Actuaries Institute

2014 PART III EXAMINATIONS

Subject Title: **C2A Life Insurance** (longer answer component)

Date: **Monday, 28 April 2014**

Time: **1:00 pm – 1:15 pm** (Reading Time)
1:15 pm- 4:15 pm (Examination)

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

Instructions: Type your answers to the longer answer component into one Word document and ensure that there is no data linked to spreadsheets.

An Excel file must be submitted for each question.

Number of Questions: **Two** (2)

Question	Marks
1	35
2	25
Total	**60**

Candidates are required to answer **ALL** questions.
This paper has **four** (4) pages (excluding this page).

COURSE 2A Life Insurance **SEMESTER 1 2014 EXAMINATIONS**

Answer two questions.

QUESTION 1 **(35 Marks)**

You are the pricing actuary at Another Good Idea Ltd (AGI). AGI is a large Australian life insurer which sells a range of risk products.

AGI's CEO has decided to develop a new stand-alone trauma product. This product will offer a premium which is level for 15 years (AGI retains the right to increase premiums in the light of adverse claims experience, but there will be no age-related premium increases over the 15-year term of the policy). At the end of the policy term, the policy terminates. The product pays out a lump sum benefit on the diagnosis or occurrence of one of a list of specified trauma conditions and events. Once a trauma benefit is paid, the policy terminates.

a) Based on the information provided in the attached spreadsheet (s:'C2A_LAQ1_S1_2014_Trauma_Level_Term') and the information below, determine an appropriate premium for a 30 year old male non-smoker taking out a policy with sum insured $200,000.

   Policy and pricing details:

   - 15 year term, with level premiums payable annually in advance for the duration of the policy.
   - The relevant expenses can be assumed to be:
     - Initial: $800 per policy plus 55% of the first year's premium.
     - Renewal (starting from the beginning of policy year 2): $65 per policy plus 7% of each annual premium.
     - Claim expenses: $350 incurred at end of year of claim.
     - Per policy renewal and claim expenses are expected to increase in line with inflation each year.
   - Reserves at the end of each policy year can be established as 20% of the present value of future premiums, with the discount rate the same as that to calculate the interest rate on annual net cashflows, which is 6% per annum (effective).
   - Explicit capital requirements can be ignored for the purpose of this calculation.
   - AGI's principal profit requirement is that the [Expected Present Value (EPV) of (profits)] divided by the [EPV(premiums)] = 8%, with the relevant EPV's discounted at a risk discount rate which reflects expected shareholder return on capital.
   - The policy cancellation experience of AGI's existing 15-year term life policies, the relevant trauma morbidity rates, and mortality rates are given in the sheet: 'Trauma level term'. All of these rates can be considered as independent of one another. You may ignore selection effects.
   - You may ignore tax, and you may ignore inflation increases on the sum insured.
   - No surrender values or maturity values are payable at any time.

(15 Marks)

b) AGI does have a secondary profit requirement that each product generates the expected shareholder return on capital. Discuss the reasonableness of this profit requirement with respect to the product above. (4 Marks)

c) The CEO has been talking to a friend who is a consulting actuary, and this friend mentioned that a major risk in life insurance is the possibility of adverse policy cancellation (lapse) experience. The CEO is now quite worried about this issue. Describe the main risks to AGI from adverse policy cancellation experience arising from this product. (4 Marks)

d) The marketing manager is concerned that the premium that you determined in (a) above is too high to be a reasonable alternative to existing annually stepped premium trauma products. She thinks that potential policyholders may not perceive the value of level premiums in early years of the policy, in comparison to annually stepped premiums.

She wants to introduce the following additional feature "Extension Plus" to make this new product more marketable and attractive to prospective policyholders.

- "Extension Plus" works like this: When a level premium trauma policyholder has reached the end of their 15-year policy term, they have the option to continue onto a new trauma policy without any further underwriting, and the new level premium policy will also have a term of 15 years and the same sum insured.

Rather than price the cost of "Extension Plus" into the premium of the initial policy, the marketing manager proposes that the "Extension Plus" feature would be even more marketable, if the cost was accounted for within the premium of the subsequent policy that would be taken up.

In this way, she believes that the cost of the feature is still accounted for, but it is shared amongst those who exercise the option rather than all original policyholders, therefore making it a more equitable proposition to all policyholders. In addition, she has highlighted that this will also provide a larger policy base over which to spread the cost of the feature, as new business sales of the initial policy will be enhanced with an extra benefit for no extra cost.

Draft a response to the marketing manager's proposal above. Your response should include the following:

- The main risk(s) to AGI associated with offering the "Extension Plus" feature;
- Potential ways that these risk(s) can be mitigated;
- A discussion of her pricing proposal, particularly in terms of risk, equity, marketability and administrative efficiency;
- Your recommendation as to whether this feature should be offered, as is or with changes, giving reasons for your recommendation and a recommended approach to pricing if appropriate.

(12 Marks)

Spreadsheet: C2A_LAQ1_S1_2014_Trauma_Level_Term.xlsx

QUESTION 2 **(25 Marks)**

You recently joined PQR Insurance Ltd as an actuarial analyst. PQR is a large Australian life insurer that has significant capital reserves, but in recent years it has struggled with low levels of new business sales across its range of risk and savings policies.

PQR's chief actuary has two tasks for you.

Task One:

PQR has a large book of a single generation of participating conventional life policies. These policies have been very profitable over the years and a significant surplus in respect of these policies has emerged.

PQR has also sold a number of unit-linked savings policies. PQR's CEO, who is new to life insurance, is concerned with the impact of recent volatility in equity markets. The CEO feels that significant falls in the values of individual policies could have a detrimental impact on the reputation of PQR. The CEO is worried that this could further adversely impact the already low levels of new business sales across all of PQR's business.

The CEO has asked the chief actuary whether they can apply some surplus funds from the participating conventional policies to the unit-linked business, in order to limit reported investment losses on the unit-linked policies. The CEO perceives that this would limit the reputational damage associated with investment losses, prevent new business volumes from falling further, and therefore keep PQR more financially viable overall.

a) The chief actuary has asked you to prepare a draft response to the CEO's concerns, outlining benefits and/or risks with his suggested proposal, and if relevant, any alternatives or modifications to his proposal that you consider reasonable. You should justify all points made. (12 Marks)

Task Two:

The second task relates to PQR quoting for a group insurance scheme. A large fast-food chain, Hungry Jill's, is seeking insurance cover for all of its employees. The characteristics of Hungry Jill's business are as follows:

- It has approximately 300 fast food restaurants around Australia.
- It employs 6,500 workers, with the vast majority employed on a casual, part-time basis, with hours of work for each employee varying from month to month.
- Most workers are either under the age of 20 or over the age of 60.
- The profile of the workers (date of birth, gender, description of occupation, and annual earnings for each of the last two calendar years) is given in the sheet: 'Hungry Jills'.

Hungry Jill's requires both a death product and a group salary continuance (income protection) product for its employees. Hungry Jill's has proposed that all employees have a death cover of $200,000, and an income protection cover of $20,000 per year, with a 2 year benefit period. It wants these covers to be in place for 3 years, with an annual premium payable at the start of each of the next three years to cover the risk of each respective year ahead.

Hungry Jill's has argued that these fixed benefits of $200,000 death cover and $20,000 annual income protection cover per employee is advantageous because it is administratively convenient and straightforward, and that all parties (Hungry Jill's, employees and PQR) know at any point in time what their insured cover is.

b) Describe any risks to PQR that arise from Hungry Jill's preferred level of insurance benefits for each employee. Recommend any alternative benefit structure that you consider reasonable in the light of the risks you described. (7 Marks)

c) The sheet 'Death and IP risk rates' contains the risk rates relevant to the pricing of this group scheme, and the following assumptions are also relevant:

- Profit criteria for PQR: 10% of each annual premium
- Expenses:
  - Initial: $5,000 for the scheme
  - Renewal (at time of second and third premiums being paid): $1,000 for the scheme
  - Claim: 11% of the total amount of death claims in any one year is estimated to approximate the total expenses associated with managing both death and income protection claims in that year (death claims can be assumed to occur at the end of each relevant year)
  - Annual commission: 5% of each annual premium
  - You may ignore tax

Assuming that no new employees join, and that no employees leave the group scheme over the next three years (for reasons other than death), calculate the total expected premiums payable for each of the next three years, based on Hungry Jill's preferred benefit levels. The date that the group cover would commence is 1 July 2014. (6 Marks)

Spreadsheet: C2A_LAQ2_S1_2014_Hungry Jills_and_Death and IP rates.xlsx

END OF PAPER