

Institute of Actuaries of India

Subject SP1 – Health and Care Principles

May 2023 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) Changes required in policy conditions:**

- Clearly indicate the coverage for both the lives.
- The adjudication events on occurrence of which the benefit amount is payable.
- The Terms & Conditions shall clearly indicate the circumstances under which both the lives are eligible to receive benefit amount simultaneously.
- Any conditions which are applicable differently to each life assured.
- The wording shall clearly state if the spouse starts either full-time or part-time employment after the policy and the benefit amount applicable in such case.

Benefit amount:

- Replacement ratios need to be mentioned clearly for both the lives separately.
- The replacement ratio for the working member may be linked to the salary.
- While for the non-working member, this may be linked to the cost of hiring a labour to do the housework.
- Typically, the member, who manages the house, is unlikely to receive any state benefit as they are not in full-time or part-time employment.
- The criteria for benefit payment on the second life who manages the house will have an impact on pricing.
- Too stringent criteria may reduce the premium, while detailed rules may add additional costs to implement.
- There could be restrictions on the benefit amount payable to the spouse who is a home maker.
- This is mainly to avoid anti-selection and over insurance.
- The benefit amount payable to non-working member need to be stated clearly whether it is level or increasing over time.
- If it is increasing, the rate of escalation shall not exceed the expected rates of earnings increase to avoid over-insurance.

Other conditions on benefit payment:**Waiting period:**

- The waiting period may be different for different lives to avoid anti selection. Need to be clearly mentioned.
- A high waiting period may not appeal to many prospective policyholders as premium will be paid with no entitlement to benefits.
- The waiting period shall also depend on the underwriting strategy and approach.
- If initial underwriting is proposed, then waiting period shall be aligned accordingly.

Deferred period:

- Deferred period is the initial period of sickness during which no benefit will be payable.
- Whether any different deferred period need to be offered to both the lives separately.
- Whether any split deferred period need to be offered to both the lives separately.

Similarly, any changes required to linked-claims period and expiry age or term need to be decided for the joint life.

Claim definitions:

- In case of working member, the occupation related incapacity definitions must be clearly defined.
- For example inability to perform own occupation, inability to perform own occupation and any other suited occupation based on the education, status or

training, inability to perform own occupation for any initial period followed by inability to perform any occupation thereafter.

- In case of non-working member, alternative incapacity criteria must be clearly stated.
- Such as Functional assessment tests, Activities of daily living, activities of daily working, personal capability assessment.

Rating factors:

- Rating factors for both the lives may not be uniform and different factors may need to be examined.

[1/2 mark for each point, **Max 11**]

ii)

Underwriting Approach:

- The underwriting approach mainly depends on the objective of underwriting, the process to be adopted and the assessment of information collected.
- Objective of underwriting: It helps in risk classification such that the experience is in line with the pricing assumptions.
- The major risk in this product is offering the product to non-working member. Hence the primary objective is to assess this member to reduce the anti-selection and offering appropriate coverage, commensurate with the need.
- The underwriting can be classified into:
 - Medical underwriting including family history
 - Financial underwriting and
 - Lifestyle underwriting
- The underwriting shall be consistent with similar products and competitors' approach.
- During the underwriting process, the insurer collects information of insured lives in terms of their occupation, habits, salary, age, family history and past medical history and tests if any.
- Such information must be used to assess the ability of insured lives to pay, reduce or mitigate scope for over insurance, any anti-selection and or moral hazard.
- May need to align with expectations of reinsurers if reinsurance is planned for the product.
- Based on the information available, the underwriting approach shall classify the risk into various categories like standard, not standard and unacceptable cases.
- The approach shall also be clearly defined for treatment of various risk categories identified by limiting the benefit or by loading additional premium or by applying any exclusions.
- Basic underwriting may be done through machine and any specialist underwriting may be done through experts. This can help in improving the speed of processing besides reducing overall underwriting costs.

[1/2 mark for each point, **Max 6**]

iii)

Reasons for reinsuring the proposed product:

- To transfer the risk arising in this product.
- Consideration basis the risk appetite, the level of free assets and the size of income protection portfolio.
- Helps in limiting the exposure of insurer.
- As the joint life Income Protection is a new product, reinsurance will help in reducing the volatility of claims experience until the portfolio is built and sufficient experience is gained by the Company.
- To manage any aggregation of claims due to a catastrophic event.
- Any regulatory provision like benefit on solvency requirement.
- Helps in smoothening of the results.
- For capital support to the insurer in the form of financial reinsurance.
- Reinsurer might help the insurer in terms of

- Underwriting
- Technical expertise
- Product design
- Policy wording
- Claims management
- Treatment of nonstandard lives

[1/2 mark for each point, **Max 5**]

[22 Marks]

Solution 2:

i) Reasons for insignificant proportion of business through Online marketing:

- There may be lack of incentive to customer to prefer online distribution in terms of simplicity, easy navigation, and/ or ease of understanding.
- Typically, the younger generation customers are digitally savvy and would be attracted to internet-based sales.
- As this product is offering coverage for different stages of cancer, the younger generation may find this product complex and not relevant to meet their needs.
- The prospective customer may be looking for individual interaction with distribution channel partner given the product complexity.
- The literature available on the company's website on this product may not be comprehensive.
- The policy conditions on this product may not have been explained properly.
- The product may not be appearing at an appropriate and prominent place on the Company's website.
- The company's website may be asking too much information to provide quote to the prospective customer.
- The product may have medical underwriting. The prospective customer may not be much inclined to approach medical examiner on their own.
- The website of the insurer may be slow and may be taking more time to navigate various aspects of this product.
- Appropriate advertisement may not be happening about the option of purchasing this product through the online Channel.
- To avoid any channel conflict, the marketing strategy may be focussed more on other channels compared to this channel.

[1/2 mark for each point, **Max 6**]

ii) Arriving at the rate of discount in premium to increase sales in volume and profitability of the product through this channel:

- The above proposal needs to consider the below aspects:
 - Improvement in sales volume
 - Savings in cost
 - Improvement in profitability
 - Improvement in demographics because of young target market
- (2)
- The rate of discount may be arrived at by carrying out profit testing using the proposed discount in premium.
 - The expected increase in volume of business and its impact on expenses, improvement in any other assumptions due to the nature of the portfolio, needs to be examined.
 - The new expense assumption, persistency rate may need to be revised in lieu of higher volume of business.
 - The improvement in incidence rate of cancer and movement between various stages of cancer may need to be revised in lieu of target market with suitable credibility factor.
 - The savings in cost need to consider the savings because of nil commission and any cost incurred for development of system.
 - Other assumptions like interest rate, tax rate may remain same as those used in existing premium calculation.

- Need to project cash flows with revised assumptions exclusively for this channel.
- The cash flows may be projected for various model points.
- The premium to be considered in cash flows shall be discounted premium.
- Need to choose suitable measures of profitability. However, it shall be consistent with existing profitability criteria used for this product.
- May use Present Value of Future Profits as a percent of premiums or Internal rate of return (IRR).
- The profit testing may be carried out with other channel business along with this channel to assess the profitability of the entire product portfolio.

(1/2 mark for each point)

- In addition to the base scenario, the company should also carry out scenario / stress testing of various discount rates in premium and its impact on the profitability under this channel using different plausible scenarios and compare that with the existing profit.

(2)

[Max 10]

iii)

Other ways of improving business under Online channel:

- The company may use other platforms to reach a higher base of prospective customers apart from company's website like:
 - Web Aggregator services
 - Social media
 - Digital advertisement
- Simplified quotation process may be adopted.
- Prominent display of this product on the company's website.
- After certain stage tele-calling or customer care executives may be allotted for sales closure.
- Assistance may be provided for undergoing any underwriting requirements.
- Apart from internet sales, mail shots and other modes of communication like WhatsApp may be introduced.

(1)

(1/2 mark for each point)

[Max 3]

[19 Marks]

Solution 3:

i)

Reviewing the experience of PMI business and reviewing the pricing basis:

- The policy data and claims data since launch of the product may be considered.
- However, if there is sufficient volume of data in the recent past one or two years such data may be considered if the experience is not distorted.

(1/2 mark for each point)

- The data may be grouped by:
 - Age
 - Gender
 - Sum Insured
 - Duration in force
 - Level of excess / Co-payment
 - Policy type
 - Distribution channel
 - Length of hospitalisation
 - Hospital band
 - Cashless Vs Reimbursement

(1/2 mark for each point, Max 2)

- The grouping shall ensure that adequate volume of data is there in each group so that the results would be credible.
- The burning cost of each group and overall burning cost may be arrived at.
- Trends in the experience also need to be examined especially in terms of medical inflation.
- While analysing the trends, consider any one-off events like COVID-19 that have influenced the results.
- The experience needs to be adjusted for future expected experience.

(1/2 mark for each point)

- The future expected experience shall consider:
 - Any likely changes in state benefits that may impact PMI
 - Any changes in the regulation or practices of health care service providers i.e., hospitals
 - Any changes in demographics like side effects of COVID-19
 - Any changes made by competitors in similar products
 - Any changes made in policy wordings

(1/2 mark for each point, Max 2)

- The burning cost arrived after adjusted for expected future experience needs to be compared with current basis.
- Similarly, the expected administrative/claims expenses need to be compared with current assumed expenses.
- Any change in the profitability criteria must be considered.
- Finally, whether premium needs to be revised or to be continued may be decided based on various factors like competition, regulatory approvals, business considerations for growth.

[1/2 mark for each point, **Max 8**]

ii) Importance of Renewal Rate assumption:

- The renewal rate assumption is important because:
 - The pre-existing illnesses to be covered after 4 years.
 - To amortise the initial expenses cost
- The risk profile of portfolio renewed up-to 4 years will be different from the portfolio which is less than 4 years old.
- The claims experience of portfolio beyond 4 years may be different and needs to be projected based on likely renewal rates.
- This experience must be adjusted while pricing the product at the inception.
- The experience of renewal rate vs. assumed needs to be reviewed regularly.
- The renewal rates are also important for deciding the criteria for No claim discount or No claim bonus rates and price those features.
- The amortisation of expenses over a period will make the price competitive.
- Further this amortisation plays an important role in future profitability forecasting.
- Hence in all these cases, the renewal rate is an important assumption.

[1/2 mark each, **Max 3**]

[11 Marks]

Solution 4:

i)

- 1) The allowance for unexpired risk will consist of an unearned premium reserve (UPR), and if necessary, an extra allowance called the additional unexpired risk reserve.
- 2) The two will cover the allowance for both future claims and associated expenses on the unexpired portion of cover.
- 3) An assumption as to how business is sold throughout the year will be needed to understand the seasonality patterns.
- 4) In the absence of any other information, it would be reasonable to assume that PMI business is sold evenly throughout the calendar year.
- 5) An assumption on the length of cover provided by the policies is also needed.

- 6) As the premiums are annual, it is likely that the cover is one year long.
- 7) An alternative, and more accurate approach, would be to use the *actual* unexpired period calculated on a policy-by-policy basis, ...
... in which case the last two assumptions would not be required.
- 8) Next, an assumption on the earnings of the premium, *i.e.* how the risk on the policy is spread over the year would be needed.
- 9) One option would be to assume that it is even over the year.
- 10) The UPR in this case would be a simple proportion of the written premium based on the number of days cover unexpired (either assumed or actual, as above) as at the calculation date.
- 11) However, it is perhaps better argued that there will be more claims during monsoon, in which case the risk is greater over those months.
- 12) The UPR can be adjusted to allow for this by using a monthly approach to the calculation, putting more risk weight on the winter months.
- 13) There is also an increase of risk with age, as health deteriorates with age and claims are more likely at the end of the policy year. However, over the space of one year, this variation in risk is not great and could be taken to be negligible.
- 14) The purpose of the reserving exercise would need to be considered.
- 15) For example, if it is for statutory purposes, a prudent method might be used, whereas for internal purposes a best estimate basis might be preferred.
- 16) An approximate allowance for prudence could be built in, for example, by taking a larger premium for the calculation (even the full written premium, so that when the proportion to calculate the UPR is taken, the result would be prudent).
- 17) For an ongoing Company, the UPR should be reduced for the uneven incidence of expenses over the year.
- 18) This will lower the reserve, the desirability of which depends again on the purpose of the calculation.
- 19) Finally, the reserve should be increased if necessary to allow for inadequate premiums, giving the additional unexpired risk reserve or premium deficiency reserve.
- 20) To assess this, the adequacy of past premiums should be analyzed.

[1/2 mark for each point, **Max 10**]

- ii) According to economic theory, the Net Present Value (NPV) cannot be improved, so if any other criterion is not consistent with it then the company should go with the NPV. (1)

Internal rate of return (IRR)

- 1) The IRR is the rate of return at which the discounted value of the cashflows is zero. (½)
- 2) All other things being equal, a company should prefer a contract that has a higher IRR. However, the IRR does not always align with the NPV. (½)
- 3) Calculating an IRR requires an iterative approach, whereas a NPV does not, and so the latter is simpler. (½)

NPV may be more reliable in some cases, for example:

- 1) If there is more than one change of sign in the stream of profits in the profit signature, the IRR will not usually be unique. (½)
- 2) The NPV can be related to useful indicators of the policy's worth to the company, in terms of sales effort or market share. There is no way to do this with the IRR. (½)
- 3) If a policy makes profits from the outset, then the IRR may not even exist. The NPV always exists, however,
 - The NPV can allow for the risks of the project by adjusting the risk discount rate and/or by including specific margins in the individual assumptions.
 - Only the second of these methods is possible using the IRR.

(2.5)

Discounted payback period (DPP)

- 1) The DPP is the policy duration at which the profits which have emerged so far have present value zero, ...
- 2) ... *ie* it is the time it takes for the company to recover its initial investment with interest at the risk discount rate.

- 3) A company with limited capital might prefer to sell contracts with as short a payback period as possible.
- 4) The DPP will not usually align with the NPV as it ignores cashflows after the DPP.
- 5) Only the NPV provides any information about the size of the profit flow. Hence neither of the other two methods can be used without considering the NPV as well.

**[Max 8]
[18 Marks]**

Solution 5:

i) The product benefit design philosophy:

A. Certainty:

- 1) The severity of the healthcare cost depends on the condition diagnosed and the treatment prescribed which is not known to the patient upfront.
- 2) The cost of treatment varies between different types of hospitals – secondary or tertiary and location.
- 3) The uncertainty of cost is exacerbated in the case of tertiary care as insured would not have experienced hospitalisation frequently in their lifetime to understand the variability in healthcare cost.
- 4) With these, insured is not able to decide adequate sum insured for him/herself and their dependents
- 5) In case of Health indemnity product with limited, sum insured there are chances that entire cost of treatment may not be covered specifically, where cost of treatment is high.
- 6) In case of a family floater policy, if one member has consumed full sum insured, other members in the family will remain uninsured till end of the policy year.
- 7) Indemnity Product with unlimited sum insured will reduce uncertainty for customers.
- 8) The cost of treatment in private hospitals has increased at levels much more than consumer price inflation over recent years. Therefore, a product that introduces certainty of coverage of full treatment cost would provide peace of mind and increase the propensity to generate demand for such a product.

B. Transparency:

Patients are often shocked when they receive their various medical bills and insured may have to bear certain portion of cost), due to any one or combinations of reasons mentioned below:

- 1) hospital cannot always communicate treatment cost upfront. This can either be due to the provider not wanting to disclose all charges upfront or due to the patient's condition and treatment not being completely known upfront.
- 2) During treatment, considering condition of patient or complications that may emerge, line of treatment might change, which will increase the overall cost.
- 3) A patient would typically receive separate bills from the hospital, surgeon, anaesthetist, radiologist and pathologist during pre-hospitalization, In-patient hospitalization and post- hospitalisation.

C. Complexity of medical scheme benefit design:

- 1) Insureds are not always aware of the various co-payments and deductibles they are subject to, and they often blame their insurance provider for not communicating these upfront.
- 2) Customers may be interested in this product where the surgery or medical procedure is not covered by their employer provided cover or their existing insurance products for example, cosmetic surgery.

- 3) Therefore, a product that can remove the “shock value” associated with medical bills and would provide peace of mind that entire treatment cost will be covered will increase the propensity to generate demand for such a product.

D. Simplicity:

- 1) No need to buy optional covers and riders as all types of medical treatment is covered without any deductible or co-payment and this will suffice all the insurance requirements.
- 2) It is easier for distributors to convince customers to purchase this product as compared to any other Health insurance products
- 3) Banks, NBFC and other lenders may provide funding option of premium to loan customers. This may solve liquidity problem of paying premium upfront.
- 4) Insurer may provide instalment premium payment options as expected premium is higher for this product
- 5) Claims adjudication process will be very simple as
 - a. Only standard exclusions are applicable,
 - b. No needed to check available sum-insured,
 - c. Calculation of amount payable after co-payment or deductible as applicable if any.
- 6) Hospital will entertain cashless as payment of invoices will be faster and without any deduction.

[10]

- ii) Nature of procedures that can be covered under this product: These must be balanced against the objective of providing comprehensive cover to customers and the need for simplicity.

- 1) Procedures that are commonly done by surgeons.
- 2) Procedures for which cost can be predicated with reasonable accuracy.
- 3) Procedures which have Length of stay in hospital with reasonable predictability.
- 4) Procedures which require lesser recovery period.
- 5) Procedures where the likelihood of a subsequent procedure is very low.
- 6) Single surgeries or common combinations of procedures that can be performed during the same admission.
- 7) Procedures for which the cost is somewhat age-agnostic.
- 8) Minimal need for specialised equipment or facilities.
- 9) Elective, non-emergency, and/or planned procedures that could lend itself to preauthorisation.
- 10) Procedures that are typically not covered by Health insurance products.

[1 mark for each point, **Max 10]**

- iii) Ways to reduce premium and how it will impact the benefit design philosophy: Limit the length of stay per hospitalization claim.

- 1) Limited Length of stay and fixed cost after that period. Say for knee replacement: Length of stay is 5 days and ₹ 50,000 for the balance period of hospitalization.
- 2) Sub limit for high-risk condition/ procedure: ₹ 15,00,000 for modern treatment procedure

Certainty: customer may feel cheated at time of claims if he /she was not explained properly at time of purchase of policy. Also, customer may not get full cost of treatment hence, purpose of buying unlimited sum insured policy will be defeated. This may create customer dissonance and increase grievances and reduce charm of the product.

- 3) Restrict treatment within preferred Network hospitals.
- 4) 100% cashless and no reimbursement.
- 5) Exclude few procedures in its entirety.

Simplicity: These will compromise simplicity as it will restrict choice of hospitals for insured. Customer has to follow-up for cashless approvals and may not get approvals in time. Network hospitals may not be in nearby location. Insurance company might have updated list of network hospitals after purchase of policy so insured has to check updated list before admission. these may have poorer customer experience and demand for such product may reduce.

- 6) Restrict to certain age groups say age up to 55 years.
- 7) Risk selection: do not offer to persons with sever chronic /co-morbid conditions, terminal illness etc.
- 8) launch only in certain locations. – do not offer in locations with higher possibilities of fraud, abuse and over-use
- 9) Reduce commission: Customers will be attracted to features and by reducing commission, premium will be more affordable to the customers.

This will create complexity in sales process and distributors may not agree to sell this product hence conversion rate might be lower.

- 10) Lower the profit requirement (which means the benefit design remains intact).
- 11) Lower the expenses if possible (which means the benefit design remains intact).
- 12) Sell at a loss and rely upon cross-subsidisation from other products.

This will create complexity for internal monitoring and inadequacy of premium will attract more capital for this product. It is not treating customers of other existing products fairly as they will end up funding portion of premium for this product. This may not be sustainable in the medium to long- term and the company may have to stop or reduce sale of this product.

[1 mark for each point, **Max 10]**

[30 Marks]
