INSTITUTE OF ACTUARIES OF AUSTRALIA

**COURSE 2A LIFE INSURANCE OCTOBER 2010 EXAMINATIONS**

**Marking Guide**

**Level of Difficulty**

| Question | Syllabus Aims | Units | Knowledge & Understanding | Straight-forward Judgement | Complex Judgement | Total Marks |
|---|---|---|---|---|---|---|
| 1 a) | 1,2,7,9,12 | 1,3,4 | | 3 | | 3 |
| 1 b) | 2,8,9,10,11,14 | 1,3,4 | 6 | 3 | | 9 |
| 1 c) | 2,4,5,7,9,10,12 | 1,2,3,4 | | | 6 | 6 |
| 2 a) | 1,2,4,5,7,10,12 | 1,2,4 | 6 | | | 6 |
| 2 b) | 2,5,12,13,14 | 1,2,4 | | | 4 | 4 |
| 2 c) | 2,5,7,9,15 | 1,2,3,5 | | 10 | | 10 |
| 3 a) | 1,4,6,7,14 | 1,2,4 | | 4 | | 4 |
| 3 b) | 1,4,6,7,14 | 1,2,4 | | 4 | | 4 |
| 3 c) | 2,4,6,7,11,12,14,15 | 1,2,4,5 | | | 8 | 8 |
| 3 d) | 1,3,4,5,6,7,9,14 | 1,2,3,4 | 4 | | | 4 |
| 4 a) | 1,9,12 | 1,3,4 | 2 | | | 2 |
| 4 b) | 1,9,12 | 1,3,4 | 1 | | | 1 |
| 4 c) | 1,7,9,12,14 | 1,2,3,4 | 1 | 5 | | 6 |
| 4 d) | 1,8,9,12,14 | 1,3,4 | | | 4 | 4 |
| 4 e) | 1,8,9,12,14 | 1,3,4 | | | 4 | 4 |
| 4 f) | 1,2,4,5,7,8,9,12,14 | 1,2,3,4 | | | 6 | 6 |
| 5 a) | 1,2,5,7,9,10,11,15,16 | 1,2,3,5 | | 5 | | 5 |
| 5 b) | 1,7,10,12,15 | 1,2,3,4,5 | | 5 | | 5 |
| 5 c) | 1,2,4,7,9,12,13 | 1,2,3,4 | | 4 | | 4 |
| 5 d) | 1,4,5,7,9,10,13,14 | 1,2,3,4 | | | 5 | 5 |
| **TOTAL** | | | **20** | **43** | **37** | **100** |

**Answer all 5 questions.**

## QUESTION 1 (18 Marks)

**SimpleCred is a company which offers credit cards to a large number of Australians. It sells a simple, no-frills credit card which has very low fees compared to other credit cards in the market. Its main target market is families that have 1 or 2 non-adult children (aged 17 or less) as it perceives that this family size is most likely to remain with a particular low fee credit card, for a long period of time.**

**SimpleCred prides itself on its customer loyalty, claiming that the proportion of credit card holders who change to another credit card provider is the lowest in the industry.**

**SimpleCred has 3 categories of credit card (gold, silver and bronze), segregated in terms of credit limits available to the card holder. The up to-date profile of each of these categories is as follows:**

**Table 1: Customer profiles by category**

| Customer category | Gold | Silver | Bronze |
|---|---|---|---|
| Number of families belonging to the group (in thousands) | 90 | 393 | 653 |
| Average outstanding credit balance owing (mid month) | $22,000 | $10,000 | $2,500 |
| Average age of account holder (assumed to be male) | 42 | 37 | 45 |
| Assumed family composition in addition to account holder | Female aged 39 plus 2 non-adult children living at home | Female aged 36 plus 1 non-adult child living at home | Female aged 40 plus 1 non-adult child living at home |

**Credit card holders can apply to change to a customer category with a higher credit limit. Credit card holders can change to a customer category with a lower credit limit at any time.**

**NeedaBreak is an Australian life insurer that is relatively small by industry standards with approximately $40 million of annual premium in force business. It has mainly sold individual risk policies via tied agents but is looking to sell new products via new distribution channels.**

**SimpleCred has recently approached NeedaBreak with a proposal to develop a simplified life insurance policy. This policy would have no underwriting, providing guaranteed automatic acceptance without any underwriting questions and pre-existing conditions would not be excluded. NeedaBreak would pay SimpleCred a benefit in the event of the death of any adult member (excluding any adult children) of a customer's family. The amount of the benefit paid would be equal to the outstanding credit balance owing.**

**SimpleCred envisages that it would market this life insurance benefit to its customers directly, and that the customer would pay the additional premium alongside their normal card billing process (but with an explicit premium for the life insurance component). The customer would have the option to accept or decline the insurance.**

 

**NeedaBreak is looking to price the proposal above and has initially decided on assumptions as follows:**

**Mortality follows Australian population mortality**
**Table 2: Australian population mortality**

| Age | Male | Female |
|---|---|---|
| 36 | 0.00116 | 0.00057 |
| 37 | 0.00121 | 0.00061 |
| 38 | 0.00128 | 0.00066 |
| 39 | 0.00135 | 0.00072 |
| 40 | 0.00143 | 0.00078 |
| 41 | 0.00153 | 0.00085 |
| 42 | 0.00163 | 0.00093 |
| 43 | 0.00175 | 0.00102 |
| 44 | 0.00188 | 0.00111 |
| 45 | 0.00203 | 0.00122 |

**Expense and profit assumptions**

- **It is anticipated that 2 additional administration staff would be required at a total cost of $110,000 per year.**
- **Additional claims managers are required.**
  **NeedaBreak estimates that:**
    - **One claim manager can review and close 4 claims in one day.**
    - **After public holidays, annual leave, sick leave, and training day. there are 206 working days in a year.**
    - **A claims manager's salary is $50,000 per annum.**
- **An amount of 2.5% of premiums to cover SimpleCred's billing expenses is assumed to be paid by NeedaBreak to SimpleCred.**
- **An amount of 10% of premiums is assumed to be paid by NeedaBreak to SimpleCred as commission.**
- **A profit margin equal to 25% of premiums is assumed for NeedaBreak.**
- **Lapses can be ignored.**
- **Tax can be ignored.**

**a) Explain the benefits to SimpleCred of this proposal. (3 Marks)**

**b) SimpleCred's research indicates that 30% of its customers would accept and pay for the insurance policy. Based on this and assuming that all policies accept the insurance at the start of month 1, calculate (ignoring the time value of money and showing all workings) for a 12 month period:**

**i) The expected claims cost (3 Marks)**

**ii) All other expected cashflows (besides the claims cost) and NeedaBreak's expected profit. Ignore reserves in your calculations. (6 Marks)**

**c) Describe the shortcomings with the above approach to pricing. (6 Marks)**

**Solutions**

a)

The benefits to SimpleCred of this proposal include:

- Improves debt recovery rates as provides protection against the risk that the outstanding amount owing on the credit card would remain unpaid in the event of the death of the male or female adult in the family.
- The additional revenue generated from the commission paid by NeedaBreak as part of the insurance premium paid by customers.
- It further enhances customer loyalty, in that an additional benefit on the card for presumably low cost could further tie a customer to SimpleCred.
- Marketing opportunity to extend the products available to the market.
- Other valid reasons described with a reasonable explanation.

**Marking guide:**

1 mark SJ for each point above with a reasonable explanation.

To a maximum of 3 marks SJ.

b)

i)

Expected claims cost over 12 months:

| Category | Gold | Silver | Bronze |
|---|---|---|---|
| Average outstanding credit balance owing | $22,000 | $10,000 | $2,500 |
| Mortality rate | m/42: 0.00163<br>f/39: 0.00072 | m/37: 0.00121<br>f/36: 0.00057 | m/45: 0.00203<br>f/40: 0.00078 |
| Expected $ claims for a customer: | Average outstanding credit balance x (male mortality rate + female mortality rate)<br><br>= 22,000 x (0.00163 + 0.00072) = 51.70 | = 10,000 x (0.00121 + 0.00057) =17.80 | 2,500 x (0.00203 + 0.00078) = 7.025 |
| Number of Policies | 90,000 | 393,000 | 653,000 |
| Proportion of customers paying life insurance premium | 30% | 30% | 30% |
| Expected $ claims per category: | Proportion of customers paying premiums x Number of policies x Expected $ claims per customer<br><br>=30% x 90,000 x 51.70 = $1,395,900 | =30% x 393,000 x 17.80 = $2,098,620 | =30% x 653,000 x 7.025 = $1,376,198 |
| Marks: | 1 mark SJ | 1 mark SJ | 1 mark SJ |

So total expected claims cost over a 12 month period is equal to:

$1,395,900 + $2,098,620 + $1,376,198 = $4,870,718.

**Marking guide:**

Marks as specified above to a maximum of 3 marks SJ.

ii) All other cashflows and profit are calculated as follows:

Expected number of claims over 12 months:

| **Category** | **Gold** | **Silver** | **Bronze** |
|---|---|---|---|
| Proportion of customers paying life insurance premium | 30% | 30% | 30% |
| Number of Policies | 90,000 | 393,000 | 653,000 |
| Mortality rate | m/42: 0.00163<br>f/39: 0.00072 | m/37: 0.00121<br>f/36: 0.00057 | m/45: 0.00203<br>f/40: 0.00078 |
| Expected number of claims per category: | Proportion of customers paying premiums x Number of policies x (male mortality rate + female mortality rate)<br><br>=30% x 90,000 x (0.00163 + 0.00072) = 63.5 | =30% x 393,000 x (0.00121 + 0.00057) = 209.9 | =30% x 653,000 x (0.00203 + 0.00078) = 550.5 |
| Marks: | 0.5 mark KU | 0.5 mark KU | 0.5 mark KU |
| To a Maximum | 1.5 marks KU for calculating expected number of claims. | | |

Expected number of claims over 12 months:

= 63.5 + 209.9 + 550.5 = 823.8

One additional claim manager can manage 206 x 4 = 824 claims in 12 months

Number of additional claim managers required:

= 823.8/824 = 0.9997.

Hence 1 additional claims manager is required. [0.5 mark KU]

Claim expenses = $50,000 x 1 =$50,000 [0.5 mark KU]

Total additional administration and claims expenses for NeedaBreak

= $110,000 + $50,000 = $160,000 [0.5 mark KU]

Commission = 10% x Premium

Billing Expenses = 2.5% x Premium

Profit = 25% x Premium

Premium – Claims – Commission – Expenses = Profit

Premium – $4,870,718 - 10% x Premium – 160,000 – 2.5% x Premium = 25% x Premium

Premium = (4,870,718 + 160,000) / (1 – 10% – 2.5% - 25%) = $8,049,148

[1 mark KU for correct formula and 0.5 mark KU for correct calculation to a maximum of 1.5 marks KU].

Commission = 10% x Premium = 10% x $8,049,148 = $804,915 [0.5 mark KU]

Billing Expenses = 2.5% x Premium = 2.5% x $8,049,148 = $201,229 [0.5 mark KU]

Profit = 25% x Premium = 25% x $8,049,148 = $2,012,287 [0.5 mark KU]

**Marking guide:**

Marks as specified above covering:

1.5 marks for expected number of claims.
0.5 mark or the additional claim managers required.
0.5 mark for the claim expense.
0.5 mark for expenses (administration expenses + claim expenses).
1.5 marks for premium.
0.5 mark for commission.
0.5 mark for billing expenses.
0.5 mark for profit.

To a maximum of 6 marks KU.

c)

The shortcomings with the approach to pricing include:

- The profile of the family composition is an estimate only produced by SimpleCred – this may have to be checked for credibility and reliability as any deviations from who is actually insured direct impacts the experience.

- Determining who is insured at any one time needs clarification and some certainty – with family membership changing over time.

- The sum insured is also impacted by the movement of customers between different categories, which can happen at any time – some allowance may have to be made for that.

- Credit card balances build up over month and are repaid. Timing of the premium determination to the billing cycle can impact the premium versus the cover. Need to use ‘average’ balance or some other approach to ensure adequate premium received.

 

- The outstanding credit balance owing may vary by age and so a distribution of outstanding credit balance owing by age may be appropriate rather than using an average across all ages.

- No allowance for time value of money, capital costs and reserving.

- Not accounting for management time is risky if this proposal progressed. It would constitute a significant proportion of the overall current premium which would naturally require resources and time from management – thought should be given to capturing this in some way. This is especially important here because of NeedaBreak's lack of experience with such business.

- Given the size of the policy and potential risks, the cost of reinsurance is likely to have to be factored in.

- Mortality rates need to allow for anti-selection from customers by virtue of the lack of underwriting , and pre-existing condition are not excluded, although the low sums insured will reduce the incentive for this

- Does not show how key assumptions affect the profit. A sensitivity analysis on varying key assumptions would be helpful.

- A one year cashflow calculation is not sufficient to show the profitability of product, rather full cashflows should be projected using underlying assumptions (which may vary from year to year) for the term of the policy.

- Other valid shortcomings described with a reasonable explanation.

**Marking guide:**

1 mark CJ for each point above with a reasonable explanation.

To a maximum of 6 marks CJ.

**QUESTION 2** **(20 Marks)**

**COTE is a large life insurance company operating in a rapidly developing Asian country selling whole of life and endowment products. These products have until recently been the only products sold within the country and they have been very profitable for the insurers issuing the products. Due to the size of COTE, no reinsurance is used for new business.**

**To date, only local life insurers have been allowed to operate, but the government recently allowed a number of large global insurers into the market. One of these has teamed with a local bank and developed a simple and cheap yearly renewable term (YRT) life product . This product has seen immediate success in terms of high levels of new business sales.**

**You are the pricing actuary for COTE and report to the CEO.**

**The CEO has approached you to discuss developing a similar YRT life product.**

a) **The CEO is concerned that the development of a new YRT life product might lead to 'cannibalisation', whereby existing policyholders with a whole of life or endowment products may choose to surrender them and take out a YRT life product.**

   **Describe six reasons why a policyholder might want to change from a whole of life or endowment policy to a YRT life policy. (6 Marks)**

b) **COTE has approached a reinsurer for their initial views on supporting COTE's venture into developing a YRT life product. The reinsurer has suggested including the risk part of whole of life and endowment products within any treaty. Discuss how the inclusion of whole of life and endowment products within a reinsurance treaty would impact the reinsurance arrangements for the YRT life insurance product. (4 Marks)**

c) **Due to its size COTE has a large amount of experience data for their existing whole of life and endowment products. The CEO believes this information should be used for the pricing of the new YRT life product.**

   **Discuss the changes required (including the reasons for such changes) for the following assumptions for the YRT life product, compared to the assumptions used for the whole of life and endowment products:**

   i) **Mortality (2 Marks)**

   ii) **Lapse rates (5 Marks)**

   iii) **Expenses (3 Marks)**

**Solutions**

a)

Reasons why a policyholder might want to change from a whole of life or endowment policy to a term insurance policy include:

- Affordability – for the same sum insured, the YRT life product will have lower premiums than a whole of life or endowment policy and so if lower premiums for the same risk coverage are a factor, a YRT life policy would be considered a reasonable option.

- There may be a change in the policyholder's circumstances, in that a policyholder may wish to change from life cover for a permanent period with a whole of life policy to a YRT life policy which can provide life cover for a temporary period.

- The availability of a surrender value on the whole of life and endowment policy means that if a policyholder needs some money in the short term, they can surrender that policy but take out a YRT life policy for just risk insurance coverage

- Policyholders may be unsatisfied with bonus rates being declared on these participating policies, and perceive better returns can be obtained on other investment products and so surrender them but take out a term policy for just risk insurance coverage.

- Policyholders may be able to get better tax efficiencies on savings in other investment products. This would be the case if they are in non-super participating products and transfer their savings to a superannuation funds, a rollover fund or invest in an annuity where tax concessions apply.

- The policyholder may prefer the greater transparency offered by using two unbundled contracts, one for investment and the other one for covering risk insurance. Participating products bundle the investment and risk parts together and do not provide transparency in terms of understanding the investment earning rate achieved.

- The YRT life insurance product is relatively new to the market, and so those existing whole of life and endowment policyholders who previously had more limited choice in life insurance products will now have more choice, and may find the YRT life insurance product suits their needs more closely.

- May be convinced by a salesman that a YRT life policy is a better option.

- Not wanting a savings product.

- Looking for a product that better suits their needs.

- Any other valid points described with a reasonable explanation.

**Marking guide:**

1 mark KU for each point above with a reasonable explanation.

To a maximum of 6 marks KU.

b)

The reinsurance arrangements for the YRT life product would be impacted in various ways:

- Benefits to COTE do exist in the form of the subsequent negotiating power available to them because of the profit due to the reinsurer on the whole of life and endowment product, which subsequently lowers the risks to the reinsurer associated with the new product and more generous terms than otherwise could be negotiated. Hence lower reinsurance premiums may be the outcome. [1 Mark]

- Depending on the level of whole of life and endowment business reinsured, COTE may be comfortable to retain more of the YRT life risk should it be able to manage the profit volatility if the YRT business. This will reduce the levels of the YRT life sum insureds it reinsures with reinsurers. [1 Mark]

- For quota share reinsurance a lower % is reinsured, whereas for excess of loss reinsurance the reinsurance limits are higher. [1 Mark]

- The stable participating portfolio will be generating a good profit stream which helps fund the acquisition costs for the new YRT life business. This will reduce the reliance on the reinsurer to provide capital support and financing to COTE. This will be reflected in the reinsurance agreement with lower reinsurance. [1 Mark]

- Any other valid impacts described with a reasonable explanation. [1 Mark]

*[note to markers – no marks for discussing impact on whole life and endowment products.]*

**Marking guide:**

Marks as specified above with a reasonable explanation.

To a maximum of 4 marks CJ.

c)

i) Compared to the mortality assumption for the whole of life and endowment policies, the term insurance mortality assumption will need to change because of the following reasons:

- Different target markets will impact mortality, with mortality rates varying according to additional and relevant rating factors used for YRT life insurance.

- Depends on the strength of the underwriting standards adopted for the YRT policy and thus the impacts of anti-selection on mortality experience. Higher mortality rates for the term insurance may come from less stringent underwriting requirements if simplified or minimal underwriting is adopted. However, if stringent underwriting is adopted and/or pre-existing conditions are excluded, the mortality rates may be close to the participating mortality rates.

- If the reinsurer is involved in the underwriting, then mortality rates may be lighter as greater attention is paid to the mortality risk for fully underwritten YRT life covers.

- Any other valid reasons described with a reasonable explanation.

**Marking guide:**

1 mark SJ for each point above with a reasonable explanation.

To a maximum of 2 marks SJ.

ii) Compared to the lapse rate assumption for the whole of life and endowment policies, the YRT life insurance lapse rate assumption will need to change because of the following reasons:

- Different distribution methods will impact lapse rates, so lapse rates depend on the strategy adopted for the distribution of YRT life insurance. If it is direct, then lapses are typically higher than otherwise.

- The skill of the sales team in selling the policy will impact lapse rates. As YRT life covers are new to the market, customers may be relatively uninformed about the benefits of the policy that they are buying and therefore may be more likely to question its utility at some stage than for a whole of life policy.

- Commissions paid to the sales force that rely on the policyholder retaining their YRT life policy with COTE for a period of time can impact on the lapses for the early durations.

- It is common for there to be peaks in lapse rates for whole of life and endowment products due to surrender value changes that occur (typically) after year 10, as well as decreases in surrender penalties after 3-5 years. These aren't likely to be present for the YRT life product and so the pattern of lapse rates over time will differ for the term product.

 

- The YRT life product will be cheaper than the whole of life and endowment products. This is likely to lead to lower lapse rates for the YRT life product in the early years.

- The shape of the premium rates for the YRT life policy will be a factor also – higher increases at older ages may result in poorer lapse experience at these ages.

- Lapse rates for whole of life and endowment policies are relatively low as these policies have non-forfeiture provisions which means lapses do not immediately occur if premiums are unpaid.

- Competition in the market place for YRT products.

- Traditional lapse rates are affected by level of bonus rates and economic conditions.

- Any other valid reasons described with a reasonable explanation.

**Marking guide:**

1 mark SJ for each point above with a reasonable explanation.

To a maximum of 5 marks SJ.

iii) Compared to the expense assumption for the whole of life and endowment policies, the YRT life expense assumption will need to change because of the following reasons:

- Investment expenses will be less significant for the YRT life product due to the smaller reserves required, and also due to lower investment management costs with the assets typically required for term insurance – cash and bonds – rather than the higher investment management costs associated with equities and property, which are more likely to be associated with whole of life and endowment insurance.

- The underwriting standards adopted are likely to be different, hence different initial costs are incurred relative to the size of the premium. Underwriting costs would be much higher for the YRT life product if full underwriting is undertaken. If limited or on-line underwriting is used then there may be a high proportion of 'straight-through' cases that need no more attention and so overall underwriting costs may be relatively low.

- The YRT life product should have lower system and administration costs as it is simpler to administer than the endowment and whole of life products, which have bonus declarations.

- Any other valid reasons described with a reasonable explanation.

**Marking guide:**

1 mark SJ for each point above with a reasonable explanation.

To a maximum of 3 marks SJ.

**QUESTION 3** **(20 Marks)**

**BabyBoom Ltd. is an Australian Life Insurer that specialises in providing life insurance products for those who are approaching or are already in retirement. For many years, BabyBoom has offered a range of annuity and allocated pension products but recently has been concentrating on increasing the sales of a product called "FlexiCert". It believes that FlexiCert offers a range of features that will appeal to a broad range of potential customers and this will allow BabyBoom to gain an even larger share of the retirement income market.**

**FlexiCert has the following features:**

- **It is an investment linked product.**
- **Policyholders can invest money at any time rather than being bound by a regular premium contract.**
- **An allocation fee is charged at 2% of the deposit invested by the policyholder.**
- **A range of investment options covering the major asset classes (such as equities, property, fixed interest and cash) can be selected by the policyholder.**
- **Investment options for either or both existing money and future deposits can be altered by the policy holder at any time.**
- **The policyholder also has the option at policy issue to purchase an investment guarantee that operates like a one-year 'ratchet' – that is, on every policy anniversary, if the account balance is lower than X then it is reset to X, where X is equal to:**

  – **Account balance at last year's policy anniversary +**

  – **Deposits (net of a 2% allocation fee) made in last 12 months –**

  – **Withdrawals made by policyholder in last 12 months**

  **The policyholder pays an additional monthly fee for the investment guarantee set at 0.1% of the policyholder's account balance at the end of each month.**

- **Withdrawal rates (as measured by the amounts withdrawn by policyholders) are in line with current withdrawal rates for allocated pension products.**

  a) **Describe the risks to BabyBoom arising from the investment guarantee feature of FlexiCert.** **(4 Marks)**

  b) **Describe the other risks (besides those associated with the investment guarantee) to BabyBoom from FlexiCert.** **(4 Marks)**

**c) In order to protect against any risks arising from the investment guarantee:**

**i) Describe the product features that could be adopted. (5 Marks)**

**ii) Describe strategies other than product features that could be adopted. (3 Marks)**

**d) A friend of yours wants to compare FlexiCert with a typical investment linked policy. Your friend has heard of a product disclosure statement (PDS).**

**i) Describe the purpose of a PDS. (1 Mark)**

**ii) Describe the information typically included in a PDS for an investment linked policy. (3 Marks)**

 

**Solutions**

a)

The risks to BabyBoom arising from the investment guarantee feature of FlexiCert are:

- A risk of asset / liability mismatch with regards to the fidelity of the guarantee. If asset values fall significantly, the value of the assets may fall below the value of the guaranteed account balance.

- There are risks associated with the pricing of the guarantee. The first risk is pricing the guarantee correctly. The second risk is being able to correctly allow for price changes given the volatility in investment markets.

- Difficulties in providing the investment guarantee feature where assets with non-liquid secondary markets (such as property) are not available, as it is difficult to devise a hedging strategy for these types of assets.

- The operational risks associated with the guarantee as BabyBoom needs to have the necessary system requirements to accurately record account balances and transactional histories.

- Baby Boom may find it does not have people with the necessary specialist skills to effectively manage the guaranteed component of the product.

- Any other valid risks associated with the investment guarantee described with a reasonable explanation.

**Marking guide:**

1 mark SJ for describing the first point above about the risk of an asset/liability mismatch.

1 mark SJ for describing other risks above with a reasonable explanation to a maximum of 3 marks SJ.

To an overall maximum of 4 marks SJ.

b)

Other risks (besides those associated with the investment guarantee) to BabyBoom from FlexiCert are:

- A risk of lapses if the market return is not up to policyholder's expectations. This could lead to premature lapses, which decreases the business in force which would lead to lower management fees and investment income. Thus, the recovery of upfront costs, in developing the product, may be diminished.

- Distraction from existing products. Given that BabyBoom sells other retirement products, the offering of FlexiCert may divert policyholders from other products, which may be more profitable and present lower risk to BabyBoom.

- New product take-up risk. A new and different product in the market may not be taken up by financial advisors or the public, and a lower take-up rate than anticipated may result in up-front costs of developing the product are not covered.

- Sales are too high resulting in the risk of having insuuficient capital to support the new business growth.

- Mispricing risk for the base management fee, deposit fee and lack of withdrawal fee.

- Any other valid risks described with a reasonable explanation.

**Marking guide:**

1 mark SJ for describing other risks above with a reasonable explanation.

To a maximum of 4 marks SJ.

c)

i) Product features that the actuary could adopt in respect of the investment guarantee include:

- Limiting the investment options to which the guarantee can be applied, so that options with riskier assets such as equity and property are excluded.

- Different pricing of guarantee for different investment options. This means the pricing of the guarantee is higher for risky asset classes (such as equity and property) and the pricing of the guarantee is lower for less risky assets (such as cash and fixed interest).

- Make the guarantee come into effect only after a qualification period e.g. 5 years.

- The fee charged for the guaranteee is subject to review and can be changed with a short notice period (e.g. 30 days).

- Limit switches, where guarantees apply, to less risky asset classes only.

- Alternative time periods for the guarantee to be applied could be considered – for example, make it a 2-year rather than 1-year ratchet (guarantee).

- Structure the guarantee to apply at the investment option level not the policy level. However, if the guarantee is applied at the investment option level rather than the policy level, then additional rules will need to be introduced for the treatment of switches. In this case, switches will need to be treated as a deposit (excluding the fee) and a withdrawal, otherwise the guarantee could be triggered by a switch on the last day of the policy year.

- Any other valid features described with a reasonable explanation.

**Marking guide:**

1 mark CJ for each point above with a reasonable explanation.

To a maximum of 5 marks CJ.

ii) Strategies, other than product features, that could be adopted in respect of the investment guarantee include:

- Undertake hedging against adverse market movements where a guarantee has been elected. This could take various forms such as referencing a suitable index, e.g. ASX200 index for Australian shares, MSCI index for international shares, or a property index, with appropriate weightings for the various investment options.

- Hold additional capital to protect against the risks associated with the guarantee.

- Investigate the availability and cost of reinsurance support.

- Any other valid strategies described with a reasonable explanation.

**Marking guide:**

1 mark CJ for each point above with a reasonable explanation.

To a maximum of 3 marks CJ.

d)

i)

The purpose of a PDS is to comply with disclosure requirements required by legislation. [0.5 Mark]

The PDS sets out the significant features of a financial product including the risks, benefits and costs. [0.5 Mark]

**Marking guide:**

0.5 mark KU for each point above to a maximum of 1 mark KU.

ii) The PDS for an investment linked policy typically includes the following information:

- The basis by which the assets and liabilities are valued.
- Information about fees, expenses and charges.
- Information about any commission or other similar payments.
- The frequency that the unitholders can transact.
- If transaction costs accrue to the manager, the amount retained by the manager.
- If a manager retains any rounding adjustment in the unit pricing calculations, the amount retained by the fund manager.
- For funds that do not have a transaction factor – the reason for its absence and the method for allowing of any transactions with the fund.
- For funds that have a transaction factor, the purpose and method of calculation.
- Any other valid information included in a PDS.

**Marking guide:**

0.5 mark KU for each point described above.

To a maximum of 3 marks KU.

 

**QUESTION 4** **(23 Marks)**

**GottaSell Ltd. is a medium sized Australian life insurance company which sells a range of individual and group risk products. Although profit has been meeting expectations over the last 5 years, the levels of new business sales have been falling short of budgeted targets and the Board of GottaSell have been making achieving new business targets a higher priority over the last year.**

**You are the product actuary responsible for the pricing of individual and group insurance products.**

**The sales manager is relatively new to life insurance, having come from a successful role in running a chain of bookstores. He is struggling with some of the terminology used in the life insurance industry, in particular the vast array of features which seem to be available on certain products.**

**The sales manager has various questions he would like to ask you. Provide an appropriate response relating to each of his queries below.**

**a) For a buy back option on an individual term product:**

**i) Describe the benefits to a policyholder. (1 Mark)**

**ii) Describe the conditions that apply when exercising this option. (1 Mark)**

**b) Describe the benefit to a policyholder of a future insurability option on an individual term product. (1 Mark)**

**c) The sales manager also has various questions about continuation options, which he has heard are available on group insurance policies providing lump sum risk benefits.**

**i) Describe the benefit of a continuation option to a policyholder. (1 Mark)**

**ii) Describe why the risk of claim differs between a policyholder exercising a continuation option and a new policyholder joining the group scheme. Assume that both policyholders have the same sex, age and sum assured. (2 Marks)**

**iii) Describe how the cost of claims arising from a continuation option is built into the premium rates. (3 Marks)**

**An independent broker has approached the sales manager with a concern about a large group life policy he has with GottaSell. The group life policy in question:**

- **Has 25,000 members who are all white-collar employees.**
- **Has an annual premium of $10 million which is the biggest group scheme that GottaSell currently has.**
- **Offers life cover equal to 4 times an employee's salary (with cover per life capped at $800,000).**
- **Does not currently have an associated continuation option within the terms of the overall group policy.**
- **Does have a profit share arrangement with GottaSell.**
- **Is up for renewal (for a 3 year term) in 3 months' time. You may assume that $10 million is the annual premium GottaSell would charge for this policy in 3 months' time, assuming no change in the policy conditions described above.**

**The broker is a key broker for GottaSell, having placed a large amount of business over the past 12 months. His concern is the lack of a continuation option within the policy. He has told the sales manager that:**

- **Other group insurers offer continuation options on group policies of this size.**
- **Other brokers have approached the group with quotes for identical coverage as GottaSell for a premium of $9.5 million, but with the additional feature that continuation options are included (this has been confirmed by other information the sales manager has as well).**
- **Surely with such a large premium, and for a group of low-risk (white collar) employees, the additional cost of a continuation option would be minimal.**
- **His preference is to offer the group the renewed policy with GottaSell, but with continuation options added, for a total premium of $9.5 million.**

**d) Discuss the issues that arise from offering a continuation option in a group insurance policy. (4 Marks)**

**e) Discuss the issues you need to consider in relation to the presence of a profit share arrangement on the existing group policy, when comparing the existing reinsurance policy terms and conditions to what the broker has proposed. (4 Marks)**

**f) Describe the other issues, besides the continuation option and profit share arrangement, you would consider in assessing the broker's proposal. (6 Marks)**

**Solutions**

a)
i)

Buy back options allow the policyholder to "buy back" the death cover after a trauma or TPD claim has been paid (relevant for acceleration policies), without the need to undergo underwriting on the same terms that their initial life cover was issued on.

*[Note to markers: Students may also mention buy backs are also available for Trauma policies, allowing policyholders to take up Trauma cover for non-related conditions following a trauma claim].*

**Marking guide:**

1 mark KU for describing the buy back option above.

ii)

In order to exercise the buy back option, the following conditions need to be satisfied:

- The policyholder usually must survive a certain period following payment of the trauma or TPD claim before the buy back option becomes available; and

- The policyholder needs to exercise the option in a specified time frame (e.g. 30 days after acceleration claim payment) after the end of that survival period.

**Marking guide:**

0.5 mark KU for each condition described above to a maximum of 1 mark KU.

b)

Future insurability options provide that at certain specified dates or on the happening of certain specified events (e.g. marriage, birth of a child) an amount of further life insurance may be affected, without evidence of health, at the then current rates for the attained age.

**Marking guide:**

1 mark KU for describing the future insurability option above.

 

c)

i)

A continuation option allows a member of a group insurance scheme the option of continuing with a life insurance cover equivalent (or close to equivalent) to what they had under their group cover, when they leave the group, without the need to undergo underwriting. Conditions may apply in respect of the manner in which the life leaves the group insurance scheme (e.g. on voluntary departure only).

**Marking guide:**

1 mark KU for describing the continuation option above.

ii)

Reasons why the risk of claim differs between a policyholder exercising the continuation option and a new policyholder joining the group insurance scheme are:

- A new policy is underwritten and there will be a selection effect on claim rates, giving a relatively lower risk of claim in the first 1 or 2 years of the policy. (0.5 Mark)

- Whereas a policy exercising the continuation option will have a higher risk of claim because there will be no underwriting impact and there will be a relatively high degree of anti-selection by policyholders. (0.5 Mark)

- Anti-selection arises because the communication of benefits to members may be poor, so only those members aware of the need for cover will seek out and exercise the option, particularly if they have existing or suspected ill-health or ailments. (1 Mark)

- Any other valid reasons described with a reasonable explanation.

**Marking guide:**

1 mark SJ for each point above with a reasonable explanation.

To a maximum of 2 marks SJ.

iii)

The cost of claims arising from a continuation option is built into the premium rates as follows:

- The premium that is charged for the insurance cover resulting from the exercising of the continuation option is the same as other policyholders for the same attained age for the individual risk product that the policyholder continues into.
- The premium charged takes into account that a certain % of policyholders are expected to exercise the continuation option, and those that do will experience a particular assumed increase in the mortality rate.
- The cost of the continuation option is accounted for by a loading (i.e. additional charge) built into the group insurance premium.
- Any other valid points described with a reasonable explanation.

**Marking guide:**

1 mark SJ for each point above with a reasonable explanation.

To a maximum of 3 marks SJ.

d) The issues that arise from offering a continuation option in a group insurance policy are:

<u>The inclusion of the continuation option:</u>

- The continuation option does have a cost in terms of the higher mortality of those exercising their option to take an individual cove when leaving the group.
- And this cost should be investigated and accounted for within the parameters of the overall approach to pricing adopted (“meet the market” in this case, could be offset by altered profit share terms, etc).
- Pricing of the option could be sourced from consultants or reinsurers if the experience for this is not internal to GottaSell.
- Assumptions about the proportion of those exercising the option, and the change in mortality of those exercising needs to be factored in to the overall risk premium that should be levied on the group premium.
- Other valid points concerning the inclusion of the continuation option with a reasonable explanation.

1 mark CJ for each point described above with a reasonable explanation to a maximum of 2 marks CJ.

<u>The management of the continuation option:</u>

- The policy mainframe database for the individual policies needs to be able to identify individual policies which have arisen from continuation options versus those that have been individually sold.

- This is particularly important for the claims team as they determine at time of claim whether the claim is in line with agreed policy conditions, and then pursue reinsurance recoveries (in this case care would have to be taken to ensure this is processed with the correct reinsurer as it may differ to other products).

- And also for administration staff who deal with customer queries and renewal premiums.

- And also for actuarial staff for the purposes of experience investigations, etc.

- There would need to be a suitable existing individual life policy to be used for the continuation option, or at least one that can be developed at low cost.

- Taking an existing YRT policy and limiting the expiry age to say age 70 may be sufficient, for example.

- Other valid points concerning the management of the continuation option with a reasonable explanation.

1 mark CJ for each point described above with a reasonable explanation to a maximum of 2 marks CJ.

**Marking guide:**

Marks as specified above to a maximum of 4 marks CJ.

e)

The issues you need to consider in relation to the presence of the current profit share arrangement, when comparing the current reinsurance arrangement with what the broker has proposed are:

- It should be checked that the other reinsurers in the hunt for this group scheme are also offering a profit share with the same X and Y parameters used in the profit share formula [ X% (Y%P – C)] and over the same time frame.

- If they are, then the comparison with GottaSell’s policy is valid, if they are not, then that is a significant difference which needs to be highlighted to the broker and to the group.

- Need to demonstrate the value of profit share feature of the current reinsurance arrangement. Calculate the actual profit share over the history of the current reinsurance arrangement. Then show that the actual reinsurance premium paid has been less than the actual profit share paid.

- The presence of the profit share means GotaSell takes on more risks by accepting part of the losses and also gives away part of the profit to the reinsurer. Consideration could be given to removing the profit share feature as this could reduce reinsurance premiums depending on the level of the X% and Y% parameters in the current profit share formula.

- Rather than removing the profit share feature entirely, consider making changes. The margin for the profit share agreement in the reinsurance premium could be reduced as long as the X and Y parameters in the profit share formula are also amended appropriately in the new profit share arrangement.

- The presence of the profit share also means that the incorporation of a continuation option may mean a lower reinsurance premium is possible, for a more limited reduction in risk than otherwise would be the case.

- Any other valid points described with a reasonable explanation.

**Marking guide:**

1 mark CJ for each point above with a reasonable explanation.

To a maximum of 4 marks CJ.

f) Additional issues to consider when assessing the proposal are as follows:

<u>Issues around reinsurance support:</u>

- The group policy is a large policy and the insurer is medium size so it is likely that GottaSell has some reinsurance support on the existing group policy.

- Renewed terms for the group policy should take into account reinsurance terms for the new policy. Need to consider whether the net effect of lower gross premium minus reinsurance premium still makes the venture viable.

- Who will reinsure the continuation options – the group insurer, and if so on what terms – this should be built into overall renewed reinsurance terms for the group policy.

- Or would the existing reinsurer(s) reinsuring individual policies be a possibility – though this could be more administratively complex and on more expensive reinsurance rates than the group insurer.

- Other valid points concerning reinsurance support with a reasonable explanation.

1 mark CJ for each point described above with a reasonable explanation to a maximum of 2 marks CJ.

The experience of the particular group to date, and the overall group experience:

- The fact that the employees of the group are white collar workers does not necessarily mean that they have low mortality risk.
- And in any event their risk characteristics are captured by the existing premium anyway.
- The mortality experience of this scheme needs to be assessed.
- As well as the performance of the overall group business.
- As it may be that the pricing is quite conservative, in which case there could justifiably be leeway to lower the premium or take additional costs on board such as the continuation option feature.
- Or it may be that experience may have been very poor for either this group or for the group business overall, in which case carefully consideration needs to be made as to whether the risk associated with lowering the premium for the sake of retaining a large premium for its own sake is worth it.
- The expenses associated with the group, and the expectations of profit should be checked to see where the pricing basis stands in light of the opportunity to renew the large and significant scheme.
- Other valid points concerning the group experience with a reasonable explanation.

1 mark CJ for each point described above with a reasonable explanation to a maximum of 2 marks CJ.

The reduction in premium:

- A 5% reduction in premium may be seen as adverse for GottaSell, but on the other hand if it does not move to meet the competition, the policy is likely to be lost in which case the profit arising (on a marginal basis) from the $9.5 million of premium is lost.
- If the expected profit margins, the expected claims, the expected expenses and expected additional costs/risks from the continuation option all fit within the $9.5 million then there is little reason to not ‘meet the market’.
- It may have been the case that the $10 million was higher than it needed to be, for example due to the broker having priority access or an excellent relationship with the group and so competition was limited at the time of the last renewal, or due to other insurers not being in the group market until recently.
- Other valid points concerning the reduction in premium with a reasonable explanation.

1 mark CJ for each point described above with a reasonable explanation to a maximum of 2 marks CJ.

Consistency with other group policies:

- Need to find out the reasons why the continuation option has not been offered to this group life policy previously when it is a common market feature.

- Need to ask this broker if he has other group policies that will also ask for similar features, now that a precedent may be set.

- Other brokers who have existing (or potential) group policies may find out about the change and ask for similar treatment – GottaSell should be prepared in terms of having a position on this possibility.

- Other valid points concerning the consistency with group policies with a reasonable explanation.

1 mark CJ for each point described above with a reasonable explanation to a maximum of 2 marks CJ.

Broker commission changes:

- It is an option to enter talks with the broker about lower commission arrangements to assist with the impact of a lower premium.

- This could be in the form of a lower commission overall, or a change to his structure to pay more for individual policies but less for this group policy, as long as the increase on individual policies is justifiable.

- In that manner, the group policy could have a higher chance of renewal as well as the broker being rewarded more for individual new business.

- Other valid points concerning broker commission changes with a reasonable explanation.

1 mark CJ for each point above with a reasonable explanation to a maximum of 2 marks CJ.

Other issues:

- The broker is a key broker for GottaSell and the value of this cannot be underestimated, so given the size of the policy and his importance it is a factor to genuinely consider his proposal in detail.

- The priority areas of the Board and CEO suggest that doing whatever is reasonable in terms of risk/return tradeoff should be considered.

- Not only would the renewal of this policy ensure that 3 years of premium are in the pipeline, but also there would be additional income from employees that exercise their continuation option to take out individual cover with GottaSell.

- Other valid issues described with a reasonable explanation.

1 mark CJ for each point above with a reasonable explanation to a maximum of 2 marks CJ.

**Marking guide:**

Marks as specified above to an overall maximum of 6 marks CJ.

**QUESTION 5 (19 Marks)**

**MadeHeapsOfCash Ltd (MHOC) is a long established Australian life insurer, of over 80 years, that has a large book of very profitable endowment and whole of life insurance. MHOC has historically seen itself as a product innovator and as such has many variations of endowment and whole of life policies in force, including participating and non-participating, as well as single premium and regular premium paying policies MHOC has considered this innovation and variety necessary to stay ahead of the competition, and on average has released two new product variations per year.**

**It also sells a limited range of morbidity products (providing TPD and disability income benefits) as riders to the endowment and whole of life policies.**

**MHOC has a high level of spare capital and it has sold and continues to sell the majority of its business through a large and long serving agent-based sales force. The agency approach has served it well over many years and many of the agents have been with the company for more than 25 years.**

**However, over the past two years MHOC has seen its levels of sales drop off quite considerably and also its level of expenses as a ratio of in force premium has been increasing more than anticipated. Though MHOC has a strong capital base and is not too concerned at this stage about its ongoing viability, it has asked you, as a consulting actuary, to advise it on some areas of the business.**

**a) Discuss the possible reasons as to why the level of expenses may be increasing more than anticipated. (5 Marks)**

**b) MHOC is considering that a consolidation or rationalisation of many of its older products may be a sensible move. Describe some reasonable methods that could be adopted to encourage policyholders to move to another product. (5 Marks)**

**c) In order to boost sales, MHOC is considering the development of an annuity product. Describe the advantages of such an approach for MHOC. (4 Marks)**

**d) MHOC is also considering a more significant expansion of its morbidity products, including the move to sell them independently of the base endowment and whole of life products. That is, to sell them as a stand alone version rather than as a rider.**

**Describe the risks that MHOC could face with such an expansion. (5 Marks)**

 

**Solutions**

a)

Reasons for expenses to be increasing as a ratio of in force premium include:

- Maintenance of the large variety of products is likely to have a growing cost over time, which includes the costs of administration, communication with policyholders, and costs of documentation and retrieval of specific features of each product (SV basis, crediting rate, etc).
- Staff training and management attention.
- More specific costs such as investment requirements for different products.
- With sales levels falling, the maintenance of a large sales force has a cost which would be proportionally more than before, and perhaps MHOC does not have the ability to easily reduce that cost in line with sales levels.
- The ‘limited’ range of morbidity product may require a proportionally high degree of expert assistance such as underwriting and claims management.
- New product launches incur significant upfront development costs.
- Inflation rates (general and wage) may be higher than anticipated.
- Lapses may be increasing on the in force business, thereby decreasing the premium basis to spread the overall expenses.
- Costs of maintaining ageing IT systems for administration and underwriting.
- Other valid reasons described with a reasonable explanation.

**Marking guide:**

1 mark SJ for each point above with a reasonable explanation.

To an overall maximum of 5 marks SJ.

b)

Reasonable methods that could be adopted to encourage policyholders to move to another product include:

- Offer an attractive transfer value if they move to other products, so that the payment on surrender is higher than that on their existing product.

- The payment of an additional one off bonus once the policyholder moves to another product. This could be a cash bonus or a reversionary bonus.

- An offer of a higher sum insured for the first 5 years of the new policy.

- Waiver of premiums for a short time period after moving products.

- Sending out letters to policyholders informing them that other inforce products have more generous terms and conditions.

- Premium discounts on morbidity products.

- Offers of free or discounted memberships with gyms or small gifts upon moving products.

- Any other valid methods described with a reasonable explanation.

**Marking guide:**

1 mark SJ for each point above with a reasonable explanation.

To a maximum of 5 marks SJ.

c)

Advantages of developing an annuity product include:

- The market in Australia is currently relatively small – so there is scope for an insurer to gain a foothold in the market if the product features and pricing are appealing.

- At the current time this is only likely for an insurer that has high levels of capital to invest and MHOC satisfies this criterion.

- If sales are successful, then the increase in the size of the in force business could alleviate the trends in expenses (though could go the other way as well).

- It could provide elements of a natural hedge against risks of higher mortality on its whole of life business.

- It would engage the sales force in a new direction, perhaps focusing them on a similar demographic to whom they can relate well to and build successful business relationships.

- It could tie in nicely with the existing endowment policyholders – who may be wishing to have an avenue or product to invest the proceeds of their savings policy with.

- Any other valid advantages described with a reasonable explanation.

**Marking guide:**

1 mark SJ for each point above with a reasonable explanation.

To an overall maximum of 4 marks SJ.

d)

Risks with the expansion of morbidity products include:

Risk of cost increases:

- There would be a reasonably significant cost involved. [0.5 Mark]

  This includes the cost of:

  - Enhanced training for the sales force, policy administration team, underwriting team and claims management team, if morbidity products become more of a lead product. [0.5 Mark]

  - Reinsurance, which is likely to be required for the protection against large claims (particularly Disability Income) as well as specialist expertise. [0.5 Mark]

  - Specialist expertise, which as above may be provided via a reinsurer, but may also have to be contracted in or hired permanently. This is particularly in the area of product development, underwriting and claims management. [0.5 Mark]

  - Preparing and distributing separate promotional material. [0.5 Mark]

  - Any other examples of valid costs with a reasonable explanation. [0.5 Mark]

Other Risks:

- If MHOC is running into issues around complexity of policy and systems maintenance on existing products, a suite of new products may exacerbate this. [1 Mark]

- The cost of capital may rise as a higher return is demanded from products that are more risky than whole of life products. This may lead to lower profit margins than are desired, or at least lower than profit margins currently arising from the endowment and whole of life products. [1 Mark]

- The morbidity market is very competitive in Australia with many established players, which may mean lower premium rates need to be offered in order for the MHOC disability product to be competitive. This will lead to low profit margins. [1 Mark]

- Other valid risks raised with a reasonable explanation. [1 Mark]

**Marking guide:**

For the risk of increase in costs:

- 0.5 mark CJ for stating the increase in costs is a risk.
- 0.5 mark CJ for each example of a cost that may increase with a reasonable explanation to a maximum of 1.5 marks CJ.

To a maximum of 2 marks CJ.

For other risks:

- 1 mark SJ for each other risk described above with a reasonable explanation to a maximum of 3 marks CJ.

To a maximum of 5 marks CJ overall for part d).

**END OF PAPER**