

Institute of Actuaries of India

Subject SP1 – Health and Care Principles

November 2020 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 sum assured under the Tiered benefits contracts are linked to the severity of the disease. The list of diseases covered under the contract are bucketed basis the severity and accordingly the sum assured payable are different and based on the financial distress corresponding to that bucket of diseases. [1]

This feature may enable the CI contract to meet the policyholder needs better. This is a closure fit to medical distress and financial needs - less severe conditions are likely to cause less medical distress and create smaller financial needs, hence a smaller benefit will probably be a better fit.

[1.5]

This is more comprehensive and fairer – benefits will be paid for less severe conditions that may not have been eligible for a claim under a standard CI contract.

[1.5]

[4]

ii)

a) Critical illness insurance has certain complexities:

- The product is subject to exclusions of diseases.
- Point of claim underwriting doesn't give confidence to the policyholder that the claim will be settled.
- Non-standard definitions of the diseases. The definitions may differ between insurers in the same market.

[2]

b) The additional complexities due to inflation protection feature are:

- In case of delay in claim reporting, whether the sum assured will increase during the period of delay
- Whether the increase in sum assured & premium is simple or compound in nature.
- In case of non-annual mode policy, will the premium remain same for the year, or will it change with the inflation factor every month.
- In case of revival of a lapsed policy, how will this factor be applied on past-unpaid premiums?

[2]

- iii) The suitability of offering the CI contracts with inflation protection feature depend on the following factors:

Customer Acceptability

- What the potential customer in the target market will find acceptable (i.e. effect on expected sales volume)
- Results of customer and seller research / feedback

Regulatory Requirements

- Any regulatory requirements / constraints on premium or sum assured increasing every year.

Needs of Distribution

- The distribution channels used and how much explanation of the consequences of increasing premium can be given
- Compensation to distribution channels for initiating sales
- Target market of the channel and complexity of products that could be sold

Price Competitiveness

- What competitors are offering (as the impact on customers is likely to be influenced by their expectations and by current market practice)
- Nature of benefits competition is offering providing inflation protection in any other form
- At what price they are offering

Profitability & Financial Requirement

- The financial requirement of the company – eg its level for free assets, new business strain, strategic plans and cost of capital
- The impact on overall profitability, allowing for sales volumes, persistency, expenses etc.
- The sensitivity of the insurers profit to change in the experiences

Company Culture – Risk Profile

- How much experience the company has in writing this type of business
- Management's attitude to risk
- Risk mitigation measures within the company
- Consistency with other products.

Administration Systems

- Limitations of admin system, eg it may be costly to adapt systems to handle inflation protection feature

Counterparty – Reinsurance / Underwriters

- The terms that reinsurers are offering

Benefits offered

- Features of the products, particularly inflation protection feature that may be difficult to price
- The uncertainty of claims experience
- The benefit will increase on annual frequency or monthly frequency
- The terms of the contracts i.e. simple or compound increase in premium and sum assured
- The extend of any other options or guaranteed benefits in the product

[10]

iv)

a) New Business Margin (NBM):

Under the CI plan with Inflation Protection feature, the premium and the sum assured increase every year by 5% with no additional premium loading for the same. The NBM for the Standard CI plan would be higher than the NBM of the CI plan with Inflation Protection feature. This is because; under a CI contract the risk increases with age whereas, the premium remains constant during the policy term. The premium charged in initial years compensate for the higher risk at later years. Under the Inflation

Protection feature, each year, the premium and sum assured both will increase by same percentage which is equivalent to buying an additional cover at later ages with the same per unit premium as charged for the whole duration.

In other words, the additional annual increase in the expected cost of claims each year, reflecting the increasing age of the policyholder, has to be allowed for by charging higher premium in early policy years to make up the shortfall from higher claim costs during later years. As there is no additional premium loading for this feature, the NBM is expected to fall.

[3]

b) New Business Strain:

The New Business Strain is the initial capital requirement to support writing the new contract. The main components of the New Business Strain are initial expenses, first year commission, increase in reserves, stamp duty etc. All else being constant, the increase in reserves in CI plan with Inflation Protection feature would be higher. This is because, with 5% increase in premium and sum assured, the present value of outgoes would be higher than the present value of inflows, resulting in higher New Business Strain.

[3]

v) Thinking about the needs of the customers, CI benefits serves a range of possible purposes:

- to provide care,
- to repay debts,
- to replace lost income,
- to meet ongoing costs etc.

[2]

These each suggest different index to link the benefits to, for example:

- Care – inflation of medical treatment cost
- Repay debts – no inflation (provided the debt is of fixed amount)
- Income replacement – earnings inflation
- Ongoing costs – price inflation.

[2]

[4]

[28 Marks]

Solution 2:

i) Following are the different purposes of calculating the *Embedded Value* of a health insurance company:

For published accounts or internal management accounts

- The calculation is likely to be carried out on a best estimate basis.
- Although, regulations may require the use of a more prudent basis.
- The purpose of calculating an EV is to give a more realistic value of the company

[1]

For estimating sale value

- Sale value may be based on realistic assumptions without margins.
- Purchase value may be based on cautious assumptions that include margins.
- The reason is, a purchaser is likely to offer a lower price for the company than the seller thinks it is worth. The final price agreed for the business will then depend on the relative bargaining

power of the buyer and seller.

[1]

For EV financing

- The reinsurer is likely to perform this calculation using prudent assumptions.
- Reason: EV financing involves the reinsurer making a loan to the insurer, which is repaid from future profits. If the future profits do not emerge as expected then the reinsurer will not be paid.

[1]

For determination of bonuses for staff and salesperson

- A realistic or perhaps slightly prudent basis.
- The insurer will not want to pay bonuses to its staff now for business that turns out to be unprofitable in the future. Therefore, a degree of prudence might be included in the basis to reduce the chance of this happening.

[1]

[4]

ii) An analysis of surplus is a breakdown of the surplus arising over a year into elements such as

- a. Actual mortality or morbidity being better than the valuation assumptions
- b. Actual expenses being lower than the valuation assumptions
- c. Actual withdrawal rates being better than the valuation assumptions
- d. Actual investment income being higher than the valuation assumptions
- e. The impact of new business being favorable.

[2]

iii)

a) Embedded value has two components:

1. Present value of future shareholder profits (PVFP)
2. Shareholder's share of net assets (Net Worth)

Impact on PVFP

If the assumptions used to calculate the supervisory reserves were exactly the same as those used to calculate the future best estimate cashflows in the EV calculation, then the profit emerging each year (and hence the PVFP) would be zero. This is because net cashflow, plus investment income on the reserves would equal the release of reserves in each year.

[2]

Impact on Net worth

Net worth is defined as the excess of assets held over those required to meet liabilities. By calculating the supervisory reserves using the best estimate basis, the liabilities value would be lower. This will result in increase in Net worth of the company.

[2]

Impact on overall Embedded Value

The overall impact on the company's EV depends on the relative sizes of the effects on PVFP and Net Worth.

If the discount rate used to determine the PVFP is the same as the investment return on the net assets, then the movements in the two component parts will have the same magnitude, resulting in an unchanged EV.

If the discount rate used to determine the PVFP is greater than the investment return assumption, then the net impact will be reduced EV.

[2]

[6]

b) The Surplus Arising during the year has following components:

- a. Impact on New Business strain
- b. Actual experience being better than the valuation assumptions

Impact on New Business strain

If using a realistic basis, the initial reserves would be much lower, perhaps even negative. The reserve should reflect the future profits expected from the business, which should more than offset the initial cost involved. The insurer should not therefore get any new business strain. However, the need to set aside solvency capital could still create new business strain if the capital required exceeded the expected future profits.

[3]

Actual experience being better than the valuation assumptions

If using realistic basis, the valuation assumption would be much lower. The release of margins as the existing book unwind during the year would be zero which otherwise would have been a positive amount. This will result in lower surplus arising during the year.

[3]

[6]

[18 Marks]

Solution 3:

i)

a) Income Protection plan

The need of the policyholder is a replacement of lost income. Hence, benefit should be in the form of regular income payments. Offering the commutation option is not appropriate in this product and allow for potential anti-selection risk.

The policyholder will never exercise the commutation option when they think they will be off work for a long time. However, if the policyholder expect to be back at work relatively quickly, then they might think taking a cash lump sum will offer better terms and try to select against the insurer.

[2]

b) Critical Illness plan

The need of the policyholder buying a CI plan is either to bear the hospitalization expenses, repay loans, replace the lost income or incur the ongoing expenses.

If the objective of buying the CI plan is to pay off a mortgage or incur the hospital cost, offering the regular income stream as a default option may not be that attractive from the policyholder perspective. Although, they will always have an option to take the commuted value which will add operational cost to the insurer.

Whereas if the objective of buying the contract is to replace lost income or incur the ongoing expenses, than offering income stream as a default option may seem beneficial to the policyholder.

[2]

ii) Advantages of Indemnity over Cash Plans

1. A range of illnesses and injuries are covered under Indemnity health insurance plans. Whereas, Cash plans have a predetermined list of diseases which are covered. Cash benefit plans do not provide any coverage for regular hospitalization expenses incurred by the policyholder. [1]
2. One of the attributes of indemnity plans is the ease of settlement through cashless hospital treatment. In the network hospitals of the insurer, policyholders can easily get access to cashless treatment by providing their insurance details. [1]
3. It might be easier and cheaper to obtain medical treatment under indemnity than from the proceeds of the non-indemnity based policy due to volume of business given to provider. [1]

Limitations of indemnity benefits over cash benefits

1. The most obvious limitation of indemnity plan is that it does not cover any non-medical expenses incurred by the patient. During the time of hospitalization, a patient and family experiences, various expenses related to food, travel, comfort, etc. These are not covered by regular health insurance plans. [1]
2. Indemnity plans require extensive documentation of all medical expenses. An insurer will compensate for medical expenses only when adequate proof is submitted. Policyholders must maintain all documents like medical bills, cash receipts, discharge summary, diagnostic reports, etc. Documentation is minimal in a cash benefit plans. [1]
3. Financing recuperation needs - Some cash benefit plans provide compensation for loan repayment, children's education and loss of monthly income. You can also boost these policies with some additional rider covers. [1]

[6]

[10 Marks]

Solution 4:

i)

- Access to virtual health community consisting of people at similar or advanced level of health-related activity, with an option to form groups.
- Daily Health alerts like medicine reminders.

- Recording of various health activities with the help of a wearable device (or Mobile App) or simply by:
 - Weight
 - Exercise
 - Water intake
 - Level of sleep
- Analysis of health parameters like BMI, level of sleep, water intake etc.
- Access to medical counselling to address your health concerns
- Discount on diagnostic tests followed up by appointment with the specialists
- Regular articles pertaining to overall wellness including areas such as food & water intake and other advisable healthy behavior.
- Alerts related to healthy activities such as marathon, Yoga camp etc.
- Access to videos to help with exercise and other activities health related activities such as guided exercise programs, yoga and meditation.
- Progressive access to benefit based on the level of overall health activity over a period.
- Discount on health equipment, gym membership, marathon registration, select restaurants etc.

[0.5 each, Max. 5]

ii)

- Anti-selection risk as diabetic patients with need for other medical treatment such as cardiovascular diseases might take this policy before going for the treatment.
- The morbidity experience under the product might be adverse than assumed in the pricing assumptions.
- This is likely to be a major risk since diabetes increases the risk of other critical diseases such as heart attack, kidney failure etc. significantly.
- Because of complications related to diabetes, the average cost of treatment is also likely to be higher due to factors such as insulin shots, diagnostic tests for regular monitoring etc.
- The company is likely to be exposed to counterparty risk as it is likely to have lesser control over the claims treatment and administration, which increases the risk that related counterparties would not live up-to their obligations under the contract.
- The company may not have sufficient relevant data to be able to ascertain the future health ailment incidences to price adequately for the product.
- Concentration risk as the product is only for the customers who are suffering from Type 2 diabetes and hence, there is a lack of diversification under this portfolio.
- For the existing Type II diabetes, the initial u/w and data recording is likely to be higher resulting into higher premium and lower sales volume.
- Greater data recording might lead to operational risk pertaining to the operations and IT systems.
- This might lead to need for greater margin resulting in high premium and finally in lower than expected sales volume.
- Lower than expected sales might result in high per policy expense loading making it difficult to achieve economies of scale.
- Conversely, greater than expected sales volume might result in higher than expected new business strain disturbing the business plan of the company.
- Since this product is likely to be more complicated than the regular PMI, the existing sales channels may not be prepared to sell the products.
- Any improper communication of the product conditions may result in customers not understanding the features of the product resulting in claims for conditions not covered under the product.
- This might result in greater claims repudiation and hence reputational risk for the company.

- Launch of similar product by other insurers might threaten the expected sales volume and profitability under the product.

[0.5 each, Max. 8]

iii)

- Company might launch the product on a pilot basis before scaling it to understand customer's reaction and claims experience under the product
- Alternatively, the company may sell it only through select channels for e.g. online channel where the quality of health-related disclosure is likely to be higher.
- Exclusion of pre-existing conditions other than diabetes and hypertension (lot of cases diabetes patients are likely to have hypertension as well) up-to a period of two year.
- Introduction of a waiting period of 6 months or more before covering hospitalization and treatment expenses.
- Introduction of a copay arrangement where the customer needs to pay a certain percentage of the claim. The co-pay percentage may be made to increase after the attainment of specific ages
- Exclusion of conditions that might increase the size or the frequency of claims such as substance and alcohol abuse, comfort accessories, congenital diseases, cosmetic treatment etc.
- Limit on the benefit available under the product such as overall sum assured limit, number of days of hospitalization, number of claims in a year.
- Non-guaranteed rates i.e. rate reviewable at the time of renewal of policy based on claims history.
- No claims discount to encourage the policyholders to avoid claiming for treatment of small amount.
- Registration into a wellness program as a pre-condition and incentives such as premium discounts based on the level of overall activity in the wellness program.
- The company may try to get more data on the level and incidence of type II diabetes to adequately price for the product. Such a data may be received from reinsurers, consultants, hospital records etc.
- Company may use reinsurance to transfer the risk as well as to get assistance on pricing, product design and underwriting.
- May reduce the counter party risk by dealing with counterparty with high credit rating and with high quality standards.
- Addition of conditions like quality review/audits in contracts with the counterparties related to the administration and delivery of health care services.

[0.5 each, Max. 6]

[19 Marks]

Solution 5:

i)

- The business volume sold from non-online channels may not be sufficient and significant volume of existing CI business may already be through online sales.
- This implies that company is effectively paying fixed cost related to maintenance of non-online channels without procuring much business from them.
- Claims experience from online channel may be favorable compared to non-online channels.
- High distribution cost associated with non-online channels along with poor claims experience makes them less attractive opportunity for the company.
- There may be frequent instances of complaints from policies sold through non-online medium due to fraud and mis-selling.

- High administrative cost associated with non-online channels due to training requirement of staff.
- Poor persistency experience from non-online channels.
- Customer segment targeted by non-online channel may not be profitable due to commission driven sales.
- Regulatory caps on commission payouts making it difficult to incentivize the sales force.

[0.5 each, Max. 4]

ii)

Merits

- Since the online sales are customer initiated, quality of disclosures would be higher enabling the company to perform better medical and financial underwriting and may result in favorable claims experience from this channel.
- Sales through online channel reduces the chances of fraud and mis-selling. Customers make a more informed choice when they buy online. They can compare features and prices of various products and insurers and decide the product best suited for their needs.
- This may result in better persistency experience of the online policies.
- This may also improve insurer's reputation in the market.
- Simplified sales process may reduce the administration expenses of the insurer. Since information from online sales is stored digitally, it reduces the need for paperwork, reducing the cost further.
- It will reduce the distribution cost as customers buy directly from the company and hence commission payouts are saved.
- Reduced expenses mean company may be able to price the products competitively which will result in higher sales and higher profits for the company.

Risks

- Selling its CI portfolio only through online channel may damage company's relationship with existing sales channels, resulting in higher lapses.
- The online channel in its existing state may not be able to handle the increase in sales and therefore, company may have to incur some additional expenses to enhance the capacity of this channel. Also, company may need to incur marketing cost to increase its online presence.
- There is a risk of lapse and re-entry from the existing CI portfolio if the products available through online channel are cheaper and relatively easier to buy.
- Targeting customer only through online channel exposes the company to concentration risk. Online sales may not have as wider reach as it may appeal more to the net-savvy customers.
- These customers may be at higher risk of sedentary lifestyle related ailments, which might impact the claims experience of the channel.
- Further, some of the complicated features of the product may be difficult to understand without assistance and customers may get confused with the products.
- If the volumes sold from online channel are lower than expected, company may not be able to recover expenses incurred on development of this channel.

[0.5 each, Max. 6]

[10 Marks]**Solution 6:**i) Risk Control

- To limit the exposure to risk under the product as the company does not have any experience in this product category.
- To avoid large single losses and ensure claims payments can be made without detrimental impact on business results and solvency.

- To achieve diversification by sharing of risk.
- To enable the company to write large risks with greater profit potential

Financial Assistance

- Reduction of new business strain as the margin for adverse deviation may be higher for the new product.
- A capital gearing arrangement to provide capital to the company.
- This may also help the company to meet the required level of statutory solvency.
- Smoothing of profits.

Technical Assistance

- Data on the level and incidence of the covered CI and the claims experience on the CI products where cover can be reinstated, from the existing and overseas market.
- Assistance with other aspects of the product launch such as:
 - Customer segmentation
 - Product design and pricing
 - Underwriting
 - Claims Management
 - Policy wordings
 - IT software (for automated underwriting)

[0.5 each, Max. 5]

ii)

- Since the company does not have any experience with this product, a quota share arrangement that cedes a specified percentage of each risk may be helpful.
- Quota share can help to reduce insurer's exposure to losses due to possible mispricing or uncertainties related to claims experience.
- The quota share percentage can be ascertained based on the comparison between the cost of reinsurance and cost of reserve for the retained portion of risk.
- In addition to above, the company may go for an excess of loss cover to shield itself from the risk of higher than expected overall loss.

[0.5 each, Max. 2]

iii)

- It may be part of the arrangement that insurance company shall recapture part of its business after a specified period from the date of start of treaty.
- The company's actual experience on its IP portfolio may be better than expected therefore, the insurance company might be looking to reduce the profit shared with the reinsurer.
- The insurance company may be getting lower rates from other reinsurer/s.
- The business volume might be enough for the insurer to reduce risk by diversification within the portfolio.
- The capital position of the company may have improved, and it may be in a position to withstand adverse experience.
- Insurance company may have gained enough data and technical expertise and may not need technical assistance from the reinsurance company.

- Change in the regulatory environment with less stringent risk capital requirements.
- Reduction in the credit rating of the reinsurer.
- The CFO's recommendations may not be completely correct as CFO may not be entirely aware of the terms and conditions related to recapture.

[0.5 each, Max. 4]

iv)

- The approach pertaining to the recapture might be defined in treaty.
- The reinsurance would like to receive an amount as recapture value that compensates it from loss of future expected profits to be earned under the portfolio.
- The key cash-flows in the projections will include:
 - reinsurance premium income + investment earnings + release of reinsurance reserves – reinsurance claims outgo - reinsurance expenses.
- The above calculations may be performed on a policy by policy basis. Grouping of model points can also be done depending on the volume and homogeneity of data.
- Expense assumptions will be based on reinsurer's expenses on the portfolio allowing for the expense inflation.
- Investment return assumption will be based on the reinsurer's experience and its investment strategy.
- Discount rate may be derived from the risk-free rate appropriately adjusted for the risk and profit margin of the reinsurer.
- The assumptions should allow for the changes in future expectations.
- Operating assumptions such as persistency and morbidity will be based on recent experience on the portfolio allowing for any change in future expectations.
- Tax rate may be based on the reinsurer's tax position.
- Sensitivity tests may be performed on the values to check the sensibility of results.

[0.5 each, Max. 4]

[15 Marks]
