

LIFE INSURANCE AND RETIREMENT PRODUCT DEVELOPMENT

EXAM SEMESTER 2 2019



Life Insurance and Retirement Product Development

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Subject Title: Life Insurance and Retirement Product Development

Date: Thursday, 10th October 2019

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

10:15am- 1:15pm
(Examination)

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.

There is no requirement for you to submit an Excel spreadsheet for this exam.

Candidates are required to answer all questions.

| Question | Mark |
|--------------|-----------|
| 1 | 25 |
| 2 | 25 |
| 3 | 30 |
| Total | 80 |

This paper has **NINE** (9) pages (including the cover page).



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QUESTION 1

(25 marks)

Note: There is no accompanying spreadsheet for this question.

SmallLifeCo is a small life insurance company that only sells level premium term insurance products. Premiums are payable annually. Most of SmallLifeCo's customers are under 50 years of age. SmallLifeCo operates in the country MadeUpLand.

You are the Pricing Actuary at SmallLifeCo and have received the following email from the Customer Services Manager who is new to SmallLifeCo and new to the insurance industry.

From: CustomerServicesManager@smalllifeco.com
Sent: 10 October 2019 9:43 AM
To: PricingActuary@smalllifeco.com
Subject: Level premium term insurance

Dear Pricing Actuary,

My team has received some complaints from customers saying their level term insurance premiums have increased.

Can you please explain the reasons why premiums for level term insurance may increase so I can reply to our customers?

Thanks for your help.

Kind regards
Customer Services Manager

- a) Prepare an email replying to the Customer Services Manager which explains the possible reasons why premium rates for level premium term insurance can increase.

(5 marks)

The Customer Services Manager has also mentioned feedback from customers that they think they are paying too much for insurance. Some customers have asked why SmallLifeCo doesn't offer stepped premium term insurance like other life insurers in MadeUpLand.

- b) Explain the similarities and differences between stepped and level premium term insurance products to the Customer Services Manager.

(4 marks)



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The Head of Products at SmallLifeCo has asked your team to start investigating the idea of SmallLifeCo offering its customers stepped premium term insurance.

Similar to level premium term insurance, stepped premiums would be payable annually.

c) Compare and contrast the impact of lapses on profitability for level and stepped premium term insurance. **(6 marks)**

d)

i. Explain how the screening stage applies within the product development process. **(2 marks)**

ii. Apply the screening stage of the product development process to the idea of developing a stepped premium term insurance product. **(8 marks)**

(Total 10 marks)

END OF QUESTION 1



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QUESTION 2

(25 marks)

Note: There is no accompanying spreadsheet for this question.

Following on from Question 1, your team has been asked to develop annual premium rates for stepped premium term insurance.

SmallLifeCo uses the following assumptions for its level premium term insurance product.

| Expenses and Commission | |
|---|------|
| Acquisition % premium | 160% |
| Renewal % premium | 30% |
| Mortality table | |
| 80% of MadeUpLand Insured Lives Table (2012-2018) | |
| Selection effect | |
| Year 1 | 60% |
| Year 2 | 80% |
| Year 3 onwards | 100% |
| Lapses (per policy year) | |
| Year 1 | 15% |
| Year 2 | 10% |
| Year 3 onwards | 5% |
| Investment returns (per annum) | |
| | 5% |

a) Discuss what assumptions you would use for pricing stepped premium term insurance for the following:

- | | | |
|------|------------------------------------|-----------|
| i. | Expense and commission assumptions | (2 marks) |
| ii. | Claims assumptions | (2 marks) |
| iii. | Lapse assumptions | (2 marks) |
| iv. | Investment return assumptions | (2 marks) |

(Total 8 marks)



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- b) Detail the steps that should be followed to produce a cashflow model to profit test a proposed set of annual stepped premium rates for a "male non-smoker aged 40 years old" model point.

Provide sufficient detail so a model could be developed by a person inexperienced at modelling without requiring further clarification from you. For example, you may wish to use some simple formulas to demonstrate calculations.

State any assumptions that you make.

Note: you do not need to develop an actual model. (12 marks)

- c) Explain how you would assess whether the proposed premium rates are adequate for a "male non-smoker aged 40 years old" model point. (2 marks)
- d) Describe what further work would be required to produce a set of annual stepped term premium rates that could be offered to the market. (3 marks)

END OF QUESTION 2



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QUESTION 3

(30 marks)

Note: There is no accompanying spreadsheet for this question.

TPDisUs (TIU) is a life insurer specialising in Total and Permanent Disability (TPD) insurance. TIU operates in a country called ThisPlace where it sells all its policies.

All lives insured are required to undertake rehabilitation before being eligible to claim under TIU's definition of TPD.

TIU has experienced the following changes in the last 5 years:

- 2014: TIU undertook a marketing campaign, aimed at encouraging more young people to purchase TPD insurance.
- 2016: TIU introduced an early identification program for seriously injured policyholders. The program's aims were to:
 - reduce the number of policyholders becoming totally and permanently disabled by providing early access to appropriate rehabilitation options;
 - reduce the delay between injury and claim under TPD policies; and
 - improve customer satisfaction with TIU.

The early identification program involved TIU partnering with a number of large hospitals and ThisPlace's central spinal cord registry to identify potential TPD claims as soon as a patient is admitted to hospital with a serious injury.

- 2017: ThisPlace's accident compensation scheme, SafetyFirst, began rejecting a number of their workplace and transport accident related TPD claims, on the basis that the individual could claim under their private TPD insurance policy instead.

You have recently joined TIU as an Experience Actuary. Due to the number of recent changes in TIU's operating environment, you have asked one of your analysts to conduct an experience investigation for TIU's policies.

A summary of your analyst's key findings are presented in the tables on the following page.

Your analyst has explained that all dollar figures in the tables have been inflation adjusted such that they are expressed in 2019 equivalent dollars to make interpretation of results easier.



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| Experience Item | Actual Experience | | | | |
|--|-------------------|---------|---------|---------|---------|
| | 2015 | 2016 | 2017 | 2018 | 2019 |
| policies in force | 147,106 | 153,772 | 145,183 | 149,474 | 149,240 |
| total sum insured (\$m) | 110,330 | 109,562 | 97,999 | 98,653 | 97,379 |
| average sum insured (\$) | 750,000 | 712,500 | 675,000 | 660,000 | 652,500 |
| claims reported | 309 | 292 | 363 | 448 | 433 |
| claims rate | 0.21% | 0.19% | 0.25% | 0.30% | 0.29% |
| claims accepted | 278 | 266 | 345 | 422 | 411 |
| acceptance rate | 90% | 91% | 95% | 94% | 95% |
| claims paid (\$m) | 206 | 191 | 221 | 259 | 255 |
| average claim size (\$) | 742,500 | 719,625 | 641,250 | 613,800 | 619,875 |
| expenses (\$m) | 60 | 65 | 65 | 67 | 68 |
| expense per policy (\$) | 408 | 423 | 448 | 448 | 456 |
| customer satisfaction (out of 10) | 7.0 | 7.0 | 6.5 | 7.5 | 7.0 |
| average months delay (injury to claim) | 12.1 | 12.2 | 11.6 | 11.3 | 10.5 |

| Experience Item | Best Estimate Assumption | A v E | | | | |
|--|--------------------------|-------|------|------|------|------|
| | | 2015 | 2016 | 2017 | 2018 | 2019 |
| policies in force | 150,000 | 0.98 | 1.03 | 0.97 | 1.00 | 0.99 |
| total sum insured (\$m) | 112,500 | 0.98 | 0.97 | 0.87 | 0.88 | 0.87 |
| average sum insured (\$) | 750,000 | 1.00 | 0.95 | 0.90 | 0.88 | 0.87 |
| claims reported | 300 | 1.03 | 0.97 | 1.21 | 1.49 | 1.44 |
| claims rate | 0.20% | 1.05 | 0.95 | 1.25 | 1.50 | 1.45 |
| claims accepted | 270 | 1.03 | 0.98 | 1.28 | 1.56 | 1.52 |
| acceptance rate | 90% | 1.00 | 1.01 | 1.06 | 1.04 | 1.06 |
| claims paid (\$m) | 203 | 1.02 | 0.94 | 1.09 | 1.28 | 1.26 |
| average claim size (\$) | 750,000 | 0.99 | 0.96 | 0.86 | 0.82 | 0.83 |
| expenses (\$m) | 61 | 0.99 | 1.07 | 1.07 | 1.10 | 1.12 |
| expense per policy (\$) | 405 | 1.01 | 1.04 | 1.11 | 1.11 | 1.13 |
| customer satisfaction (out of 10) | 8.0 | 0.88 | 0.88 | 0.81 | 0.94 | 0.88 |
| average months delay (injury to claim) | 12 | 1.01 | 1.02 | 0.97 | 0.94 | 0.88 |



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- a) Without reviewing the detail in the numbers, outline five (5) distinct questions you would ask of your analyst to check the quality and reliability of their analysis. **(5 marks)**
- b) The Head of Valuation has asked you to prepare a memo which explains the impact of the changes in TIU's operating environment on TIU's recent performance.

Write a memo that summarises:

- i. Three (3) key observations from your analyst's experience investigation **(3 marks)**
- ii. The potential drivers of each of your observations (based on the information provided for this question) **(3 marks)**
- iii. Their likely impact on TIU's performance **(3 marks)**
- iv. One (1) action you would recommend in response to each item of experience **(3 marks)**

(There is **1 mark** available for clarity of your memo.)

(Total 13 marks)

- c) Discuss how reinsurance could have been used to smooth TIU's experience over the last 5 years using:

- i. Two (2) types of proportional reinsurance **(3 marks)**
- ii. Two (2) types of non-proportional reinsurance **(3 marks)**

(Total 6 marks)

- d) Currently, TIU's policies exclude coverage for any disabilities related to post-traumatic stress disorder, depression and severe anxiety. However, ThisPlace has recently introduced a new law prohibiting insurers from excluding or declining coverage for mental health related conditions for all new policies sold. As a consequence, TIU will be expanding its definition of TPD for all new policies sold from 1 January 2020 to include these mental health related conditions.

- i. Describe three (3) risks of this change from TIU's perspective. **(3 marks)**
- ii. Evaluate how the risks that you have identified could be managed. **(3 marks)**

(Total 6 marks)

END OF QUESTION 3

END OF EXAMINATION