INSTITUTE OF ACTUARIES OF INDIA

Subject CP1B – Actuarial Practice

(Paper B)

May 2024 Examination

INDICATIVE SOLUTION

Introduction

The indicative solution has been written by the Examiners with the aim of helping candidates. The solutions given are only indicative. It is realized that there could be other points as valid answers and examiner have given credit for any alternative approach or interpretation which they consider to be reasonable.

Solution 1:

i)

- The maximum age limit at which the option can be exercised can be set say as 60 years.
- The option can be exercised only during the specific time interval like on every 5 years of policy inception.
- The number of times the option can be exercised.
- Or it could be added on specific life events like getting married, having child etc.
- Or reduce the term of the option say initial 10 years of policy inception.
- Reduce the limit on the sum assured to which the option can be added say up to 50% of the original sum assured.
- The option may not be applicable to substandard lives on inception.
- Need to ensure proper underwriting of the policy at inception.
- The underwriting grid could be based on the maximum enhanced sum assured at the beginning of the policyholder where the option is chosen by the policyholder.
- Perform some risk based underwriting basis profile of the customer.
- example do not provide option even of the life is healthy but comes from area where lot of fraudulent claims have been reported in the past.
- Obtain reinsurance to include the optional benefit.
- The exclusions, if any, which apply for the initial benefit will also apply for the add on benefit.
- Restrict the amount of SA that can be written under the option at portfolio level and monitor the exposure continuously.

(1/2 mark each, Max 6)

ii) Demerits:

1. The policyholder may get overwhelmed with the complexity of the features/riders offered.
2. The sales process may become complex as it takes time to explain the riders in the plan.
3. The sales agent/advisors may also find it difficult to explain the features of the riders and may abandon the plan or stop pushing the riders leading to poor uptake.
4. The riders are mostly low in premium and therefore may not enhance the commission of the agent drastically.
5. Or they may try to push riders with high cost/premium to increase the commission or meet targets.
6. This could lead to mis-selling and complaints from the policy holders.
7. The riders may come with their own additional underwriting requirements which will lead to a hurdle at the point of sale.
8. This will increase the length of time taken to issue the plan.
9. Lead to poor customer experience while issuance.
10. May interfere with the issuance of the base plan itself, leading to poor sales for the term plan.
11. The riders can increase the operation complexity for the insurer like underwriting and claim management.
12. The insurer may not have expertise in claim/underwriting management for some of the complex riders offered like health riders etc.
13. Enhancing the expertise would require time and investment by the insurer.

14. The premium may increase substantially with the addition of riders for the policyholder.
15. Example CI rider with comprehensive coverage.
16. High administration and reporting complexity like reinsurance administration

Merits:

1. It may make sense to offer 1 or 2 riders which meets need to the customer.
2. This will also help the agent/advisor to show the depth of the expertise and build confidence in the mind of the customer, which may help with future sales.
3. It may be cheaper to attach a rider for the customer than to buy a separate plan providing the same features.
4. The rider, if opted may enhance the overall margin of the company from new business.
5. The riders may increase the marketability of the plan.
6. They could increase the new business premium for the insurer.
7. The riders may also be offered by the competitors as differentiators and hence demanded by the customer/distributor.

(1/2 mark each, Max 10)

iii) It is important to monitor the financial viability of the plan to:

1. To determine whether the plan as profitable on an expected basis
2. Adherence to minimum profitability criteria laid out in the pricing philosophy of the insurer
3. Requirement of the Board and the regulator to monitor the viability on continuous basis
4. If the plan is not financially viable then corrective actions can be taken for example repricing
5. To optimize/maximize the profitability margins of the plan(s).
6. To determine the contribution to the embedded value of the company
7. To see the additional capital requirement due to writing new business under the plan

(1/2 mark each, Max 3)

iv)

1. The premiums offered to the new policyholder will increase by 10%
2. The reinsurance premium paid will also be higher by 40%
3. The claim recoveries modelled from the reinsurer will not change as the mortality assumptions are not changed.
4. This will lead to a higher payout to the reinsurer; however, the reinsurance recoveries will remain unchanged.
5. Therefore, leading to reduction in the reinsurance credit (or increase in reinsurance related loss) as compared to earlier.
6. The fixed per policy expense will not change.
7. However, the premium related expenses both initial and renewal will increase.
8. Similarly, the absolute amount of commission will increase.
9. Claim expenses will remain unchanged since the number of claims is at same levels.
10. The reserves would increase as higher reinsurance premium needs to be provided.
11. The increase in the premium by 10% on average may not be able to offset the increase in the future outflows on account of increased reinsurer premium.

12. Therefore, the higher reserves will reduce initial profit.
13. But in later projection periods there will be release of the reserves to offset higher reinsurance premiums outgo.
14. The solvency margin is also expected to be reduced due to the increase in the reserves.
15. The cost of capital will increase.
16. Investment income: higher mainly due to the higher reserves.
17. The increase in premium is unlikely to offset the increase in the outflows, so, a reduction in profitability from the pricing model would be expected.
18. Tax on profits will reduce due the reduction in the profit.
19. The actual profit arising will depend on experience relative to pricing for example:
20. The increase in premium rates may reduce the price competitiveness of the product, impacting new business volume.
21. However, that will depend on whether other companies also experienced an increase in the reinsurer rates.
22. Some companies may decide to absorb the cost of the increase and therefore the premium may not change substantially from the current levels.
23. The volume sold will determine the sufficiency of cost allowances built in the plan.
24. The impact on the lapses. If the premium rates further increase in the future, then it is expected that a higher number of policyholders will hold on to the current plan.

(1/2 mark each, Max 7)

v)

1. The insurer will have to see the number and the volume of business written historically with more than suggested/new retention limit.
2. If the volume is historically low than it would expect to retain almost the entire risk
3. This may make sense if it expects that the increase in the premium by the reinsurer is not justified.
4. Or just want to protect the volatility in the P&L on account of very high value claims.
5. It may also need to check whether the target market will change in future as it will impact the claim experience.
6. Example if it is planning to sale through tied agency then the level of anti-selection risk and mortality experience is likely to differ as compared to past.
7. The suggestion will likely increase the profitability of the plan theoretically however it will depend on the emergence of actual mortality experience vis-à-vis pricing.
8. Need to see the impact on the overall mortality risk for the company and whether it is still within the risk appetite.
9. The retention policy needs to be modified and board approval may be required.
10. The regulatory restrictions on retentions, if any, need to be considered.
11. It will help to retain insurance premium within the country and therefore may be positively viewed by the regulatory
12. If the company is listed on stock exchange then potential Impact on share price and view of analyst needs to be considered.
13. It could also get quotations from other reinsurers to compare the reinsurer rates.
14. The increase in the retention limit will have implication on the capital requirement for the company forward.

15. As it will not be able to take credit for reinsurance in determination of the company solvency
16. It may also have to increase the margin for adverse deviations for valuation.
17. Therefore, the insurer will need to see the impact on the P&L and solvency because of increasing the retention limits.
18. It will also have to perform the sensitivity and scenario testing for mortality and the reinsurance retention parameter to gauge the impact on the key matrices under planning.
19. Depending on the volume of the business written it can have the following implications on capital management.
20. Constraint the ability to write new business volume across segments.
21. Reduced ability to pay dividends.
22. Capital injection in future to maintain healthy solvency.
23. Reduced ability for investing like in establishing new sales channels, acquisitions etc.
24. Need to discuss with the reinsurer whether the higher limit will be acceptable.
25. If the premium on the portfolio reinsured reduces substantially then it may not make business sense from the reinsurer to cover the business
26. The company could consider whether the experience of high sum assured policies might differ from smaller policies.
27. e.g. due to the policyholder being from a higher socio-economic group.
28. Then it may negotiate rates with the existing reinsurer
29. The reinsurer may be happy to take on business due to the high quality of lives it will cover.
30. The underwriting guidelines may be based on the reinsurance manual and since there is a substantial increase in the retention, the insurer can perform the underwriting as per its requirement.
31. By not going by fixed underwriting grid governed by reinsurance manual, it could design a risk-based grid for underwriting.
32. This could enhance customer experience and potentially increase the volume of business.
33. Also reduce the overall underwriting cost of the business
34. However, it will also lose technical support from the reinsurer like claims management as most of the claims will be retained.
35. The operation complexity will be reduced due to the lower number of policies being passed on to the reinsurer.
36. This will also lead to a reduction in the legal disputes with the reinsurer.
37. It must keep monitoring the experience and change the retention strategy as appropriate, for example by reducing the retention levels under surplus arrangement.
38. Use of analytics to have a control on the quality of business being written

(1/2 mark each, Max 14)

vi)

- Reinsurance administration at many companies has not kept pace with the increased sophistication of reinsurance.
- Complicated reinsurance treaties and solutions may be difficult to model in the old admin system.
- Therefore, they may continue to use manual processes for some treaties, which can be costly and prone to errors.

The errors will be in terms of:

- Missing the policies which are required to be reinsured.
- Reinsuring higher or lower sum assured
- Claims failed to be recovered by the reinsurer.
- Example litigation cases where the decisions are made against the insurer, after many years from the date of death.

This will have implication in the form of:

- Financial loss for the insurer
- Legal disputes with reinsurer
- Increased costs and time to resolve disputes.
- Scrutiny from board and regulator
- Allowance for risk will lead to an increase in reserves.
- Difficulty in getting reinsurance coverage for new business

– Difficulty in finding experienced personnel to perform reinsurance related tasks and administration.
– Limited ability to conduct the performance analyses of individual contracts and treaties for management information.
– Unable to provide management dashboard to access the performance on live basis across treaties, products etc.
– The limited ability to integrate with the finance reporting/payment tool and other relevant systems.
– Limited ability to provide automated disclosure reports like for regulator, public disclosure etc.
– Poor governance and frequent audit issues

(1/2 mark each, Max 6)

vii) Some of the areas where the AI can be used:

– **Improve efficiency:**

– AI could help to automate the process like issuance, pricing etc which could improve productivity, potentially leading to lower premium costs for consumers.
– It could use to detect the propensity to lapse in the existing block of policyholder so that more effort is spent to retain these set of customers leading to higher retention.
– Chatbot and other AI tools can guide customers through numerous queries without human intervention.
– They're also available 24/7, unlike many teams of actual people.
– AI-assisted risk assessment can help insurers better customize plans so that customers pay only for what they need.
– The improved efficiency and experience may also lead to higher take up of the insurance policies thereby increasing the volume.

- AI technologies can also be used for underwriting for example faced based scanning to detect health of the individual.
- **Detecting Fraud:**

- Using AI to filter out fraudulent claims would ensure the industry only pays out to those who deserve a settlement.
- Weeding out fraud will lead to better outcomes as it will translate to higher profitability and/or lower premiums.

- **Open up insurance to new groups:**

- Data analytics along with AI can open insurance for new groups which were deemed insurable previously.
- Example one can perform financial underwriting of business owners/shopkeeper's basis the transactional value generated through various payment apps.

- **Prevention:**

- The use of AI to advise policyholders could reduce claim ratios.

Example

- Smart home monitoring technologies installed in home of seniors can monitor the house/movement and can call an ambulance/care given if there is emergency like falling from bed etc. thereby reducing the claim ratios.
- Innovation of this kind promises to alter the underlying business model of insurance companies, such that they generate income not only from rectifying damage but preventing it from occurring.

(1/2 mark each, Max 8)
[54]

<u>Solution 2:</u>

i) The factors which need to be covered are:

- Taxation:
  - The tax payable on the income generated including any double taxation treaty with the investor home country.
  - Other taxes include good and services tax, income tax etc.

- Climate change: The island may be sinking which could lead to loss of the value of the investment.
- Diversification
  - The investment opportunity to tap into high end luxury tourist market at a secluded place on earth.
  - There is great rebound is tourist activity post covid and which may be expected to continue.
  - In covid times there was reasonable demand due to secluded nature of the place away from crowded cities.

  - It may help the insurer to diversify from the current asset classes as the correlation with certain other asset classes may be low.
- Risk and return
  - The opportunity costs as there may be other projects which can give better risk adjusted return.
  - The illiquidity aspect of the investment
  - The risk appetite of the insurer
  - The expertise in investing and managing such projects.
  - The financial projection of the investment and the return on the investment
  - Need to give regard to any sectorial limits imposed by the regulator.
  - The asset and liability matching as result of investing in the resort.
  - Whether such investments are allowed by the investor and the treatment for determination of solvency
  - The value of investments and any income will fluctuate (this may partly be the result of exchange rate fluctuations) and investors may not get back the full amount invested.
  - The size of the investment in respect to the fund

- Legal System
  - Whether the land is granted on freehold basis or lease and the terms of the lease are favourable to the investor
  - Example sublease rights, management rights and mortgage rights.
  - The strength of the legal system to protect the rights of the property owner

- Other Factors
  - The competition and the upcoming projects in the area which could impact the potential revenue stream.
  - The availability of the resources and personnel for resort management and operations
  - The transport infrastructure needs to be assessed: international airports and domestic airport and other transport and logistic facilities.
  - The energy infrastructure and grid to provide electricity to the distant island
  - The wealth and number of HNI people in Asia are growing at substantial rates leading to potential high demand for luxury travel.
  - The impact of potential geopolitical events which could impact the potential revenue.
  - Need to be aware of the various policies from governance point - like employment policies, pension policies, bankruptcy law etc
  - The ease with which the dividends and capital could be repatriated.

(1/2 mark each, Max 14)

ii) The main operating costs of the resort will include:

- Staff costs: This includes salaries, wages, benefits, and training expenses for all hotel staff, including front desk, housekeeping, restaurant, and maintenance staff.
- Accountancy fees: To hire an accountant to manage financial records, prepare tax returns etc
- Insurance costs: Insurance coverage to protect your property, guests, and employees from any potential risks and liabilities.
- Software licenses: Purchase of software licenses for property management systems, online booking platforms, and other essential tools.
- Banking fees: Banking fees associated with managing finances, such as transaction fees, wire transfer fees, and account maintenance fees.

- Utilities: This includes expenses for electricity, water, gas, and other utilities to run resort.
- Housekeeping supplies: Purchase cleaning supplies, linens, and other housekeeping essentials.
- Food and beverage costs: Budget for food and beverage costs, including ingredients, supplies, and labor.
- Marketing and advertising expenses: Cost on marketing and advertising efforts, such as creating a website, printing brochures, and running social media ads.
- Property maintenance: This includes expenses for regular maintenance and repairs of physical structure, as well as any necessary upgrades or renovations.
- Landscaping and outdoor amenities: This may include maintaining the exterior, such as gardens, pools, and other outdoor recreational areas.
- Taxes and licenses: Pay for various taxes and licenses required to operate, such as occupancy tax, business license, and liquor license.
- Security: To ensure the safety and security of guests and employees, need to invest in security measures such as cameras, alarms, and security personnel.
- Training and development: To maintain a high level of service and keep up with industry standards, need to provide ongoing training and development opportunities for staff.
- Administrative expenses: This includes expenses for office supplies, postage, and other administrative costs associated with running resort.

(1/2 mark each, Max 7)

iii) The primary objectives are:
(1) To protect value of surplus against changes in changes in asset values;
(2) To influence investment strategies to achieve financial objectives, through 'risk – reward' optimisation

(1 mark each, Max 2)

iv) The asset and liability related aspects are as below:

a) Life and health Insurance products

1. In a portfolio of life and health insurance contracts, due to underlying mortality and morbidity assumptions, claim sizes and the timing of cash flows can be predicted with reasonable accuracy.
2. Therefore, for ALM purposes are bonds are effective because they typically have a fixed term to maturity and yield regular payments.
3. As long as bonds do not default and the bond market has sufficient depth, it is possible to construct a bond portfolio that matches the expected cash flows of liabilities, or their duration through a duration matching strategy.
4. However, incidental deviations from mortality tables or systematic changes of mortality could lead to false predictions of life insurance liabilities.
5. Options embedded in life insurance contracts also lower the predictability of cash flow due to the policyholder's discretion in when to exercise,
6. for example, a surrender option or a paid-up option
7. On the asset side, asset classes other than bonds like the resort investment may be considered for an ALM.

8. Although their cash flows are not completely certain, a regular annual income stream the can serve as cash flows that approximately match liabilities.
9. For many life insurance contracts, duration is longer than the maturity of bonds in the market.
10. These investments therefore can help close a "duration gap" between assets and liabilities.
11. In this case, the inherent illiquidity of long-term investment fits well with illiquid liabilities and creates a sort of natural match.
12. Also, as the resort rates are expected to go up with inflation it may lead to better match to some of the expenses.
13. The investment may provide higher return over long term as compared to bonds.
14. It may lead to diversification of the invested assets
15. However, some of the options like surrender values and mass claims can lead to illiquidity issues for the insurer.
16. It will be difficult to sell the resort to other willing party in short span of time.
17. Also, any requirement from the Government of country Y will be required to be met like any minimum lock in period.
18. or sale allowed only to reputed and financially sound buyer.
19. Such liquidity must then be supported by investments in liquid assets, which reduces the capacity for investing in illiquid, long-term assets.
20. As the cashflows from resort will be in a different currency, it can be used to match any liability in that currency.
21. If currency risk needs to be hedged, then derivatives to be used. Derivative has their own residual risks.

(1/2 mark each, Max 7)

b) General Insurance products

- It may not be possible to find assets that exhibit risk dependencies with liabilities, either in the timing or claim size dimension.
- As GI product are less precise compared to life and health risks, the aim of ALM would mainly be to ensure short-term liquidity management.
- Therefore, GI products may not be backed by illiquid, long-term investment projects.
- Unless such investment may represent small portfolio of AUM for the general insurer
- Investment projects financed through investment funds/RIET, the shares of which can be easily sold, may be better aligned with the liability.

(1/2 mark each, Max 2)

v)

1. Elevated sea level causing
    a. coastal erosion, land loss, flooding, inundation
    b. impacting the viability of the properties built on the island.
2. Elevated ocean and lagoon temperatures
    a. leading to destruction of Coral bleaching, fish morbidity
    b. impacting the number of tourist attractions for visitors.
3. Changed ocean currents and/or wind patterns

   a. causing changed surfing conditions, dangerous swimming conditions
   b. higher number of incidents can lead to bad publicity
4. Elevated air temperatures
   a. Heat stress for humans and increase in diseases.
5. Increased rainfall variability and greater extremes leading to
   a. Drought, flooding leading to negative outcomes for property owners
6. Extreme high winds
   a. Outside activities curtailed and also structural damage to properties.

7. Tourists who may choose to visit other destinations where the impact of climate change is comparatively less leading to financial viability of the industry.
8. Tour operators may also not advice and market other luxury destination
9. In ability to get insurance both for the operators of resorts and tourists visiting the nation
10. Or increase in the price of insurance.
11. Inability to find workers due to job insecurity or increased risk/job hazard.
12. The cost of maintenance will increase as result of climate change.
13. The properties will become illiquid due to lack of demand.
14. The implication from the taxation angle - government may have to increase the taxes to protect decreasing revenue.

(1/2 mark each, Max 9)

vi)

1. The regulation will restrict the choice of stocks that can be held under the various investment funds.
2. Particularly if a small number of companies are eligible for the investment under the proposed regulation.
3. This may bid up price for certain stocks due to supply and demand mismatch.
4. If a business is paying shareholders too high a percentage of its profits, it may be a sign that management prefers not to reinvest in the company given the lack of upside.
5. This means that the allowed stocks are likely to be the ones which have limited upside potential in terms of an increase in the stock price.
6. If the company is growing than it is a matter of time before its start paying dividend and therefore the insurer would like to invest in these stocks
7. On the other side some companies may have been able to pay dividends due to taking on more risks, the investment department may not be comfortable investing in those companies.
8. A sudden recession or situation like a pandemic means that the companies do not pay dividends for a year or two which will further reduce the universe of investible stocks.
9. Some sectors of the market the high dividend may be a standard feature like FMCG companies.
10. However, they may not be the best match for the insurer liabilities/investment philosophy.
11. The regulation therefore is likely to reduce the overall return that the insurer can earn on the investment portfolio by restricting the choice of investments.
12. This may have impact on the overall returns and therefore profitability of the insurer.

(1/2 mark each, Max 5)

[46]

****