Institute of Actuaries of India

ST1 – Health and Care Insurance

November 2013 Examinations

INDICATIVE SOLUTIONS

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. Anti-selection is the result of a member having advanced knowledge of a potential claim arising out of the chosen optional benefits and hence choosing benefits that are financially in his/her best interest.

(1 Mark)

ii. The risk of anti-selection can be allowed as follows:

- Load less on less risky option or load that completely in base cover, so that members find these options more attractive to opt ;
- Load the more risky option higher to drive members to the lesser risky options;
- Spread the cost of anti-selection equally over all options;
- Do not load any price for the anti selection risk but control that risk through waiting period

(2 Marks)

iii. The company will consider this unexpired risk in two different ways:

- A retrospective approach: how much of the premiums that were charged should we be holding in respect of the unexpired risk? This will give us the: Unearned premium reserve (UPR) – the balance of premiums received in respect of periods of insurance not yet expired.

- A prospective approach: how much is needed now to cover the expected claims and expenses from the unexpired risk? This will give us the: Unexpired risk reserve (URR) reserve in respect of the above unexpired insurance premium where it is felt that the premium basis is inadequate.

(2 Marks)
[Total Marks-5]

Solution 2 :

i. For private medical insurance, there are several possible approaches to underwriting:

- Full medical underwriting – proposer is medically underwritten at the time of application and information on medical history is gathered.
  The applicant is usually accepted at standard premium terms but the policy is endorsed so that any pre-existing conditions are specifically excluded.

- Moratorium underwriting – Instead of undertaking medical underwriting at the time of application, the insurer states that it will not cover any medical conditions that existed during a pre-specified period prior to the policy commencing. This period is usually between two and five years.

  It will later cover these conditions if no treatment, symptoms or advice takes place on those conditions for a period of, typically, two consecutive years after taking out the policy. The insurer is, however, on immediate risk for all other conditions.

- Medical History Disregarded (MHD) – Here, the individual's proposal to effect insurance will be underwritten without regard to that individual's past medical history, ie there are no exclusions for pre-existing medical conditions.
  MHD is more likely to apply on group PMI schemes than on individual policies.

(4 Marks)

ii. Following challenges:

- It is open to misunderstanding and client gets the impression that their pre – existing conditions will automatically cover after 2 years.
- Poor knowledge of the agents / sales force for this type of product or underwriting approach
- High degree of mis-selling to customers expected
- General mind set of doctors to help patients and under all circumstances, so high risk for insurers
- Poor availability of medical records and medical history, so difficult to assess and price the risk.

(1 mark for each point up to a max of 3 points. Any additional points may also be considered).

(3 Marks)

[Total Marks-7]

Solution 3 :

i. A female applicant for a long term care plan who has high diabetes.

- Decline if diabetes level is above max limit of company's underwriting manual
- Take reinsurer's opinion and pass on the maximum risk to the reinsurer
- If risk is not to be declined, charge adequately high premium
- Exclude claim directly emanating due to diabetic problem. However difficult to give specific exclusion as diabetes can be cause for many illness

(2 Marks)

ii. An applicant for income protection plan working as a security guard to a politician.

- Not a so significant risk, so decline is likely to be too extreme
- If occupation is considered to be risky, extra premium can be charged. However difficult to get much of data from past experience hence need to take opinion of reinsurer.
- Can be accepted at standard rate. However may apply some exclusion for example any claim arising due to an act of terrorism, rioting etc can be excluded.

(2 Marks)

iii. A young energetic applicant applying for critical illness plan who is very fond of rock climbing and mountaineering.

- The concern here is accident risk, so unlikely to be significant for CI cover.
- Could exclude TPD cover or change definition of TPD cover if that includes TPD due to an accident as well.
- Can apply exclusion for the claim arising due to such adventurous activities.
- Insurer can charge extra premium but cannot decline the cover

(2 Marks)

[Total Marks-6]

Solution 4 :

i. In general reserve has following components:

- Reserves for in-force policies
- Claims reserves (including IBNR)
- Unearned premium reserve (UPR)
- unexpired risk reserve (URR)
- outstanding claims reserve
- incurred but not reported claims reserve (IBNR)
- incurred but not enough reported claims reserve (IBNER)
- Equalisation or catastrophe reserve
- Claims in transit reserve

Qualitative factors to be taken into account to while estimating claims amount by case to case method include the following:

- Procedure type - this will indicate the cost of the procedure itself and the likely in-patient duration for accommodation costs
- Hospital (medical centre) to be used
- Name of surgeon, consultant or other medical principal
- Policy coverage (full indemnity, excess, limits, recuperation benefit etc)
- Current levels of medical inflation.

(4 Marks)

ii. Adjustment in claims data to improve the reliability of the development factors –

Adjustments in data that might improve the reliability of development factors without being unduly biased and can include:

- Simple averaging
- Geometric means
- Remove outliers claims
- Weighted averaging

(1 Mark)

iii.

Main assumption is that past experience is representative of future. However reasons that this may not hold true and may include:

- Change in benefits
- Change in claim reporting process
- Change in TPA's and claims processing philosophy
- Change in backlog levels/processing times

- Further there is a need to determine how much smoothing or adjustments to the completion factors are appropriate.

- Last, big issue is credibility in recent months where completion is low and paid-to date is volatile. There may be a need to use some other methods to replace recent month's volatile figures.

(3 Marks)
[Total Marks-8]

Solution 5 :

i. The term "facultative" applied to the ceding company's part of the agreement, which means ceding company is free to place the risk with any reinsurer which provides the best value to the company as per its risk management strategy.

Similarly, so far as the reinsurer is concerned, facultative means that reinsurer has no obligation to accept the risk and hence is free to accept or reject the risk as per its own risk management policy.

Advantages

- The main advantage of facultative reinsurance is the flexibility that both parties have within the process. Both of them can decide without any obligation to what suits best to their risk management strategy.

Disadvantage

- It is a time-consuming and costly exercise to place facultative risk
- There is no certainty that the required cover will be available when needed
- Even if cover is available, the price and terms may be unacceptable
- The primary insurer may be unable to accept a large risk until it has been able to find the required reinsurance cover.
- This means the insurer cannot accept business automatically when it is offered, and consequently its standing in the market may be reduced.

(5 Marks)

ii. Calculate reinsurance sum insured for XYZ.

No of policies	Annual benefit	75% quota share	Retention	Sum ceded per benefit	Total sum ceded
4,500	50,000	37,500	12,500	37,500	168,750,000
400	150,000	112,500	37,500	112,500	45,000,000
100	200,000	150,000	50,000	150,000	15,000,000
5,000					228,750,000

The reinsurance sum insured is Rs. 228,750,000

(2 Marks)

iii. Suitable re-insurance arrangement for the income protection portfolio :

- Since the insurer has most of the benefits below 75,000 it should choose quota share reinsurance from XYZ.
- Reinsurance arrangement offered by XYZ Company can manage small as well as large risks.
- It is simple to administer and reduce the required solvency requirement.
- If the company has enough free surplus and don't want to pass on risk to reinsurer then they may decide to go with ABC as it would result in higher retention by the insurer.

(2 Marks)
[Total Marks-9]

Solution 6 :

i. This term is generally used to describe companies particularly banks who offer financial services that encompass both banking and assurance operations.

The banks can distribute insurance product as a tied corporate agent tied up with one insurer only or work as broker and distribute products of more than one insurer.

A major objective is to broaden the distribution reach and cross sell the products of one operation to the customers of the other.

(2 Marks)

ii. This channel gives access to the "existing" customer base of the banks with whom the company (bank) already has an established relationship and that can be accessed through the bank's branches and hence results in tapping new customer base and increased sales.

The bank's brand name and ability to reach customers, provides big business opportunity for the insurer.

(2 Marks)

iii. Following products can be easy to sell through banc-assurance channel:

a. Critical Illness: This is a product with relatively less premium and can be easily bundled with loans and credit card customers. The tenure and sum-insured of CI benefit can be dovetailed with that of outstanding loan to give extra protection to bank and relief to customer.

b. Retail Indemnity Product: The most useful feature of this product is that it can be designed and customised for different customer segments, viz., for HNI the sum insured limits can be very high and peripheral benefits, like, PED coverage, maternity, pre-post hospitalization cover, etc. can be doled out. For middle income segment it can be simple product with medium sum-insured and no freebies. For segment that may not be able to afford high premium, sub limits, co-pay and deductibles can be introduced.

c. Personal Accident: This is a simple product, like Critical Illness (CI), with low premium and can be sold to any segment of customer, especially, those who have taken loans. Like CI its benefits and tenure can be adapted as per the customer's requirements.

d. Long Term Care: Although this product is not available in India. If available, this can be marketed to the annuity holders and pensioners. Those who buy pension products may also be interested in this product.

e. Overseas Travel: Those customers who approach bank for foreign exchange may be target buyer for this cover.

(4 Marks)

iv. Various segments of bank customers who can be sold health insurance products are.

- Saving Bank Account Holder: This is the major customer base for many banks in terms of count and can be tapped to sell health insurance products.
- Current Account Holder: Current account holders may vary from a small entrepreneur to big corporate customers. Their requirement of health care insurance products may also vary significantly. This segment cannot be ignored to sell both group and retail health insurance products.
- Credit Card Holder: This is another customer base which can be huge in number, especially, for some banks which are active in this space.
- Loan Customer: Some banks are having huge portfolio of home loans. Generally, home loan customers have long term relationship with banks and the same can be utilised to sell health insurance products.
- Fixed depositors of the banks: This segment would be more affluent economically and base could vary across rural, urban, metros etc.

(4 Marks)
[Total Marks-12]

Solution 7 :

i.

- The data chosen would be for the most recent year possible from the current CI product.
- Policy data might be grouped by region, distribution channel, sales agent, duration in force, frequency and size of premium, premium payment method, gender, age, illnesses if sufficient data available.
- Groups may need to be combined in order to achieve adequate volume of data in order to produce credible results.
- For each group, calculate the proportion of those policies in force at the start of the particular policy year. The withdrawal rate would be determined as one minus persistency rate.
- The calculation should be adjusted to exclude the CI claims made and deaths happened.
- Trends in past experience would be identified, and any reasons established.
- When interpreting the past data, allowance would be made for any one-off events (eg political or economic factors) that may have influenced the results.
- Future withdrawal rates would then be estimated, and would be used in the new critical illness product.
- This estimation would take account of any known or expected future changes in such things as:

  - the relative competitiveness of the product compared with the market as this is a new construct
  - economic conditions that might affect the public propensity to buy and/or keep unit linked product
  - the political environment (which could become more or less favorable to CI)
  - the distribution channel or selling methods , how comfortable they are selling unit linked CI product
  - the territory or target market
  - the policy wording
  - The premium payment method.
- The recovery of these expenses will be spread over a number of years' premiums, but if insufficient new policies renew (and for enough years) then the assumptions will be invalidated and the company will make less profit than expected.
- It is an essential assumption for the financial planning of the business, eg for the forecasting of future profitability.
- The analysis will also enable the company to identify groups, eg particular agents, channels or regions that may have very different withdrawal experience.
- The company can then take appropriate remedial action, eg change its sales distribution and/or marketing strategies.

(10 Marks)

ii. Change in investment strategy of the company.

- For unit linked critical illness plan assets are matched to the unit liabilities.
- Company can now invest in same assets as used to determine the benefits.
- For non unit liability the investment would still be held in short term assets mostly in debt securities varying from a year to 3 years.
- Company can use free asset to mismatch unit-linked benefit if by doing so company can expect to achieve a higher return.
- If the returns are higher than matched assets the profit would be earned by company and if the returns are lower than that of the determining unit price the company has to bare the loss.

(2 Marks)

[Total Marks-12]

Solution 8 :

i. Explain the risks faced by the company.

- Mispricing – getting the assumptions wrong or model incorrect model
- Underwriting & claims management – the underwriting and claims processes are not robust enough to u/w the risk or assess the claim payouts correctly
- Trend – changes in claims experience over time may be because change in lifestyle, occupation etc.
- Inflation – increasing healthcare costs more than anticipated
- Coverage Scope – unintended coverage in case of ambiguity in definitions of coverage/conditions
- Medical Advances – technological change; diseases are likely to be diagnosed quite early

- Healthcare System – scope and incentives
- Policyholder Behaviour – learning how to claim and hence likely to claim more than anticipated.

(4 Marks)

ii. Supervisory valuation basis for this business.

- Transition rates from healthy to sick, between different levels of care, and from sick states to dead
- Total claim costs will be very sensitive to claim incidence rates (at the different levels of benefits) and to duration of claim payments (which is itself a function of the rates of transition out of the claiming states, including mortality). Reserves will therefore be very sensitive to the choice of this basis.

Investment return

- Cashflows will tend to be positive at early durations, becoming increasingly negative (on average) at later policy durations.
- It is a without-profits contract and the benefits are guaranteed. These factors lead to a large reserve requirement and considerable sensitivity to the investment return assumption used for discounting the future cashflows.
- The reserve will be sensitive both to the returns obtained on the existing assets (those backing the reserve itself) and to those obtainable from investing the future positive cashflows as they arise (where applicable), and so both aspects of future investment performance are important.

Inflation

- This affects premium and benefit levels. The older the policyholder, the less the future premium growth compensates for the future benefit growth, so that there is an increasing risk from high inflation. Reserves will therefore be increasingly sensitive to the inflation assumption the older the current age of the policyholder.

Expense inflation

- Inflation also affects future expenses, which can be a large component of total costs, and further increases the sensitivity of the reserves to this assumption.

Expenses

- The business can be very expensive to administer, due in particular to the costs of claims handling and claims underwriting, especially given the different levels of benefit available.

- Fixed expenses per policy can be disproportionately high while the volume of claims handled is low , and so could have a significant impact on the reserves.

(6 Marks)

iii. Type of asset the insurance company would be holding:

- Company is selling pre-funded long term care plans which will require long term assets to back them.
- The liabilities increase with inflation so it’s better to have assets which increase in line with inflation. Insurer can invest in indexed linked bonds which are linked to price inflation.

- For liabilities in payment insurer may consider cash or short term government bonds to meet the liquidity requirement as these assets are highly liquid and with low volatility in returns
- The expenses will be linked to a combination of price and salary inflation so the insurer should aim to match these liabilities with assets linked to these indices if they are available. Index-linked bonds based on price inflation would be a fairly good match.
- The insurer could consider investing any free assets in higher yielding assets, such as equities, in order to generate higher expected returns for shareholders.

(3 Marks)

[Total Marks-13]

Solution 9 :

i. Main disadvantages of formula approach is that it –

- Does not allow for the proper timing of events.
- Reserves are ignored completely when using this approach.
- Does not properly allow for capital needs
- Does not allow for the impact of net negative cashflows in any period
- Does not allow for separate inspection of premium-related cashflows or claim-related cashflows
- Does not allow easily for variation of assumptions over time
- Does not allow for changes in the assumed future experience and cannot be used to measure the sensitivity of profit to such variations
- Cannot easily allow for more complicated product structures, eg unit-linked.

(2 Marks)

ii. When setting assumptions it is important to:

- Take particular care in determining the assumptions that will have the most financial significance
- Achieve consistency among various assumptions of additional and existing benefits
- Consider any legislative or regulatory constraints on offering additional benefits
- Ensure that the parameters derived from data are produced as accurately as the body of data will permit
- Ensure that the data used to derive these assumptions are relevant to the risks that the policies encompass; By "risks" here we mean the insured lives involved.
- Ensure that assumptions used for periodic valuations and reserves are flexible to reflect changing risk circumstances.
- The assumptions made should be responsive to any changes in the circumstances of the in-force policyholders that might affect the financial experience – including claims – of the company.

(6 Marks)

iii. <u>Product development considerations:</u>

- It should be clarified whether insured can avail these benefits as inpatient or outpatient also. This will have significant impact on the pricing of this benefit.

- In case of cashless claims, do we have providers of maternity and dental benefits in our network or not. What is the density of such providers and is it concentrated in a particular geography?
- Whether additional benefit is to be offered to both the existing and new policyholders or to new ones only.

  If it is to be offered to existing policyholders mandatorily whether we have flexibility to charge higher premium because of this extra benefit in view of regulatory issues and risk of increase in nonrenewal.

- If this benefit is offered on optional basis (in form of rider or separate variant), how the risk of adverse selection would be managed.

Pricing Considerations:

- If there is some credible data of incidence rate and average claim size of these benefits, especially, of insured population the same can be used in assessing the risk premium for this benefit.

- If insured population data is not available at all, we can look for national statistics and use the same with appropriate adjustment.

- If we have ever extended this benefit in any other product, like Health coverage to corporate customers, the data from same can be used with proper adjustment.

- We can also look for industry statistics for pricing this benefit or take help of re-insurer if they have some experience of such a product. Overseas data or data from consultants can also be of some help.

- It is appropriate to build adequate prudence margin in pricing for this product due to uncertainty because of incomplete information.

- If there are similar products available in the market, a comparison can be made with suitable adjustment.

(6 Marks)

[Total Marks-14]

Solution 10 :

i. Measures to ensure the data used for claim analysis is complete and accurate.

Regular vetting, spot checks

- Regular inspection of the processes by which data is accepted by the system.
- Check that the data captured is comprehensive.
- Carry out systematic comparison of paper records against data stored on system.
- Include modules in the system to detect/query inconsistency or unusual features in the data.
- Check internal consistency of data – e.g. sum assured v. premium.

- Check consistency of data over time – i.e. compare data on policies at this valuation and last valuation (e.g. numbers of policies or total sums assured, allowing for movements).
- Check policy records "end to end", especially if the data is passed between several systems and/or manual processes.
- Have a single system storing all the data.

Controls on data acceptance

- Inbuilt checks to prevent erroneous items from being accepted at the time of data input, for example: sex field will only accept M or F ,maximum age at entry cannot exceed 120 ,sum assured must be in whole number ,any special features of the product that could impose further restrictions on data acceptance.

- Certain "exceptions" must only be overwritten by persons of pre-specified status and an audit trail of such special exceptions will be stored by the system.

Compulsory fields

- An individual policy record will have certain fields which are mandatory. The input will not be accepted unless all such information is included, for example:
    - age/date of birth
    - sex
    - benefit
    - term

- A claim record will not be accepted unless there is a policy number for cross-reference.

Staff training

- Ensure adequate training provided to staff responsible for data input.
- Establish a culture of the value of accuracy of data and develop the ability to spot information which may have been submitted wrongly, either deliberately or accidentally.
- Encourage close liaison between staff responsible for establishing the software and the staff involved in the training.
- Encourage feedback from the staff responsible for data input.
- Ensure that proposal form and input screens have the same format.
- Ensure that systems are developable and refineable in order to continue to capture all required data.

(8 Marks)

ii. Following points are relevant to write report to board showing ways and means of improving the claims experience.

- Reduce claims incidence for a given risk
- Increase exclusions applied
- Implement more stringent claims control processes
- Change basis of claims payment from own occupation to own/suited or to any occupation
- Decline more claims
- Increase deferred period
- Introduce linked claims clause to encourage return to work
- Offer lower expiry age / term
- Reduce escalation of claims paid
- Limit duration of claims payment
- Implement rehabilitation services to help claimants back to work
- Implement an early notification scheme to allow early claims intervention
- Offer long-term claimants with high reserves a lump sum in lieu of a regular income

(6 Marks)
[Total Marks-14]

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