describe the two main components driving the size of the EV. **(2 marks)**

   ii) Having received your explanation, the CEO of DIVERSIFIEDLIFE is now of the opinion that the winning bidder will need to pay significantly more than the EV determined in part a). She also believes the value of ANNUITYLIFE to DIVERSIFIEDLIFE is greater than this amount.

   As a result, she has asked you to “find some more value” to help her convince the Board to make a higher offer.

   Describe **two** changes to the assumptions and/or allowances in the EV calculation that you might consider making in order to arrive at an increased EV representing the value of ANNUITYLIFE to DIVERSIFIEDLIFE.

   For each change:

   – Explain why it will increase the EV.

   – Outline any important matters that DIVERSIFIEDLIFE needs to consider before allowing for the increase in value from the change.

   ***Note:*** *Do not incorporate any of these changes into the spreadsheet.* **(6 marks)**




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c) Whilst ANNUITYLIFE does not currently hold any target surplus, DIVERSIFIEDLIFE's policy is to hold target surplus equal to 50% of the Prescribed Capital Amount (PCA).

i) Recalculate what the ANW and VIF determined in part a) would be if allowance is made for DIVERSIFIEDLIFE's target surplus policy to be applied to ANNUITYLIFE. All other assumptions should be per part a).

**Note:** *You may create/copy worksheets for the calculation. Ensure your final result and explanation are contained in the Word document.* **(2 marks)**

ii) Explain:

– The incremental impact on the ANW and VIF from the figures in part a).

– What the recalculated ANW would mean for DIVERSIFIEDLIFE post-purchase.

**(3 marks)**

d) The sale process has unexpectedly been delayed by 12 months.

Based on the following information, the CEO of DIVERSIFIEDLIFE has asked you to update your EV calculation to be effective as at **31 December 2017** and provide an analysis of change in the ANW and VIF from the prior valuation per part a).

*Experience variances over 2017:*

– Per policy expenses incurred in 2017 were $1,500 instead of the $1,200 assumed.

All other experience was in line with the assumptions per part a).

*Assumption changes effective 31 December 2017:*

– Reduction in the **investment return assumption**, from 5% p.a. to 4% p.a. (1st assumption change).

– Reduction in the **mortality assumptions**, from 100% to 95% of the base table (2nd assumption change).

All other assumptions (including the policy liability discount rate) should be per part a), and you may additionally assume during 2017:

– There have been no dividends or capital injections.

– There has been no investment return on any capital held above 100% of regulatory capital.

i) Perform the required calculations in the spreadsheet.

**Note:** *You may create/copy worksheets for this purpose. Ensure your final analysis of change is displayed in the Word document.* **(8 marks)**

ii) Write a brief e-mail to the CEO of DIVERSIFIEDLIFE to assist her in interpreting the key changes in the EV components over the year. **(3 marks)**

**END OF QUESTION 2**




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## QUESTION 3 (27 Marks)

You are the Valuation Actuary of STARLIFE, a small but well-established Australian life insurance company that only sells retail yearly renewable insurance products (both lump sum and disability income).

STARLIFE currently performs valuations **quarterly** (i.e. only at the end of each quarter). The valuation is based on full projections using a complete extract of policy data (i.e. model point file) from the administration system. Under the current timetable, all valuation results are due by the end of the fourth business day of the month following the quarter-end (known as “Working Day 4”).

A new CFO has recently been appointed to STARLIFE. While she is a qualified actuary, she has not worked in an actuarial role for 10 years. One of her first requests is that financial reporting now be completed **monthly** with valuation results still due Working Day 4.

Due to system constraints, a full extract of policy data cannot be produced in time on a monthly basis (other than at quarter-ends), meaning it is not possible to use the existing policy liability calculation process on two out of every three month-ends.

For these month-ends, the Appointed Actuary has proposed a method to determine the policy liability for policies inforce at the most recent quarter-end. This method has been approved by the senior management of STARLIFE.

a) The CFO has now asked you to outline an approach that could be adopted to evaluate the policy liability for policies that have commenced since the most recent quarter-end which will meet her timetable. She has mentioned to you that while the full policy data extract is not available (so you cannot run the projection model as you usually do on a quarter-end), other useful information can be made available from the Finance team.

   Draft a memo to the CFO explaining in detail an approach to estimate the policy liability **for policies commencing since the previous quarter-end** that meets her needs.

   In your memo:

   i) Describe your approach, providing an explanation of the key components and illustrating how these components fit into the policy liability calculation using a simple formula. **(5 marks)**

   ii) Describe a possible source of data for each of the key components presented in part a) i), and highlight any approximations which may be required. **(4 marks)**

   iii) Outline **three** disadvantages of the approach you have described. **(3 marks)**

   iv) Outline how you will mitigate against the disadvantages of the recommended approach to ensure results are robust. **(3 marks)**

 

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b) It is now Working Day 3 during quarter-end. The Finance team have suddenly discovered that the stamp duty rates have not been applied correctly for a product. This has resulted in an underpayment by STARLIFE of first year stamp duty on new lump sum business for the product since it launched three years ago.
Describe how this will affect your valuation, and the impact this will have on the reported profit for the previous quarter. **(3 marks)**

c) Your recommended approach from part a) has now been in place for over a year. As part of the year-end audit process, an accounting auditor has noticed that:

- Sales volumes over the year were significantly lower compared to the budget (which was set at the beginning of the year).
- The policy liability in respect of business not inforce at the previous year-end differed greatly each month compared to the budget, and indeed still differs at the year-end.
- Yet the actual profit in respect of new business over the year was very close to budget.

The auditor is concerned the new monthly valuation process for non-quarter-ends may have caused an error in the year-end accounts, and has requested you to explain the above observations.

Prepare a response to the auditor with your explanation. Ensure you address the auditors concern.

Note that the quarter-end valuation process is also adopted at year-end. **(3 marks)**

d) At a recent Finance Actuarial team meeting, one item that was discussed was proposed changes to the role of the Appointed Actuary for Life Insurers by the prudential regulator.

Two key aspects of the proposed changes that were discussed at the meeting were:

- The introduction of the requirement for the Appointed Actuary to produce an Insurance Liability Valuation Report (ILVR) annually. The ILVR will set out the data, methodology, assumptions, outcomes and reconciliations performed as part of the valuation process in sufficient detail so that another actuary can understand how the policy liability was determined.
- A renewed focus on managing conflicts of interest with respect to the Appointed Actuary.

You have been asked by the Appointed Actuary of STARLIFE to consider these aspects of the proposed changes, and report back at the next Finance Actuarial team meeting.

i) Describe how the proposed requirement to produce an ILVR differs from the current requirements, commenting on how much extra level of effort is likely to be required to produce the ILVR for STARLIFE. **(3 marks)**

ii) Outline the current requirements that apply to Appointed Actuaries which aim to manage their conflicts of interest, and describe how the requirements achieve their purpose. **(3 marks)**

**END OF QUESTION 3**

 

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