Institute of Actuaries of India

Subject SA2 – Life Insurance

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:

You are an actuary working for a large life insurance company in India which has been in operations for last 20 years. The Company sells conventional participating savings products, term insurance products and immediate annuities through individual agents, bancassurance partners and its own website.

While conducting annual analysis of surplus on statutory basis for its existing business (excluding new business sourced during the current year), it is observed that the term insurance business has made surplus on account of expenses. However, on further distribution channel-wise analysis, it is observed that the term businesses sourced through individual agents have resulted in deficit on account of expenses.

i)

1. Based on the expense analysis, the company can understand the scope of bringing expense efficiency at the acquisition stage, during the maintenance of policy or at the claim stage.

   Improving the Direct acquisition cost
2. Rationalising the Commission and incentive schemes, to improve the business written under this portfolio. For e.g. sum assured band wise incentive.
3. Discouraging very small sum assured policies or giving lesser incentive to them, to make it cost effective
4. Have contests to improve productivity

   Improving other acquisition expenses (per policy/ premium related)
5. The Company should also understand the proportion of fixed cost (per policy) and variable cost (per premium) incurred for this channel.
6. In case the fixed expense is high then making an attempt to increase the sale of term business through this channel may help in bringing down the per policy cost.
7. Improve the process of NB processing and underwriting, to improve the cost efficiency;
8. Since the overall expense analysis on term plans is showing a surplus and only that sold through agency channel is showing a deficit; one can check if we can adopt any efficient process followed for other channels.
9. In case per premium expense is high then insurer can explore to sell higher sum assured policies or can increase the minimum sum assured limit for this channel so that there is increase in average premium size
10. Digitisation of onboarding process like electronic proposal form can help in reducing the acquisition cost.
11. However, there may be one time high cost for digitising these processes.
12. Or since the company is selling through company's website, it can explore how it can leverage on those digital processes even for agency channel to reduce the time and cost of acquisition.
13. The company can explore possibility of training individual agents through digital medium so that it saves on the cost.
14. The Company in consultation with its reinsurer can carry out the effectiveness of medical tests being carried out at underwriting stage
15. And explore if some tests can be dropped or replaced by some other tests so that the overall medical costs reduces without compromising the effectiveness of medical underwriting
16. The Company can also have a re-look at the medical underwriting grid and see if the same can be relaxed for lower age and / or lower sum assured cases without adversely affecting mortality experience.

   Improving maintenance expenses including claims expenses

17. Customer communication like renewal notice could be sent by email / mobile message so as to reduce the cost.
18. If the claim cost is higher, then it may imply that claim investigations are required under many policies.

19. Agents can be given better training how they can help customers submit all the appropriate documents in one go, to avoid delays and costs of claims processing.
20. In such cases, strengthening the underwriting at acquisition stage may help lessen the number of claim investigations and hence the cost.

[Max 10]

ii)

1. It is a general expectation of participating policyholders that the change in payouts over time is limited.
2. In fact, smoothing of total benefits over time is characteristic of participating funds, which may pool business both within and between generations and classes of policyholders.
3. The company is distributing surplus through reversionary bonuses and it enables companies to offer a smoothed level of returns.
4. The payment of terminal bonus along with reversionary bonuses allows the company to have a smooth reversionary bonuses and the terminal bonus can reflect the actual investment experience.
5. Company's past practice of smoothing would also affect the degree of smoothing.
6. Some companies set aside a smoothing reserve over a period of time, to help in managing the volatility in the surplus arising and declaration of the reversionary bonus rates.
7. The assets backing the participating fund would also impact the degree of smoothing.
8. In case equity investment is significant, then the investment return is expected to be volatile depending on the equity market.
9. In such case, it would be difficult to smooth the bonus rates unless the company has significant free assets.
10. However, the ability to reduce final bonus rates following market falls would be restricted by smoothing policy.
11. The size of free assets will decide the freedom the company has in smoothing bonus rates
12. Company's policy on smoothing would also decide the degree of smoothing.
13. Surplus arises out of various sources other than investment, like mortality, expense, lapses, etc. Depending on the company's bonus philosophy, it can decide which surpluses can be used to support reversionary bonuses and which can be used for either fund the TB or the free assets.
14. Other aspects could include the competition and marketability; based on how the other players in the market are declaring bonuses, this company will need to manage smoothing its bonus rates to keep its products marketable and competitive.

[Max 7]

iii)

1. Supportability of reversionary bonuses can be tested by comparing the gross premium valuation (GPV) of existing participating business with the realistic value of the assets backing these contracts.
2. The GPV of the existing participating business is calculated on best estimate (BE) assumptions.
3. BE assumptions should be adopted for mortality, investments, expenses, lapses, etc.
4. The company may not take lapses in their reserve calculation; however the AA may choose to take the BE for the lapses for the bonus supportability exercise
5. To start with, the current rate of reversionary bonus rate can be assumed for all future years for this purpose
6. An assumption would also have to be made for the target percentage of terminal bonuses.
7. The investment return assumption would be crucial and hence it would be worthwhile to carry out this calculation using different future investment scenarios.
8. Asset share would usually be used to compare to the liabilities.
9. Asset share is the accumulation of the premiums received plus investment income earned from the inception of the policies, less deductions due to benefit payments, commission, expenses, tax, a reasonable cost of capital and of guarantees, contribution from miscellaneous surplus (if considered appropriate) and transfers to shareholders.
10. Wherever possible, the Appointed Actuary should make use of actual historical data and cash flows to derive the historical asset share.

11. However, sometimes detailed historical records on actual experience may not be readily available (especially for policies which have been in-force for a very long time).
12. In such cases, and only in such cases, the Appointed Actuary may make use of proxies to the actual historical experience, such as best estimates where it is considered equitable to do so.
13. The Appointed Actuary would also need to consider the need to calculate investment returns on a marked to market basis and the extent to which smoothing may need to be applied to investment returns.
14. It is also necessary to consider the level of expenses allocated to asset shares are consistent with policyholders' reasonable expectations.
15. The Appointed Actuary must consider the consistency of expenses being charged to asset shares with what had been illustrated to customers.
16. AA shall ensure that derivation of asset shares are consistent with the appropriate tax rules prevailing.
17. The scenarios in which assets are greater than liabilities would indicate the current rates of reversionary bonuses are supportable.

[Max 8]

iv)

1. Assuming the company has been writing annuity business for last 20 years , it needs to be checked whether the Company has sufficient historical data which can help to identify the trend fully.
2. In case the company doesn't have sufficient data then the projection would have to be based on other set of data, may be on industry standard table or population data.
3. The projection based on population or other source may not be appropriate for the Company's annuity business.
4. And hence using the improvements based on population data may introduce basis risk.
5. Especially, because the pace of mortality improvements in many countries has been more rapid for the higher socio-economic group like annuitants.
6. Also, it has been observed that mortality improvements exhibit strong patterns by year of birth, cohorts.
7. The company would have to make adjustments to the projection based on population data to arrive at the company specific improvements.
8. Other option is to see if any industry standard table has been recently published. The mortality improvement in the industry table can be used subject to suitable adjustments to allow for basis difference and cohort effect.
9. But using industry standard table would be better than population experience, as it would be annuitant experience of the industry.
10. There may also be some delay in the experience; so some adjustments need to be made while projecting it.
11. These adjustments would depend on the view of the user and may have strong subjective elements.
12. With the onset of pandemic and the threat of any future variants; it has become a bit more uncertain to project mortality experience with any confidence.

13. Mortality improvement arise due to the interaction of a number of factors, such as changes in smoking habits, advancement of medical care, breakthrough in the treatment of cancer and other life threatening diseases, increases in inactive lifestyles, etc..

14. These interactions makes it very difficult to model cause specific mortality rates in a robust way.

[Max 7]

v)

1. Due to longevity risk, insurance company writing annuities is exposed to unknown annuity outgoes in future.
2. Hence to manage longevity risk, the objective would be to hedge uncertain annuity outgoes with a fixed level of outgo.

3. To do this, the insurance company can enter into a longevity swap arrangement with a bank /reinsurer.
4. The insurance company would pay a fixed series of payments agreed at the outset of the swap.
5. These fixed payments would reflect bank's / reinsurer's best estimate of the annuity cost plus a risk premium to take on this risk.
6. The payments made by insurance company are fixed as these are known at outset.
7. However, these payments would usually reduce over time as expected survivors in the annuity book decreases.
8. The bank / reinsurer would pay a floating series of payments linked to the actual annuity amounts paid.
9. However, this swap arrangement increases counterparty risk for both, insurance company as well as the bank / reinsurer, as these are mainly over the counter deals and not exchange traded swaps.
10. To reduce the counterparty risk, collateral mechanism can be followed.
11. Collateral can be calculated by taking into account the value of swap at any given date, i.e. the present value of the floating leg less the present value of fixed leg.
12. In case the value of swap is positive then this would indicate that the bank / reinsurer must post collateral and vice versa.
13. The collateral is calculated on a regular basis.
14. However, there is usually delay in new information on mortality rates so this can lead to collateral not actually capturing the real value of swap
15. and hence the counter-party exposure can still be significant
16. Thus a longevity swap arrangement has resulted in insurance companies indemnifying itself against its longevity risk. However, the insurance company is now exposed to counterparty risk and also has passed on a part of its expected profit to bank / reinsurer in exchange for certainty of annuity payments.

[Max 8]

vi) A life insurance policy shall clearly state:

i. the name and UIN allotted by the Authority for the product governing the policy, its terms and conditions; name, code number, contact details of the person involved in sales process;
ii. whether it is participating in profits or not,
iii. whether it is linked or non-linked;
iv. the manner of vesting or payment of profits such as cash bonus, deferred bonus, simple or compound reversionary bonus;
v. the benefits payable and the contingencies upon which these are payable and the other terms and conditions of the insurance contract;
vi. the name of Nominee (s), age of nominee(s) and their relationship and name of guardian in case of minor nominees.
vii. the details of the riders being attached to the main policy;
viii. the date of commencement of risk, the date of maturity and the date(s) on which survival benefits, if any, are payable;
ix. the premiums payable, periodicity of payment, grace period allowed for payment of the premium, the date of last instalment of premium, the implication of discontinuing the payment of an instalment(s) of premium and also the provisions of guaranteed surrender value;
x. the details of revival schemes provided for reviving a lapsed policy and requirements to be submitted for revival there under. The insurers shall use term "revival" which is in vogue for renewing a lapsed insurance policy.
xi. Name, Address, Date of birth and age of the insured as at the date of commencement of the policy.
xii. the policy conditions for conversion of the policy into paid up policy, surrender, foreclosure, non-forfeiture and discontinuance provisions in case of Linked Policies.
xiii. contingencies excluded from the scope of the cover, both in respect of the main policy and the riders;

xiv. the provisions for nomination & assignment,
xv. the provisions for loans on security of the policy and a statement that the rate of interest payable on such loan shall be as prescribed by the insurer at the time of taking the loan;
xvi. any special clauses, exclusions or conditions imposed on the policy;
xvii. the address, email id of the insurer to which all communications in respect of the policy shall be sent;
xviii. the notes to policyholder highlighting the significance of notifying timely the change of his/her address;
xix. details of insurer's Internal Grievance Redressal Mechanism along with address and contact details of Insurance Ombudsman within whose territorial jurisdiction the branch or office of the insurer or the residential address or place of residence of the policyholder is located;
xx. the list of documents that are normally required to be submitted by a claimant in case of a claim under the policy.

[Max 10]
[50 Marks]

Solution 2:

i)

- This age group doesn't have regular income, but own property. For this type of group, reverse mortgage products could be more suitable as it will enable to unlock equity held in property without the need to sell the property.
- Insurer can offer reverse mortgage products in two different forms: home reversions and lifetime mortgages.
- The size of the property and location will be an indicator to the socio-economic strata the customer belongs to.
- There can potentially be a very wide range of properties in value, so the group can be very diversified. We may need to consider some kind of segmenting within this group to create homogeneous sub categories.

Risks:
Related to Property valuation

- Fall in domestic property prices and property is worth less than the loan outstanding at the time of its sale.
- Lack of maintenance, the policy holders may lose interest in maintaining the property
- Also possibly due to old age, they may not be able to maintain it
- …. hence on reversal the property may lose value
- Property valuations can have a lot of subjectivity; it is prone to manipulation; hence you can't be sure of the accurate value of the property
- Due to the long term nature of the contract the property prices may increase or decrease over time, due to some development project in the locality or due to bad neighbourhood
- If the property value goes up significantly in the future (due to some development project); the customer may feel cheated and can lead to bad publicity
- Other risks of the property is transferred to the insurer. Like fire, damage due to natural calamity, etc. And the policyholder may not have specific interest in being regular with the property insurance premiums.

Mortality Risk

- Longevity risk, if it is combined with huge fall in property price.
- Longevity risk, where there is a no negative equity guarantee. For e.g., longer the policyholder lives the more likely it is that the guarantee will 'bite'.
- Risk of more than expected deaths when property prices are low and given situation where the value of loan to be repaid exceeds the value of the property.

Interest Rate risk

- Interest rate risk, where loan is at a fixed rate of interest guaranteed for the life, due to reduction in interest rates leading to better deals with other insurers.

Other Insurance risks

- Persistency risk when interest rates fall significantly, due to re-broking associated with higher commissions.
- Expense risk due to longer term and the need to revaluation.
- There could be unanticipated legal expenses, as it involves property; any disputes arising at a later stage

Reputational Risk

- Reputational risk due to possible perception of benefits the insurers could gain, when the prices of house go up due to poor understanding of early repayment charges.
- When the primary policyholder's die, there could be issues if the insurer has to evacuate the other family members in the property. Leading to a bad image for the company.
- There could be long legal battles from the heirs and this can be bad publicity for the company
- Relative significance of each risk depends on the type and conditions of the particular reverse mortgage product offered.

Mitigation Measures:

- The property valuation should be done with more than one valuer, in order to be sure of the property value
- Loan should be taking a certain lower percentage of the property value (say 80%) and this percentage should vary by locations; as some locations the property value can be quite volatile; here we can take a lower percentage say 60%
- Clearly explain to the policyholder's how the reverse mortgage will work and what exactly happens after their death. Communication should be clear
- Similarly the policy contracts should be well written to avoid any legal hassles later on.
- No objection certificate should be collected upfront from the legal heirs so that they do not take the insurer to court at a later date
- Regular valuation of the property should be done, to keep a control of the policy deficit, if any.
- Regular inspections to be made to the property to ensure insurance premiums are made and the property is maintained well.
- Some bonuses can be given in the annuity payments if the property is well maintained
- Annuity values could be designed in two parts to reflect one part as guaranteed minimum and the second to reflect the variable part considering the property values at regular intervals say every five years.
- Instead of fixed interest mortgage, design a floating rate mortgage; floating rate which is dependent on both interest rate changes and also maintenance of the property
- Floating rate of interest could be applied, to manage longevity risk due to interest rate changes,.
- Exit penalties or early repayment charges could be applied to manage persistency risk, but marketing pressures may limit the extent to which this can meet the losses.
- Mortality risk due to lower value of property value, consider only certain percentage of the property value initially and step up the value after certain period, say 5 years.
- Keep running campaigns to create awareness among senior citizens group to build the trust with them

[14]

ii) Customer profile:

- Age profile of the group is not provided in the question, but given the information that they are currently actively playing some sports at a high level, it can be assumed that the age group could be between 18 to 40.
- This group could be considered as healthy group compared to other insured population, due to sports occupation.
- They are likely to be having healthy lifestyle, regular fitness check-ups and proper diet, etc. So future mortality experience can also be expected to be good.
- However there could be sport related injuries and accidents which needs to be kept in mind
- High pressure to performance is common in sports people, there could be risk of mental health or stress related illness

- As there is no specific information provided about the type of sports occupation, the sports could be of any type from dangerous activities like racing, surfing, skydiving, boxing, mountaineering, skiing etc to other than dangerous sports like cricket, running etc.

Different types of products for this group:

- Sport person's earning can be for limited years; however they need cover for the longer term.
- Single premium or limited premium payment mode of premium products could be attractive.
- Level of cover can vary by sport person's income from endorsements and prize money.
- Also some sports has more money, (say like cricket) compared to others
- For sport people (other than risky sports events) we can offer term plans with some accidental, disability and critical illness covers with single or limited premium paying term.
- Insurer may not give term/disability cover for people risky sports else they have to be underwritten and priced differently keeping in mind the safety standards followed under that sports.
- It could be offered under group platform, so that insurer will have the option to revise the pricing based on the experience.
- Endowment products or whole life products could be offered as an investment vehicle with short premium payment term, but the value of such products would depend on the local investment markets and other possible obligations such as repayment of mortgages etc.
- Sports people's earnings would be for limited period; so deferred annuity products will help them get some income even after they stop being active in sports.
- During the deferment period, the risk coverage could be minimal to reduce risk taking and also enable accumulations to grow at faster rate.
- They can offer other types of annuity like variable annuity, income draw down type of plans. Giving the policyholder the flexibility to choose how much to withdraw from the corpus based on his/her other sources of income at later date
- offer flexibility in premium payment may be offered; as they are unlikely to get level income during their whole career
- Universal Life or unit linked plans may be able to meet this requirement. It can be a comprehensive product involving life cover and cash accumulation. Giving the flexibility to have a low flat premium with the option to top it up with higher investment, when the sports person has higher income.
- Insurer can offer women specific products covering specific women specific diseases under critical illness products. Family floater health plans could also be offered to the sports person and their family members.

[10]

iii) Underwriting considerations:

- Underwriting requirements for the above 60 group would be very different from that for the sports group
- Sports group
- Sporting activity itself can lead many types of injuries and diseases, insurer need to be cautious while underwriting this group.
- However with modern training facilities, sophisticated equipments, access to medical experts to sports people in higher level; the awareness of best practices in health care would be high
- some exclusions could be included for certain risky sports (if done without proper certification or safety)
- Since the product is considered in group platform, there may be a need to offer a free cover limit.
- The nature of sports and access to the sports person good facility can help decide the FCL
- As these people will be subject to regular fitness tests, medical underwriting requirement can be reduced or eliminated
- They may need financial underwriting as they may not have regular income source, unless the premiums would be paid by their sports association for all its players
- That would help us get a good share of players from a given sports group, making the pooling of risk better.
- Senior Citizens
- Critical Illness cover to senior citizens can be a risky proposition
- Pre-existing condition can be excluded, subject to local regulations

- Cover levels have to be limited
- Set some higher age limit (like 80 yrs) for entry or maximum age to provide cover
- Experience rating needs to be used to revise the pricing at the renewal
- Also added services may be offered to this group, for e.g., can be encouraged to join yoga groups/ health clubs/ etc and if done so, offer them better terms in pricing

Common to both groups

- Waiting periods and survival periods may need to tailored to different groups within the group to reflect the group diversity
- Proposal form should cover all the necessary questions that would cover the groups material risks involved and the current medical condition.
- Consider any country specific restrictions that are applicable while asking any type of information.

Pricing considerations:

- Premium to offer should reflect the risk undertaken for each of the group.
- If it is one year renewable group CI product, insurer would have the ability to review the rates based on the experience,
- It will give the insurer the confidence to price without much prudence
- Availability of appropriate data for this group and the possible divergence it would bring in w.r.t the existing experience in this product
- Pricing should be separated for different sports categories and different socio- economic group for senior citizens to keep the pricing stable
- Data elements that are required and source of such data like previous insurance, claims status, deaths, sickness rates, hospitalization rates, types of diseases that are general to this group
- Various Sports associations may be holding medical information about its players; it may be useful for the insurer to use the same
- Experience of senior citizens should be closely monitored and reviewed at every renewal, due to their higher propensity to claim for critical illness.
- Insurer can consult reinsurer for experience data and pricing
- Completeness and credibility of the data that is available.
- Competitors' products available and the general trends in the market. consider such products in the international market as well.
- If long term product to be offered option to regular review of the rates

[12]

iv)

- In general, insurer is expected to act honestly, fairly and professionally in accordance with the best interests of its policyholders and is specific to local jurisdiction.
- The illustrations should be clear and fair to enable customer to make an informed decision.
- They should clearly distinguish between guaranteed and non-guaranteed benefits and state the quantum of benefits that vary.
- Send to all policyholders, at least annually, statement containing number of units, fund value at the NAV, changes in the units from the previous statement.
- Guide the customers on the features, risk factors and charges
- Advertisements should contain adequate, accurate, explicit and updated information fairly, in a simple language depicting:
    - Factual picture of inherent risks involved
    - Risk factors associated with specific reference to fluctuations in investment returns and the possibility of increase in charges
    - Premium and funds are subject to certain charges
- Terminology used should be simple, concise and understandable to convey exact meaning, should avoid technical jargon.
- While reporting past performance of the funds, only include the results of the funds and be duly supported by related figures.
- Past performance, if reported, should contain:
    - Compounding annual returns for previous 5 calendar years,

- The insurer should not demonstrate a link between the past performance and the future. As this could be misleading

- In general, insurer should ensure that the communications that it makes with the policyholders should consider their ability to understand the products, the effectiveness and clarity of such communications in dealing with various products.
- The advertisements or material provided to the policyholders should spell out clear, fair and not misleading materials.
- As benefits dependent upon investment markets in unit linked products involving complex structures, insurer should categorically mention the reliance on market conditions any interest rate guarantees applicable.
- Provide for appropriate information, where relevant, about past performance and provide for necessary details on the possible performance of such products like impact of stock market movements on unit linked products in the past and the corresponding benefits.
- Provide for reasonable projection about various benefits given the uncertainty with the benefits.
- Charges levied to the fund or where such charges deplete the funds such charging structure should be explicitly communicated along with it reviewability, if applicable, during the term along with its impact on such funds.
- Such reference to be consistent with the past practice and communications to policyholders, and the practice of the whole industry
- Insurer should take utmost care while drafting contents of sales literature, advertisements, promotional material, illustrations, quotations, policy projections, unit statements, and policy documents to avoid future litigations and to set appropriate expectations.

[5]

v) There is no universally agreed definition of insurance risk.

Insurance risk covers mortality, withdrawal and expense risk. It primarily deals with uncertainty associated with the insured events vis-à-vis the expectations at the time of underwriting such as fluctuations in the timing, frequency and severity of insured events (timing and amount of claim settlements).

This possibly could be explained in terms of changes in mortality and persistency rates; possibility that guarantees impacting and adversely affecting financial soundness and its ability to meet its obligations;

… expense overruns relative to pricing or provisioning.

General Management of mortality risk:
Through underwriting, insurers attempt to evaluate the underlying risks and charge premium appropriate to the risk being taken on.

This helps the insurer to allow risks appropriately as factored in the pricing with an expectation that the experience doesn't vary from that allowed for in the pricing basis.

Another tool could be to have appropriate reinsurance arrangements. With suitable arrangements, it has the potential to limit the impact of adverse experience.

General management of withdrawal risk:

This is generally allowed for during the designing products so that the benefit on withdrawal is at most equal to the asset share.

However, during early durations generally the asset share is negative and hence not possible to achieve.

This is also heavily dependent on the ability of the sales force in providing for need based solutions to its customers, which would in turn limit early withdrawals. Hence, insurers need to have robust system of ensuring sales practices are appropriate to its business philosophy.

General management of expense risk:

This primarily deals with the efficient management of the entire company. There should continually monitor processes and look for ways to keep them as efficient as possible.

Insurer should aim at having appropriate controls/authorizations in place for various expenditure outgo.

Third party outsourcing of certain areas could limit uncertainty in the expenditure, but management of the third party and its services would still be with the insurer.

General management of insurance risk:

Systems and controls required for management of insurance risk will generally vary with the scale, nature and complexity of the insurer's activities.

In general, based on the business plan, insurers devise appropriate monitoring of various activities compared to such business plan for accepting new insurance risk and managing its existing insurance risk.

Insurer should have a documented policy for insurance risk; determining its risk appetite; measure, monitor and control that risk.

The policy should include the classes and types of risk it will accept; limits on the amount of business that can be written; how to manage expense levels associated with its business; framework to exercise discretion; approach to use reinsurance; managing persistency risk and analysis of risks.

Insurance risk is closely linked to solvency monitoring, capital management and financial reporting and hence include frequent information on its insurance risks and their impact on solvency and profitability to management.

[9]

[50 Marks]

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