



2017 PART III EXAMINATIONS

Subject Title: C2A Life Insurance

Date: Wednesday, 11 October 2017

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	30
2	30
3	30
Total	90

Candidates are required to answer **ALL** questions. This paper has FIVE (5) pages (including this page).

QUESTION 1

(30 Marks)

The Australian Government is currently working on legislation to develop a framework which would require trustees of superannuation funds to offer members at retirement a product that protects against outliving one's savings. In selecting an appropriate product trustees would need to meet their obligations to act in the best interests of their members.

TrustMe for Life (TML) sells both life insurance and superannuation business.

In preparation for this legislative change TML Life Company is considering developing a lifetime annuity that it could offer to its superannuation members as they approach retirement. This product is expected to be sold to healthy rather than substandard lives.

TML has been selling yearly renewable term (YRT) business for 15 years but has no experience with writing lifetime annuity business.

You are a product development actuary at TML.

TML's CEO has asked for your help to understand the key features of annuities. The CEO understands you do not have a lot of experience in this area but is confident you will be able to apply actuarial principles and your knowledge of pricing to answer his questions.

a) Develop a simple model that calculates the **present value** of **premium** and **annuity benefit** cashflows for a lifetime annuity based on the following assumptions:

- Male, age 65 years.
- Purchase price = \$500,000.
- Annuity rate: \$48,653 per annum.
- Mortality rates: refer q1.xls.
- Mortality improvements = 1% pa.
- Inflation rate: 2.5% pa.
- Discount rate: 10%.

You can assume:

- Annuity payments are made annually in advance.
- Annual annuity payments are indexed at the fixed inflation rate.
- Payments cease at age 110.
- Mortality improvement is applied as $q_x * (1 - z)^{(t-1)}$ where z is the mortality improvement assumption and $t \geq 1$.
- Ignore all other assumptions and tax for the purpose of this projection.

(8 Marks)

b)

- i) Compare and contrast the cashflow profile for lifetime annuities and YRT and explain your observations with reference to underlying assumptions and areas of uncertainty in respect of:
- Premiums. **(3 Marks)**
 - Benefits / claims. **(3 Marks)**
 - Investment returns. **(2 Marks)**
 - Acquisition (non-commission related), maintenance (including benefit payment) and investment management expenses. **(3 Marks)**
 - Commission. **(1 Mark)**
- ii) Discuss how differences in the cashflow profile for lifetime annuities and YRT impact capital for these products. **(2 Marks)**

Total 14 marks

c) The CEO has asked you to prepare a memo which discusses:

- The risks to TML of introducing a new lifetime annuity product. **(4 Marks)**
- How these risks could be managed. **(4 Marks)**

Total 8 marks

END OF QUESTION 1

QUESTION 2
(30 Marks)

XYZ Life is the Australian subsidiary of XYZ Global whose parent is based overseas.

XYZ Life sells:

- Stepped and level premium yearly renewable term (YRT) and total and permanent disability (TPD) business.
- Stepped and level premium income protection (IP) with waiting periods of 30, 60 and 90 days and benefit periods of 1 year, 2 years and to age 65 years which includes annual indexation of benefits whilst on claim.

In addition, it has a closed book of participating investment account (IA) business that guarantees that the annual crediting rate cannot be negative.

XYZ Life also has a small closed book of participating Whole of Life (WoL) business.

XYZ Life asset mix comprises cash, Government bonds, corporate bonds, equities and property.

(For this question, students can assume there is no reinsurance in place and can ignore the impact of tax.)

- a)** Describe what factors you would consider when determining an asset mix for:
- i) IP business with a mix of 1 year and to 65 year benefit periods. **(3 Marks)**
 - ii) YRT and TPD with stepped and level premiums. **(4 Marks)**
 - iii) Participating WoL and participating investment account business. **(5 Marks)**

Total 12 marks

XYZ Life's Enterprise Risk Management Team has asked for your help with the development of the following scenario for its Stress and Scenario Testing.

- Severe downturn in the Chinese economy leading to a decline in global growth and a recession in the Australian economy.
- The impact of this shock is persistent and prolonged.
- At a macro level, GDP falls by 5 percent and unemployment increases to 14 percent.

- b)** Describe what impact this scenario is likely to have on XYZ Life's
- i) Cash, government bonds, corporate bonds, equities and property assets. **(5 Marks)**
 - ii) YRT, TPD, IP, WoL and IA liability cashflows. **(5 Marks)**

Total 10 marks

- c)** What actions could be taken to manage the impacts you have described in part b)? **(8 Marks)**

END OF QUESTION 2

QUESTION 3
(30 Marks)

You are the experienced actuary of LifeCo.

The annual mortality investigation for YRT has recently been completed for in force males.

Data for your investigation is provided in the spreadsheet Q3.xlsx, which includes policy information, claims information and mortality rates.

a)

- i) Calculate Actual to Expected (A/E) ratios by lives and amounts and summarize your aggregate results in the following table:

	A/E (Number)	A/E (Amount)
Non-smoker		
Smoker		
Total		

Show all workings

(8 Marks)

- ii) Comment on the results for 35 year olds. **(1 Mark)**
 Provide an explanation for these results. **(1 Mark)**
 Discuss what impact these results are having on the overall results. **(1 Mark)**

Total 11 marks

b)

- i) Discuss and explain the results from part (a) in respect of:
- o Total portfolio. **(1 Mark)**
 - o Non-smokers. **(2 Marks)**
 - o Smokers. **(3 Marks)**
- ii) Discuss the implications for the adequacy of premium rates. **(5 Marks)**

Total 11 marks

- c)** Following on from the introduction of the Life Insurance Code of Practice, LifeCo is seeking to improve transparency regarding its underwriting and claims processes for its YRT business.

To achieve this LifeCo is considering changing its definition of a pre-existing condition such that if a life insured has not sought medical treatment for symptoms in the last 12 months, then the condition is not classified as pre-existing and so claims related to it are not excluded from payment.

Discuss the pros and cons of this proposal.

(8 marks)
END OF QUESTION 3