

Institute of Actuaries of India

Subject SP1 – Health and Care Principles

July 2022 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)**

1. Key risk is the number of claims, specifically the number of hospitalizations claims where length of stay is longer than the deferred period. There is also claims risk associated with longer admissions.
2. There may be anti-selection if people join the affinity group to obtain cover. This could be affected by how the affinity groups market their membership.
3. This will also affect the mix of business. If the age/gender/health status profile of the membership differs from that expected, the flat rate may not be adequate. For example, if the pricing basis assumed that 75% of members will be less than the age of 45 years, if due to anti-selection, this assumption is not borne out resulting in higher than portfolio incidence rate assumed.
4. There is volume risk, if the affinity group membership expands too rapidly for the capital of the insurer to support the risk and also, if it grows too slowly for the insurer to have enough volume to cover the fixed expenses.
5. There is competition risk if the affinity groups choose to partner with other insurers offering more competitive products in terms of price and/or benefits.
6. There is a regulatory risk associated with how hospital cash products are sold and the nature of benefits they may offer.
7. There are internal risks associated with the operating expenses of the product, claims management and customer service.
8. There is reputational risk associated with the affinity groups and their ability to attract and retain membership and the aggregation risk that may be associated with this business.

[1 mark for each point, Maximum 7 Marks]

ii)

1. The health insurer can enter into a reinsurance agreement to transfer the claim-related risk. A quota share arrangement will share risk associated with the frequency of claims and enable the insurer to write more business.
2. An excess of loss agreement will share risk associated with longer admissions. Effective claims management can also assist in managing longer admissions.
3. The agreement with the affinity group can include requirements of minimum volume commitment, range of mix and limits for aggregation, for the flat rate to be valid. For example, the quote could include levels of variation in these measures which would trigger a review of the flat rate.
4. This may also include how the affinity groups market to their members. Sensitivity testing of the flat rate to variations in age/gender/health status profile to ensure that margins are adequate without compromising on competitiveness of the quote.
5. Internal controls to manage expenses and ensure that internal procedures are robust to manage fraud. May consider alternative sales channels to increase business volume from other sources (and diversify the relationship and reputational risks associated with the affinity groups).

[1 mark for each point, Maximum 5 Marks]

iii)

1. The best source of data will be internal data. The insurer will need to identify emergency admissions in the current data to assess proportion eligible for the higher benefit.
2. The insurer can use own admission data to price for the additional day of cover. But will need to use external data sources to assess the number of new admissions eligible for cover.
3. Use of own data should also need to take account of the type of policyholder more likely to opt for the new cover e.g. higher earning, more health risk, older.
4. The insurer could approach a reinsurer for assistance with this or use industry data if this is available. The pricing model needs to be adjusted for larger number of admissions (due to shorter deductible) and higher benefit amount (on emergency admissions) Need to ensure that expense loadings are adequate to cope with higher volumes and also the need to assess claims against the definition of an emergency.
5. Need to ensure sensitivity tests are done for all assumptions. And that competitive products are considered, and regulatory requirements are met.

[1 mark for each point, Maximum 4 Marks]

[16 Marks]**Solution 2: Minimising anti-selection risk:**

- 1) The timing of exercising the option may be restricted for example: The option might only be exercisable on certain life events (annual salary increase, marriage, divorce, or birth of a child) rather than at time of any renewal
 - a. May impose a limited number of exercise dates.
 - b. May impose a maximum age for the exercise of the option.
 - c. May impose a maximum duration for the exercise of the option (cover increases after 10 years may require underwriting).
 - d. Consider imposing a maximum initial sum assured for the option or maximum sum assured after increases.
 - e. May impose maximum policy term.
 - f. May need to restrict the option to lives accepted at standard terms.
 - g. 0.5 marks for any logical design suggestion [like minimum tenor, exclusions etc..]

(3)
- 2) The insurer can ensure that the option is priced prudently with margins while ensuring the pricing does not become so high that only the high risks take out the policy. (0.5)
- 3) Limit the sum insured increases if CPI is likely to fall below 10%. For example, the insurer might consider a minimum of CPI and the 10% to help keep the option affordable and avoid over-insurance. (1)
- 4) Some form of financial underwriting might be considered. (0.5)

[Max 4 Marks]**Solution 3:*****Policyholder***

- + The policyholder will receive a contribution to the cost of each claim. In addition, his/her total liability has a ceiling of ₹1,000 each year.
- + The fact that there is a contribution to each claim means that there is some incentive to seek treatment when it is needed. This will be advantageous for the long-term optical and dental health of the insured.
- Some policyholders may think that the annual excess amount is rather high, as they may have to pay up to ₹1,000 each year. They may prefer to pay a smaller fixed excess for each claim, of say ₹100
- A simple fixed excess may be easier to understand compared with the proposed structure.

Insurer

- + If the insured receives some benefit each year, no matter how small, they may be inclined to value the policy more and thus be more likely to renew it each year, which will improve overall profits for the insurer.
- A major disadvantage is that there is the possibility of many small claims each year, which will substantially increase the expenses of processing claims. (However, as each claim only involves a straightforward validation and a reimbursement, these costs should be controllable.) A fixed excess for each claim would reduce the number of claims and the associated fixed expenses.
- + The policyholder co-payment acts as an incentive for them to seek less expensive (or value for money) treatment, as they need to pay 25% of each claim (up to ₹1,000 per policy year), and so helps to keep claims costs down.
- + The encouragement to seek treatment when it is necessary may also be an advantage for the insurer, as it may reduce the long-term cost of claims.

[1 mark for each point, Maximum 5 marks]

Solution 4:

There may be no link between the levels of income protection and the long-term care benefits required. The level of income protection benefit depends on earnings, but the level of long-term care benefit depends on the difference between the cost of care and the amount the insured can afford to pay towards care costs.

This, and the fact that the IP protection benefits and the long term care benefits do not overlap, means that the policy with a rider would resemble two policies packaged together rather than an integrated product. There would be some saving in expenses, but few other savings. The combined policy would not be much cheaper than buying two separate policies.

LTCI has a good overlap with CI insurance, because many critical illnesses in old age would generate the need for long-term care.

LTCI and PMI complement one another. The LTC benefits are similar to PMI benefits, but relate to the provision of care for a condition rather than the provision of medical treatment.

LTCI and whole of life insurance have a good overlap because LTC benefits can be viewed as accelerated death benefits.

The IP + LTCI plans have a lower awareness and hence it is potentially unlikely to generate a large market. Adding LTCI to CI or life insurance (products that consumers are aware of) is likely to be more successful.

[1 mark for each point, Maximum 4 marks]

Solution 5:**i)**

1. An early lapse may cause financial loss, where insufficient premiums have been received to recover the initial expenses involved in underwriting the policy.
2. Anti-selective renewal and lapse by healthier lives will impact the overall portfolio.
3. The opportunity loss of future sales to an existing client.
4. Agents / intermediaries may lose the confidence to sell company's product.
5. May impact the brand image of the insurer

[1 mark for each point, Maximum 4]**ii)**

- 1) analyse own data, subdividing into relevant risk cells, regrouping as to maintain balance between homogeneity and credibility (0.5)
- 2) Possible subdivisions include
 - policy type (stand alone, claim acceleration)
 - different version of products (issued in different past years with different benefits, Terms & conditions)
 - sales channel
 - sales agent
 - policy term & total duration including renewals
 - premium size
 - sum insured
 - premium payment frequency (annual /quarterly/ monthly)
 - premium payment method (cheque / direct debit)
 - age
 - gender
 - smoker status
 - location (3)
- 3) Consider industry and reinsurers' experience, especially with regard to trends. (0.5)
- 4) Assess whether withdrawals have been in response to changes
 - Changes to premiums (where premiums are reviewable)
 - Changes in surrender values, if any (1.5)
- 5) Analyse changes in the external environment
 - commercial (is there a better or cheaper competitor's product)
 - is there reduction in overall market share/volume of business
 - policy holder's awareness -is there a belief that the policy is necessary
 - economic- is premium affordable
 - political -State benefits are offered as an alternative (2.5)

[Maximum 8]**iii)**

- 1) Change sales channel: The sales channel can have a direct effect on the renewal experience. (0.5)
- 2) Different channels employ different sales processes, which can include differences in terms of the selling approach, the extent to which customer needs and ability to pay are considered, and who initiates the sale. These factors can influence persistency,

- particularly early on, when people who have been “over-sold” their policies are most likely to cancel. (2)
- 3) Proper sales training is very important to increase persistency. (0.5)
 - 4) Appropriate commission levels for all products such that intermediaries are encouraged to recommend “the right policy for the customer”. (0.5)
 - 5) A survey of client understanding can serve the purpose of ensuring policyholder satisfaction with both the sales process and the product itself. (0.5)
 - 6) Results of this survey, performed as part of an after-sales service, will be fed back into the literature provided and into the approach by which products are explained and sold. (1)
 - 7) Provide a product which meets the needs of the consumer (0.5)
 - 8) The more artificial the needs creation through the sales process, the less likely the policyholder is to maintain the product itself, let alone purchase further covers from the insurer. The aim should be to meet needs at an affordable price. (1)
 - 9) The customer should receive information on a regular basis as promised. (0.5)
 - 10) Retention team may be formed to communicate with lapsing policyholders and recommend suitable alternatives. (0.5)
 - 11) Monitor renewal rates by relevant key parameters (0.5)
 - 12) Provide no claims discounts or loyalty discounts (0.5)
 - 13) Ensure servicing quality is meeting the customers’ requirements (0.5)
 - 14) Check the sourcing pattern. For CI policies, rider policies are likely to have lower renewal than standalone policies. (0.5)

[Maximum 9 marks]

[21 Marks]

Solution 6:

- i) The different assumptions made by the consultant for the purpose of calculation of embedded value are the following:

I. Claim inception & Termination rates

- The insurer is dominant in IP business in the market, hence consultant may rely on the insurer’s data for the purpose of deriving the best estimate assumption
- The weight placed on the insurer’s data would depend on the credibility of the information
- More weights shall be placed on the recent information to reflect any change in the experience
- The data needs to be analysed basis the different definitions of claim as provided in the terms & conditions

- Assumption shall be compared with external data i.e. Reinsurer/Market data to check whether the derived assumption captures the demographic profile of the insurer
- Any improvement or deterioration in future shall also be reflected in the assumption
- Any change in assumption from the previous exercise along with reason shall also be required

[0.5 mark for each point, Maximum 2 marks]

II. Expense

- Expense investigation result may be the starting point for setting the assumption
- Any non-recurring expense may be excluded from this analysis
- Company may prefer to use assumptions with a long term view as the best estimate for this exercise
- The best estimate assumption will be adjusted for inflation in future years
- Any overrun in the maintenance expense needs to be handled separately for this exercise

[0.5 mark for each point, Maximum 2 marks]

III. Commission

- Commission rates used for policy projection are based on the commission rates approved in the product
- The rates may vary by policy duration and distribution channel

[0.5 mark]

IV. Persistency rate

- The detailed lapse and surrender experience analysis shall be done for each distribution channel of the company
- The experience may differ across different policy duration and premium paying modes
- It is also necessary to check the credibility of data
- The assumption shall be based on its own experience in case credible data is available
- If credible data is not available, the assumption shall be adjusted basis the market information with allowance for the characteristics of the specific portfolio

[0.5 mark for each point, Maximum 2 marks]

V. Interest rate

- Interest rate used for projecting and discounting the cash flows shall be based on the risk free rates
- This shall be based on Zero coupon central government bond yields
- Interpolation/extrapolation may be used in case of non-availability of data at any duration
- The yield curve shall be based on some benchmark index
- The consultant may also be interested to check on pricing errors implied by the curve

[0.5 mark for each point, Maximum 2 marks]

VI. Inflation rate

- This shall reflect the company estimate of long term inflation of its various cost centres
- This shall be based on the historic cost inflation rates of the company with respect to different items e.g., Salary inflation, rent inflation etc.
- In case own data is not available, the information may be based on market data or some benchmark inflation index

[1 mark]

VII. Tax rate

- The prevailing tax rate shall be used for adjustment of shareholder's cash flow
[0.5 mark]
[Maximum 10 marks]

ii) Cost of capital approach for determining risk margin

- The cost of capital method involves projecting forward the future capital that the company is required to hold at the end of each projection period during the run off of the business
- The projected capital is the amount required to be held in excess of the projected liabilities at each period
- Calculation of projected capital may require complex projections, stochastic modelling, correlation matrices and or copulas
- This is also guided by the local regulatory basis, which may allow a simplified approach
- This may involve selecting a driver which has an approximately linear relationship with the required capital,
- The projected capital can then be approximated as a percentage of projected values of driver
- The projected capital amounts are then multiplied by a cost of capital rate
- This represents the frictional cost to the company of locking in this capital to earn a risk free rate rather than being able to invest it freely at a higher rate
- This is calculated as excess of weighted average cost of capital over the risk free rate
- The overall risk margin is then calculated at time 0 as the discounted value of capital charge at each time step in the projection period

[0.5 mark for each point, Maximum 5 marks]

iii) Advantages and Disadvantages of outsourcing

- This will help to manage many specialist activities, where insurer doesn't have technical expertise
- It will bring expense efficiency at a price cheaper than in-house costs
- This may reduce the risk to the insurer as it doesn't have its own expertise
- It will leave the insurer management to perform other tasks, where they will feel most competent, including the strategic decisions
- It may help to develop its own expertise over a time period
- This will help the insurer to perform certain activities within a specified time and meet regulatory requirements, if any
- Insurer may lose control over those activities, which are outsourced to a third party
- Vendors may exploit the insurer and ask for higher price over longer time frame
- This may increase the overall expense to the insurer in longer period
- This may bring redundancy to the system
- Insurer may find difficulty to adopt any change of regulatory requirement in future
- Insurer may need to have regular checks and inspections to guard against any reputational risks, business risks and security issues

[0.5 mark for each point, Maximum 5 marks]

iv) Following options are available to insurer to manage the risk from outsourcing

- Insurer shall perform proper due diligence to all the vendors before on boarding
- Insurer may categorize the vendors into different category on the basis of risk parameters and prefer to carry the services with low risk category

- It shall enter into a Service Level Agreement (SLA) after due diligence
- SLA shall cover the details of task to be carried by vendors along with the time require for each activities
- SLA shall also contain the penalties, in case of failure to meet the service standards
- It shall also contain the cancellation clause to get out of the outsourced contracts in case of poor quality or any regulatory changes
- Insurer may also diversify the risk by engaging different vendors for different activities
- Insurer may also carry regular audits of the outsourced activities to keep controls over the vendors
- It may prefer to keep tight control over all those activities which have direct impact on the financial of the insurer
- It may put a financial limit over which any activities shall be processed with approval of the insurer

[0.5 mark for each point, Maximum 5 marks]

v) Possible recommendations of the consultant

- Insurer must have a proper mechanism for data input to the IT system
- Data shall be validated through auto check mechanism at the input stage
- There shall be proper audit trail of any change management in the IT system
- Claims data shall also be captured accurately along with cause of claim / benefits paid during the claim period and other information required for the purpose of analysis of the portfolio
- Actuarial models used for projection shall be validated independently through spreadsheet models
- An independent review of all the policy and other data used in the calculation
- An independent review of experience investigations used for setting assumptions
- An independent review of any economic model used to determine cost of capital
- Any interpretation of legal / court matters shall be taken from a legal firm rather than placing its own opinion
- Consultant may also provide opinion on the quality of services delivered by the outsourced vendors along with scope of improvement

[0.5 mark for each point, Maximum 5 marks]

[30 Marks]

Solution 7:

i) Different asset class held by the insurer for ALM

- The benefit outgo is guaranteed in monetary terms as the contract provides a fixed lump sum on diagnosis of CI
- The expense outgo will increase every year with inflation, which may be linked to some benchmark index
- Asset class shall be held in the currency of operation of the insurer to avoid any currency mismatch risk
- Insurer should also consider its daily cash flow requirement for the management of the business
- Insurer should invest in short term assets such as cash and short dated bonds to meet the daily requirement
- The insurer should also invest in medium term / longer dated bonds to meet the liability outgo over the medium to long term
- A part of the investment will also be done in the Index linked bonds to meet the expense outgo

- In case Index linked bonds are not available, any other asset class that provide real return might be suitable e.g., properties, equities etc. subject to regulatory provisions
- In case of group CI product, majority of the assets will fall under cash and short dated bonds as the tenure of the liability will be small (1-3 years)
- It is also necessary to consider the level of free assets as this will provide opportunity to depart from the matching strategy and company may go for higher yielding assets like equity/property etc
- It is also necessary to consider the regulatory constraints around the investment in assets e.g. types of asset allowed in the regulation, restriction on any particular asset class etc.

[0.5 mark for each point, Maximum 5 marks]

ii) Underwriting approach for the management of risk

- The insurer may follow fully medical underwriting approach for the management of risk under this product [0.5]
- This will allow the insurer to get most information about the individual's medical risk and protect from the risk of anti selection. [0.5]
- This may consume additional time and hence may be unattractive for few applicants [0.5]
- It may not be necessary that every individual have to go through complete medical underwriting as it depends on the information provided in the proposal form, which covers question about the medical history, family history, occupation etc. [1]
- Company will normally provide a non-medical limit on the basis of Age and Sum assured of the individual and any policyholder that meets the criteria will not have to go through medical underwriting unless there is some adversity basis the assessment of the proposal form [1]
- However, for Group CI, Underwriting requirement also depends on the size of the group and there may be an additional requirement of "Active at Work" clause to ensure that the members are in good health at cover commencement date [1]
- Company may also require financial information to validate the evidence of earning, his premium paying capacity etc. [0.5]

[Maximum 5 marks]

iii) Factors to be considered for reinsurance arrangement of the product

- Size of the insurer-The insurer is operating in this space for a long time, having a large book of profitable business, hence less exposed to random fluctuation of claim experience. As a result, they may require less reinsurance. However, insurer may require excess of loss reinsurance arrangement to protect from accumulation of risks.
- Experience in the market-As the insurer has lots of experience in the market and have credible data to estimate its assumption for premium rates and liability calculation. Hence, the insurer has the capacity to retain a larger amount of risk with small amount ceding to the reinsurer.
- Amount of free assets- The insurer is writing profitable business for years and hence have larger amount of free assets available in the balance sheet to absorb any volatility in the claim experience. Hence, it may require reinsurance arrangement with higher retention limit.
- Size of the portfolio-The larger the portfolio, the more credible the past claims experience, which should better enable the insurer to predict future claims, and the

more diversified the business, which should lead to smoother results, both of which reduce the need for reinsurance.

- Predictability of business outcome-The insurer is operating in this segment for a longer time and hence have strong underwriting and claims management system in place. Hence, it has more predictable outcome and may require less reinsurance.

[1 mark for each point, Maximum 5 marks]

iv) Steps to minimize the risk of miss-selling

- Product shall be sold on the basis of need of the customer
- Product shall be priced fairly so that the customer may see a value in it
- Sales promises shall be consistent with terms & conditions of the product
- Insurer needs to keep adequate controls over the sales person to protect from churning of the portfolio
- There shall be provision for commission claw back in case of lapsation of the policy
- There shall be a fine balance between initial and ongoing remuneration of sales person
- Commission shall be loaded in such a way that it should not encourage product bias and over selling
- There shall be a proper mechanism to analyze the quality of sales force
- Any complaints shall be reviewed properly
- There shall be adequate training for all the sales and support staff before the launch of any product in the market
- The marketing literature shall be simple and easy to understand

[0.5 mark for each point, Maximum 5 marks]

[20 Marks]
