

# **Institute of Actuaries of India**

## **Subject SA1 – Health and Care Insurance**

May 2011 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

**Q.1]****(a)**

- Premium increase
- Bad service (slow policy issuance, late claim payment, poor call center experience, bad reputation)
- Better fitting product offered by the competition

**(b)**

- Claim free bonus, e.g. increased sum insured
- Coverage of pre-existing conditions
- Coverage of specific illnesses
- Coverage of pregnancy

**(c)**

Practical challenges are non-standardized definitions and non-standardized benefits in the market. For instance different rules for sum insured bonus in case of claim free years. Different definitions for pre-existing conditions or different exclusion clause related to pre-existing conditions.

Alternative examples provided by the candidate should be of similar importance as the example above.

- i. The insured can assume that he will be accepted as a standard risk by any other health insurer since he is healthy. Hence, change of the insurer will be easier since accrued rights will not get lost, e.g. coverage of pre-existing conditions, or claim free bonus will be transferred to the new contract. Hence the healthy insured can change to the insurer of his choice because the new insurer is cheaper or provides the better service, etc.
- ii. The insured must assume that he will not be accepted as standard risk – due to his health condition and hence he may get confronted with a discouraging offer from competitors. This makes it likely that the insured will stay in the existing portfolio. In case insurer is losing more healthy risks – which is likely when he increases premiums or because of lacking service – the premium for the remaining portfolio, e.g. the chronically sick insured – may need to even further increase.

**(d)****Risks:**

- Increased anti-selective lapse as described under c) especially when premiums are required to be adjusted. Anti-selective lapse means that the healthier part of the insured population is tending to lapse due to the reasons explained under c).
- Hence, obligation to write more fresh business to keep the risk profile of the portfolio at the same level and cope with the increased anti-selective lapse.
- Additional complexity in underwriting to cope with the accrued rights of changing policyholders.
- Substantially increased administration expenses since product specific rules like waiting periods, claim free bonuses ,etc. are not followed in case of changing customers.
- Risk of not being able to recover initial expenses with the renewal experience less predictable and quite sensitive.
- Increased risk of fraud and error, e.g. accrued rights may be stated wrongly by the insured, etc.
- Increased pricing risk since portfolio is more exposed to competitor's behavior, new product launch can lead to sudden and unexpected anti-selective lapse, etc.

**Chances:**

- Strong incentive to provide good services and keep the premiums low by underwriting and claims management. Improved reputation e.g. industrial service and underwriting standards should improve.
- Companies successful in this regard can capture more quickly market share and bit the competition.

**(e)**

- The insurance companies own underwriting policy could be violated by the regulatory change. Companies with efficient underwriting approach and good service standards could now attract sub-standard risks without getting the adequate premium as per the companies risk assessment.
- Hence, the chances of the regulatory change could be shifted to companies with less favorable claims service standards – since less health or chronically sick insured's may tend to change the insurer in that case. This could allow those companies to keep premiums low and attract more new/healthy risks.

**[Marks – 24]**

**Q.2]****a)**

- **Pro:** Client friendly feature and hence product easier to sell.
- **Pro:** Cashless feature requires contractual relationship to providers, e.g. a provider network.

The claims pre-authorization process bears basically the chance to control claims better. Pre-agreed fee schedules or package rates allow the insurer to manage the ongoing medical inflation better.

- **Pro:** A quality provider network provides the opportunity to use their brand to help to sell the product accordingly.
- **Con:** Cashless feature may increase the utilization by insured's, hence higher claims costs.
- **Con:** Cashless feature may increase the risk of fraud and misuse – since an additional party is involved in claims settlement.

**b)**

The candidate needs to evaluate if the pros or cons are dominating as per his assessment. Three points for a consistent and logical explanation.

One extra point if the advice provided is a concrete solution and discusses additional product features like deductibles, co-insurance, sub-limits, network management and claims management which could mitigate the risks of the cashless facility.

**[Marks – 9]**

**Q.3]****(a)**

- **Data Risk:** Inaccurate, inadequate or incomplete data can lead to wrong actuarial conclusions or policy of claims underwriting decisions.
- Pricing Risk/Wrong Assumptions (including model risk, parameter risk and random fluctuation risk).
- Counterparty risk related inter alia related to distribution partners, reinsurers, TPA's and providers.
- Risk regarding regulatory and taxation changes.
- Reputational Risk.
- Any type of operational risk (internal fraud, physical risk in case of catastrophes – IT recovery, etc.).

- Aggregation and concentration risk due specialization of products (covering inpatient claims only) or distribution related concentration.
- Catastrophes like war, nuclear disaster, epidemics or pandemics.

**(b)**

- **Pricing Risk:** Data quality is generally problematic due to rather limited regulations on provider billing. In addition many insurance companies deal with different TPA's which increases the risk of inconsistent data within the insurance company's portfolio. In case of group business, even the age or gender distribution of covered dependents are not known, which increases the pricing risk drastically.
- **Counterparty Risk:** Many companies have outsourced provider network management and claims processing to TPA's. This bears additional counterparty risk – as compared to non-health insurance companies.
- **Pandemic and Epidemic Risk:** Health Insurers are especially exposed to this type of risk. SARS, SWINE Flu have been pandemic threats in the past. The exposure of stand-alone health companies carrying only morbidity risk is especially high to this risk.
- Risk related to Regulatory changes and changes in taxation are generally higher in emerging insurance scenarios since markets and regulation are both emerging. Examples for this risk are the regulatory change in regard of portability of accrued rights and TDS obligations in case of cashless payments.
- **Reputational Risk:** Huge premium adjustments of more than 100% after less than 2 years after policy launch because of pricing or underwriting mistake, claims denials due to lack of transparency in policy wording regarding benefits and exclusions, namely pre-existing conditions and miss selling lead to maximum number of ombudsman related complaints and often bad feedback in press and TV.

Other risks and examples are acceptable as long as a valid and logical explanation is provided along with a valid example.

[Marks -17]

**Q.4]**

$$i. \quad \textit{Incidence Rate} = \frac{\textit{No.of Claims}}{\textit{Exposed to Risk Population}}$$

$$ii. \quad \textit{Average Claim Size} = \frac{\textit{Total Claim Amount}}{\textit{No.of Claims}}$$

$$iii. \quad \textit{Burning Cost per Capita} = \frac{\textit{Total Claim Amount}}{\textit{Exposed to Risk Population}}$$

$$\text{iv. } \textit{Premium per Life} = \frac{\textit{Earned Premium}}{\textit{Exposed to Risk Population}}$$

(Above formula is given in order to be consistent with other formulae; alternative formula based on GWP and lives underwritten is also acceptable)

$$\text{v. } \textit{Loss Ratio} = \frac{\textit{Total Claim Amount}}{\textit{Earned Premium}}$$

**Relation:**

From i, ii and iii above:  $\textit{Burning Cost per Capita} = \textit{Incidence Rate} \times \textit{Average Claim Size}$

From iii, iv and v above:  $\textit{Loss Ratio} = \frac{\textit{Burning Cost Per Capita}}{\textit{Premium per Life}}$

Total Claim Amount, ERP, Earned Premium, etc. should belong to the same period. The definition of Claim Amount or No. of Claims should be consistent across, i. e., Paid, Paid plus Outstanding or including IBNR.

[Marks – 7]

**Q.5]**

- a) **Usual, Customary & Reasonable (UCR) Charges:** An amount customarily charged for or covered for similar services and supplies which are medically necessary, recommended by a doctor, or required for treatment. It means that the charge is the provider's usual fee for a service that does not exceed the customary fee in that geographic area, and is reasonable based on the circumstances. Conventional indemnity plans operate based on usual, customary, and reasonable (UCR) charges.
- b) **Preferred Provider Network:** Preferred Provider Network is a network of healthcare service providers with which an insurance company has negotiated contracts for its insured customers to receive healthcare services at discounted costs. The insured may go outside the network, but would incur larger costs in the form of higher deductibles, higher coinsurance rates, or non-discounted charges from the providers.
- c) **Age-at-entry pricing:** "Age-at-entry pricing" refers to the practice in some markets of calculating premiums for PMI products with due allowance for the increasing age of the policyholder over the prospective period of cover. Premiums do not increase because of the policyholder's increasing age and insurance company keeps special reserve to smooth out the results over a period of time known as "Aging Reserve". The insurer usually retains the right to increase premiums subsequently to allow for medical inflation or medical inflation in excess of levels assumed in the original calculation.
- d) **Community Rating:** Community rating refers to the practice of charging all policyholders the same premium rate irrespective of rating factors such as age, sex, medical status, claims history, etc. This practice may sometime expose the insurance company to adverse selection.

[Marks – 4]

**Q.6]**

- a) **Policy Year Loss Ratio:** Policy Year basis means segregation of all premiums attributable to policies having an inception or renewal date within a given twelve-month period and losses relating to those same policies whenever they may occur. In other words, the total value of all losses (including reserves if any) arising from (regardless of when reported) policies incepting or renewing during the year is divided by the fully developed earned premium for those same policies to calculate underwriting year loss ratio. The finally developed earned premium will always equal the written premium for those policies. This is sometime also known as Underwriting Year Loss Ratio.
- b) **Reasons of upward trend in Policy Year Loss Ratio:** The following could be the reasons for upward trend in the loss ratio on policy year basis given in the question:
- **Anti Selection on Renewal** - It is quite possible that people with comparatively poor health are renewing their policies which is causing the deterioration of the portfolio performance.
  - **Effect of initial Underwriting** - The positive impact of medical and other underwriting withers off in few years time pushing the loss ratio upward.
  - **Medical Inflation** - The medical inflation will result in deterioration of loss ratios if there is no corresponding rate increase to counter the same
  - **Waiting Periods & Exclusions** - Some of the inpatient indemnity health insurance products come with certain exclusions of benefits during first few years of the policy. With subsequent renewals of policies the policyholders start availing those benefits resulting in increase in incidence rates and thus loss ratio deterioration.

These are the main reasons for upward trend in Policy Year Loss Ratio.

There can be an interplay of other factors also like, increase in general morbidity, outbreak of disease, change in business mix, random fluctuation, etc. along with factors mentioned above that can be responsible for the upward trend in Policy Year Loss Ratio as observed in the example given above.

- c) The main limitation of using Policy Year as basis of monitoring the portfolio performance is that it takes longer time for experience to fully develop. Apart from this, policy year extends to two calendar years and, therefore, it is not very good measure to track frequency and severity trend, e. g., inflation.

**[Marks – 8]**

**Q.7]**

Long Term Care includes all forms of continuing personal or nursing care and associated domestic services for people who are unable to look after themselves without some degree of support, whether provided in their own homes, at a day centre, or care home setting.

Long-term care covers a very wide spectrum of needs. Some people only require a small amount of assistance to be fully independent, whilst others could not function without high levels of care. An optimal long-term care programme would be designed to help people regain as much independence as possible, slow down the rate of deterioration and provide the necessary care support and environment to maintain well being.

The costs of care can be divided between living costs, housing costs and personal care.

The demand for private long-term care insurance is driven by the need to have

- security
- independence
- choice and
- dignity

in older age.

The following are the important demographic, political and social factors that have bearing on the demand for Long Term Care Insurance product in India:

- a) **State Provision:** Availability of protection from State is an important consideration for any insurance product which is even more applicable in case of LTCI given its nature. If we analyse the past practice and present trends in State provision in India, it is clear that Long Term Care has not been very high in the agenda of Central and State Governments. There are a few schemes running for care of old aged but either these are mean tested or the benefits are too low to take care of needs of old aged in middle class. Moreover, given the stress on Public Finance, it is not expected that the situation will change drastically on this front in near future. Therefore, on this ground there is need for LTCI kind of products in India.
- b) **Non-Governmental Organizations:** There are a few Non-Governmental Organizations (NGO's) helping the old age people in need in the country. But their reach is restricted in regional areas and they may not have enough means to make a difference at a very large level. The concept of 'Old-Age Societies' has not gained popularity in India as in some other developed countries. This again goes in favor of LTCI products.
- c) **Informal Care:** This is one of the most important considerations to assess the need of LTCI in India. Historically, Indian society structure is such that the care to old people is provided in family whenever there is any need. Children feel that it is their moral duty to provide care to their parents and grandparents and are committed to this emotionally, physically and financially. This reduces the need of LTCI which provides formal care and financial support in case of need in old age. But as we would notice later in few points down the line, this trend is slowly changing.



- d) **Age Composition:** The median age in India is still less than that of many other countries and therefore we do not expect a huge jump in old aged people in near future. So, collectively no massive pressure is expected on resources, but at an individual level it is better to start provisioning for old age in the form of LTCI. Trend in age composition is also an indication of expected volume of such product.
- e) **Longevity:** We have seen that mortality is becoming lighter in old ages for better availability of health care facilities (amongst other things). This trend is expected to continue in future as well and should result in pushing the demand for LTCI product.
- f) **Nuclear Families:** In last couple of decades the size of families is reducing very fast. Now-a-days, couples go for one child of maximum two children. Moreover, for various reasons some people prefer Nuclear Family to Joint Family. All this will reduce the availability of informal care and will push the demand for LTCI product.
- g) **Health Consciousness:** People are becoming more and more health conscious which will on the one hand delay the need of having long-term care, but on the other hand make them feel more responsible for their future needs in the old age.
- h) **Rapid Growth of Middle Class:** LTCI is mainly targeted towards middle class because rich people can always pay from their pockets in case of need and poor people have other pressing priorities rather than paying premium for LTCI. With rise of middle class the prospects of LTCI look good in future.
- i) **Sophistication in Choice:** People are becoming more demanding and would like to have the best care for themselves in the old age too. High disposable income coupled with fastidious attitude should increase the demand for LTCI.
- j) **Self dependence and dignity:** There is trend towards financial independence and people who are earning well would not like to depend on their children in the old ages. This also shows that there is need for LTCI product.

Some of these social and demographic trends are at their nascent stage and may take time to be fully visible, but since LTCI is a product with long term horizon (especially pre-funded version), it will be better to move early from the point of view of both insurer and insured.

[Marks – 10]

Q.8]

a)

The calculation of required rate change is as follows:

Particulars	2008-09	2009-10	2010-11
1. Earned Premium (Provided)	435	1438	1954
2. Reported Claims (Provided)	298	904	1293
3. Loss Development Factors (Provided)	1.000	1.021	1.178
4. IBNR [(2) X {(3)-1}]	0	19	230

5. Ultimate Claims [(2) + (4)]	298	923	1523
6. Trend Factor <sup>1</sup>	1.545	1.403	1.274
7. Trended Claims [(5) X (6)]	461	1295	1940
8. Projected Loss Ratio [(7) / (1)]	106%	90%	99%
9. Overall Projected Loss Ratio[ $\sum(7) / \sum(1)$ ]			96.6%
10. Target Loss Ratio <sup>2</sup>			70.0%
11. Required Rate Change [(9) / (10) - 1]			37.9%

<sup>1</sup> The calculation of trend factor is given below:

Particulars	2008-09	2009-10	2010-11
1. Mid of experience period	10/1/2008	10/1/2009	10/1/2010
2. Mid of coverage period	3/31/2013	3/31/2013	3/31/2013
3. Length of Trend in years [(2) - (1)]	4.50	3.50	2.50
4. Annual Frequency Trend	2%	2%	2%
5. Annual Severity Trend	8%	8%	8%
6. Trend Factor $\{[1+(4)]^X[1+(5)]\}^3$	1.545	1.403	1.274

As the revised premium rates will be valid for policies written till 31.3.2013 (which will be effective till 31.3.2014), the coverage period is from 1<sup>st</sup> April 2012 to 31<sup>st</sup> March 2014. Therefore, mid of coverage period is 31<sup>st</sup> March 2013 as given above.

<sup>2</sup> Target Loss Ratio = 1 - (Expense + Profit) = 1 - (10% + 10% + 5% + 5%) = 70%

**b)**

This kind of methodology is appropriate where the overall adjustment in existing rates is required. This is the case when there is no cross subsidy (intentional or unintentional) in various plans. The single overall rate adjustment is required only to account for trend in utilization, inflation, expenses, etc. that impact the different plans uniformly.

The other approach is to divide the overall data in different sub groups based on rating factors, such as, sum insured, age bands, gender, geography, etc and determine the risk premium for each cell separately. To decide on no. of sub classification, a trade off is achieved between accuracy and credibility of data. Then the gross premium is determined for each of the sub groups by applying relevant loading for expenses. This kind of approach is appropriate where the experience of different plans and sub plans is expected to be different and the price cannot be adjusted by a uniform factor. In this method, multivariate analysis is also applied in case there are many rating factors.

**c)**

As per our calculation given in 8a) we expect a loss ratio of 70% for the coverage period after increasing our premium rates by 37.9%. As a matter of fact, the actual performance of the portfolio is a function of various factors that interact with each other in a very complex way, for example, expectation of policyholders, availability of other alternatives, outlook about health insurance, reaction of competitors, actual realization of trend assumptions, etc. The major worry about increasing rates by close to 38% is the risk of selective lapsing. It is quite possible that unhealthy policyholders decide to pay increased premium as they may fear of not getting cover elsewhere. While comparatively healthy people may decide not to renew their policies with the present insurer. They may be confident of finding health cover with some other insurance company or may decide to not take health insurance cover at all. This will result in deteriorating performance of the portfolio and the calculated rate increase may not be enough. In order to avoid this kind of situation, small increases in premium on regular intervals should be preferred to a few big corrections.

d)

$$\text{Expected Loss Ratio} = \frac{\text{Projected Loss Ratio}}{1 + \text{Proposed Rate Change}} = \frac{96.6\%}{115\%} = 84\%$$

[Marks – 21]

[Total Marks – 100]

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