

Institute of Actuaries of India

Subject SA3 – General Insurance

May 2013 Examinations

INDICATIVE SOLUTIONS

Solution 1 :-

i)

- a. Definitions need to be clear, not open to different interpretations, practical, attempt to minimize moral hazard and are easy and cheap to administer.

Disablement:

Total disablement i.e. unable to work

Not in receipt of sick pay

Or it could be defined in terms of minimum level of disability i.e. able to work 30% or less of normal working hours

Minimum waiting period or qualifying period of say 2 months

Unemployment

Period over which actively seeking employment

In the event of retrenchment, evidence of redundancy pay received

Minimum waiting period or qualifying period of say 2 months

b.

Cover should be refused under the following circumstances:

Person is currently disabled or unemployed or has a record of disability or unemployment in the last 3 to 5 years

Poor credit/payment record with utility payments

Person works in a seasonal industry with regular periods of unemployment

Person is over a certain age say 60 to avoid “early retirement claims”

Person has previously been refused disability cover

c.

Reasons for exclusions are to restrict coverage to people that are not going to be high claimers. Exclude people with incentive and reason to select against the insurer. This will keep premiums more affordable.

ii)

A rating variable is a risk characteristic that may be used to divide an insurance pool into sub-pools with different expected claims experience. The purpose of the risk classification process is to produce a premium rating structure based on rating variables that explain as much as possible of the variation apparent in the claims experience of the portfolio. Such a structure must be statistically sound in order to limit scope for adverse selection, while at the same time it must not be too complex for administration and it must be acceptable in the market place.

When making a decision about possible rating factors that can be used, it is important to ensure that the selected factors are objectively measurable and easily verifiable. Possible rating factors that can be used are:

Occupation of the insured

This will influence the likelihood of disability. Likewise, employment in seasonal industries will impact the likelihood of unemployment

City in which the insured is residing

This will influence the cost of the utility service provided. Tier 1 cities are likely to be subject to higher taxes/levies which will impact the provider's servicing costs.

Utility provider

This will influence the cost of the utility service being provided. Providers which have economies of scale may offer more competitive rates.

Past utility bills

This will influence the expected claim cost. Utility bills from more recent periods should be used as they are likely to better reflect the quantum of consumption of the utility service and the inflationary impact of utility costs

Insured's bill payment history

This will influence the likelihood of moral hazard i.e. individuals with a poor payment track record are more likely to claim. This will also influence the expected delay in receipt of premiums.

The product needs to be simple and expenses must be kept as low as possible. Recommendations include:

Limit selection through exclusions

Limited rating structure related to a fixed percentage of utility bill (or could even suggest a fixed amount per bill covered)

The policy should be easy to sell and administer and limit the potential for selection.

iii) Sources of information include:

- **Utility companies:**

- Past payment records

- Distribution of the size of bills

- Information on payment experience versus any rating factors being contemplated, if available

- **Insurer's existing portfolio**

- Rates of claim incidence due to disability or unemployment

- Information on the distribution of claim durations (both sub-divided by any rating factors being contemplated)

- **National employment statistics for trends in unemployment**

- Need to consider the impact of selection (both consumer and insurer through exclusions etc)

[Total Marks-17]

Solution 2:

i) I would expect the impact of each of the five changes to be as follows:

Conversion to annual policies

- Depending on the proportion of policies which were six-monthly, this may result in an uneven distribution of renewals throughout the year moving forward
- If there were a large number of six-monthly policies this transition may distort various KPIs on a monthly basis (i.e. some KPIs may look very different in one six month period versus another)
- Expenses should reduce as only one renewal notice is sent per annum

Introduction of pay-by-the-month policies

- Expenses likely to increase due to additional administration costs associated with pay-by-the-month policies
- Cancellation rate – depending on recording practices of company XYZ, this will most likely significantly increase as non-payment of premium for pay-by-the-month policies will be processed as cancellations rather than lapses (on renewal).
- Renewal rate technically likely to increase due to cancellation rate increasing
- Assuming the worse risks are more likely to take up pay-by-the-month, we might expect the average written premium to increase if offering pay-by-the-month policies attracts these new customers
- Claim frequency – either neutral or increased depending on anti-selection issue – most likely a slight increase, particularly if the initiative drives more new business
- New sales likely to increase due to new product offering

Increase in basic excess level

- Should reduce claim frequency as some smaller claims no longer get lodged
- Corresponding increase in average claim size

Premium rate change

- Overall average premium should increase although actual change likely to be different to the 5% expected due to selection – i.e. policyholders receiving the discount more likely to renew and policyholders receiving an increase more likely to lapse
- Should result in changes in retention experience and sales experience by segment i.e. sales should increase where company XYZ has become more competitive and decrease where rates have significantly increased (depending on how prices compare to other insurers)

- Will hopefully lead to increased profitability

Aggressive Marketing campaign

- Will hopefully increase the proportion of policyholders who hold multiple products
- Should increase new sales
- Average premium may reduce (due to 10% discount)

ii) Loss ratio (Net incurred claims/Net earned premium)

The loss ratio is an important indicator of the financial health of the portfolio. The changes made would be expected to have some impact on the portfolio loss ratio

Expense ratio (Underwriting expenses/Net written premium)

The expense ratio is another key indicator of the financial health of the portfolio. Moves to stop writing half yearly policies might be expected to reduce expenses whilst offering pay-by-the-month policies may increase expenses. Either way it is important to monitor the expense ratio over time to avoid any potential blow-outs in expenses

Renewal Rate (Total renewals accepted/ total renewals sent)

The renewal rate represents the proportion of policyholders who were sent a renewal notice who actually renew the policy. This measure therefore excludes any policyholders who were known to cancel their policy during the year. The renewal rate will be an important indicator of the impact of price and policy changes on retention. Note that there will be a lag between the initial sending of the renewal notice and ultimate renewals received (due to late renewals received etc)

Cancellation Rate (Total policies cancelled/total policies in-force)

The cancellation rate (however defined) is some representation of the level of policy cancellations received during the period. Most cancellations will be due to change in the insured's circumstances i.e. death, moving country, car written off but the introduction of pay-by-the-month policies means that (depending on company XYZ's recording practices) non-renewals are likely to come through as cancellations rather than lapses. This will have the effect of increasing the cancellation and reducing the apparent renewal rate.

Average Written Premium (Total gross written premium/total policies in force)

Changes in the level of average written premium will highlight the impact of various changes made to premium income and to the mix of business being achieved. Company XYZ will need to be careful to correctly interpret trends as

some of the changes made (e.g. pay-by-the-month etc) mean that depending on the definition of average premium used the results may be misleading.

Claim frequency (Number of claims incurred/earned policies)

The claim frequency of the portfolio is an important indicator of claim performance. The changes made will be expected to impact claim frequency (e.g. increasing the excess) and company XYZ will also need to monitor the claim frequency following the increase in excess and introduction of pay-by-the-month policies

Average claim size (Total claims cost incurred/number of claims incurred)

The average claim size is another important indicator of claims performance. As the frequency reduces due to excess changes, we would expect the excess change to impact the average claim size. Some small claims which were previously reported to Company XYZ will no longer be reported, however the excess increase should also reduce the size of most claims by Rs. 50

New Sales

Given the aggressive marketing campaign launched, the level of new sales per month is an important indicator of the success of marketing initiatives. One would expect that the level of new sales should increase when the aggressive campaign is launched

Policies-in-force (as at a certain point in time)

Changes in the total number of policies in-force is an indicator of the overall growth of the portfolio. This will be one measure of the overall success of price changes and marketing campaigns (although the mix of policies will be equally important)

Average number of policies per motor policyholder (or % of policyholders with Motor and House policies)

The average number of policies per Motor policyholder (or some other measure of average level of product holdings) would provide some sort of indication of the success of the campaign to increase the multi-product penetration.

[Total 14 Marks]

Solution 3 :-

- i) The discount rate used for outstanding claims liabilities is the risk free rate, calculated using the zero coupon yields of government bonds.

However an appraisal value is a discounted cash flow model for the price of the insurance company. From the Capital Asset Pricing Model (CAPM), the discount rate to be used for pricing shares in a company is the risk free rate plus an allowance for market risk. The amount of allowance for market risk is related to the share's beta.

If Specialty Insurance is a listed company, then we can calculate the beta value from the historical share market data. If it is not listed, then we may use the beta value for Prominent Insurance or for similar insurers or alternatively for the entire insurance index

- ii) The minimum data would be:

- Balance sheet
- Actuarial reports for outstanding claims/premium liabilities
- Full cash flow projections for outstanding claims liabilities, to allow adjustments to discount rate
- Full cash flow projections for premium liabilities, to allow adjustments to discount rate
- List of intangible assets to exclude from the appraisal value
- List of fixed assets i.e. office furniture which have limited value
- Details of reinsurance covers

- iii) Shareholder's capital may overstate or understate the break up value because:

- Outstanding claims liabilities are discounted at the risk free rate and therefore are overstated
- Outstanding claims liabilities have prudential margins and therefore are overstated
- Premium liabilities are discounted at the risk free rate and therefore are overstated
- Premium liabilities have prudential margins and therefore are overstated
- Assets may include intangibles which have no value in a break-up scenario
- Assets may include capitalized expenditure (e.g. software development) and/or fixed assets which have a much lower value in a break-up scenario

- iv) Other factors to be considered are:
- Customer loyalty may contribute to additional value. Many of the existing customers will renew their policies, giving a source of future profits
 - The insurer will need to use some of its capital to support writing insurance for the existing customer base, so there is a cost to locking up its capital
 - There is a limit to the premium increases or policy/benefit changes that can be made in order to keep the customer base, so if Specialty Insurance is not profitable at the moment, there may not be much value to the customer base
- v). There is value in Specialty Insurance beyond the embedded value:
- The brand name can generate future business by attracting new customers
 - Prominent Insurance obtains diversification benefits from a large insurance base
 - Prominent Insurance has a larger premium base over which to spread fixed costs
 - Prominent Insurance may improve its market power, allowing it to charge higher premiums
 - Prominent Insurance may be able to cross sell some of its other insurance products to Specialty Insurance customers, giving an additional source of income
 - Prominent Insurance may save on reinsurance costs
 - The share market may price insurers much higher than their embedded values, so purchasing Specialty Insurance may improve the share price for Prominent
 - There may be opportunity for expense savings e.g. sharing a computer system between Prominent and Specialty Insurance which would improve profits
 - There may be a bidding war between potential purchasers

[Total 14 Marks]

Solution 4 :-

- i) Possible reasons for the board's decision to exit:
- Considerably small proportion of the total book...
 - ...requiring a disproportionate amount of senior management time and/or capital
 - Does not feature in the company's core strategy anymore
 - It has been loss making or not sufficiently profitable...
 - ...or is projected to make a loss
 - This could be due to poor historical loss experience, insufficient premium rates, high level of expenses, inadequate reserves...
 - ...or due to an anticipated regulatory or legal change in the market

- Motor fleet was purchased as a part of a larger acquisition in the past but was not the reason for the acquisition...therefore management was never interested in actively writing it
- Combination of some of the above

ii) Factors to consider when choosing an appropriate exit strategy:

- Reason for the exit. Need to discuss with management the primary reason and secondary concerns from those enlisted above.
- Alternatives available
- Costs associated with each available option
- Available timeframe versus anticipated time to implement each strategy
- Desired level of risk transfer / acceptable level of risk retention
- Financial strength of the insurance company
- Regulatory factors
- Tax implications
- Likely perception of the deal from the perspective of policyholders, shareholders, regulators, rating agencies and reinsurers
- Industry practice
- Level of uncertainty around the motor fleet portfolio. There should be more certainty around the property damage claims than the third party liability, especially bodily injury, losses. Need to review the two separately to assess the overall uncertainty of the portfolio.
- Impact on cash flows and capital. Need to consider the expected claim and expense outflows with running-off the motor fleet portfolio compared to the costs of the exit strategy. Given that it has considerably shrunk over the years, the loss of premium income following the exit should not be a concern.

Tradeoffs may have to be weighted between...

- ... the costs and benefits of the exit strategy;
- ...the desire to transfer maximum risk/uncertainty and the desire to exit as soon as possible. We may have to choose between a strategy that eliminates all risk and achieves finality with immediate effect or one that gradually reduces risk over an acceptable long-term.

iii) Administering run-off of the motor fleet portfolio is simply continuing to manage the business as usual except that no new policies would be written. The responsibility of paying and administering claims from the business currently on the books stays with the insurer.

This leaves the insurer exposed to the uncertainty with the business that has been historically written, which could go on for several years to come till the claims are fully paid out and closed. This could be an issue with the long-tailed bodily injury type of claims further for which settlement costs go on escalating with inflation.

Over time, as the in-force portfolio shrinks and claim activity decreases there would be a disproportionately high call on time and costs attributed to claims handling, regulatory reporting and staffing. This is apparently the state that the insurance company already is in with the motor fleet business.

Run-off to exhaustion may not be quite be an exit solution in the true sense though it may be employed for an interim time period till an alternative swifter exit strategy could be put in place. The day-to-day administrative functions could be outsourced, in the meanwhile, to a specialist run-off provider, although this does not absolve the insurer from his liability to pay claims and from his usual regulatory reporting and capital requirements.

Re-entry, if desired, would be easier.

A commutation implies that the insurer cancels all policies with immediate effect and is not liable for any further claims on those policies. Neither is he liable for future payments on existing unsettled claims nor on any new claims that may arise in future on the commuted policies.

Commutation can happen only with the agreement of both parties. The insurance company will have to pay the policyholders an agreed amount to compensate them for any future recoveries that they could have made under their policies, in respect of existing or new claims.

The ultimate liability under the commuted policies will have to be estimated incorporating both IBNER and pure IBNR reserves. The level of future uncertainty will depend on the mix of property damage and bodily injury claims in the portfolio. Predicting future claims experience will be challenging for bodily injury and third party liability losses.

The advantage to the insurance company of this exit strategy would be reduction in the administration and claim handling costs over the long term. However, the cost savings will have to be factored into the offer made to the policyholders.

At the same time, the costs of effecting the commutation – valuing the ultimate liabilities, making an offer, negotiating with policyholders and drafting the legal contract, should be factored into the offer.

Policyholders may find the immediate lump sum of money being offered as lucrative and the deal may be struck soon. Else there would be negotiations until agreement can be reached which would elongate the time taken to implement the exit.

A major problem would be the possibility of all policies not being commuted in which case, the insurance company will have to explore alternative strategies or manage the run-off of the motor fleet cover left on its books. That leaves it yet exposed to administrative costs, regulatory reporting and capital requirements etc as mentioned above.

If the insurance company has purchased any reinsurance cover for the motor fleet business then it would want to arrange for its reinsurers to pay towards the commutation offer, which they may not be willing to do.

Given that the portfolio has considerably shrunk over the years, the loss of future investment income should not be a concern.

[Total 22 Marks]

Solution 5 :-

i) Examples of known disease claims experienced on EL cover by the insurance industry are:

- Vibration white finger (VWF) or repetitive strain injury (RSI) caused by repeated, frequent or prolonged use of hand-held vibrating tools such as power drills
- Asbestosis / pleural plaques / mesothelioma
- Industrial deafness / hearing loss caused by exposure to noisy working conditions
- Diseases due to inhalation of toxic fumes or dust e.g. coal miners' black lung disease
- Psychological disorders / stress at the workplace

- ii) EL claims are characterised by delays made possible at several stages –
- Condition previously unknown, emerging now
 - Condition being noticed
 - Condition being reported to the insurer
 - Condition stabilising
 - Litigation against the insured
 - Litigation against the insurer(s)
 - Insurer processing the claim
 - Establishing when the claim was incurred – if there is a change of insurer then establishing to which policy year does the claim get attributed to
 - Establishing the liability of the insured
 - Assessing amount of settlement and agreeing upon an exact figure
 - Processing the claim payment(s)
 - Emergence of medical condition or judicial rulings rendering re-opening of a claim previously assumed closed/settled

Claim frequency in general depends on the type of business the insured is engaged in. Our clients are large multinationals employing thousands of employees. The frequency per employee is likely to be low but the frequency per policy will vary per the riskiness of the insured's occupation. Chemical manufacturers, miners and construction workers experience more claims per policy than a retailer or a desk job service provider.

Claim severity depends on the reason for the claim. Most claims will be for fairly small amounts but there would be occasional large claims for diseases.

The claim characteristics of injury claims and disease claims are quite different. Injury claims are well defined, reported quickly and settled typically with a single payment, making them less susceptible to claim cost inflation. They are high frequency, low severity in nature.

Illness or disease claims may only emerge several years later when the medical condition comes to light and consequently experience significant reporting delays. Further delays are caused by disputes / litigation establishing first the liability of the employer and then the extent of monetary compensation. Claim payments are made in several part payments and full and final settlement delays could span several years. This makes them susceptible to both wage and court award inflation.

Accumulation is caused since one policy covers several employees working in the same office/factory so that a single event will trigger many claims. Also, a court award for a certain claim will set precedent and potentially invite several claims from several employers engaged in same/similar activities.

iii) IBNR reserving specifically for disease claims on the EL book is extremely uncertain due to the various factors outlined above. The only time the reserve amount is reliable is when there are no legal disputes and the loss is reserved to exhaust coverage. Normally, the methodology used is to apply a load or a multiplier to outstanding claims or reported claims to date.

Frequency-severity methods and curve fitting are alternative approaches to reserving for disease claims, though these approaches are restricted in a way by lack of sufficient, credible loss data that is specific to the insurer's exposure / EL portfolio.

There are often insufficient claim details available on the type of diseases, dates of report and part payments, open/closed status, split of amount paid in indemnity versus expenses and reliable case reserve estimates.

Further details on policy conditions, cover and exclusions, limits and attachments, deductibles, nil claims, reinsurance etc. are required if we are attempting to establish benchmarks using aggregated industry data.

The loading will depend on various factors such as:

- Statistic to which the loading is being applied – paid claims / reported claims / outstanding case reserve estimates
- Maturity of the cohort
- Backlogs of unsettled claims and processing delays
- Type of business – primary direct, reinsurance or retrocession
- Layers exposed – primary or high excess
- Policy limits, that act as a cap on the insurer's liability in absolute amounts...
- ...and attachment points
- Reinsurance structure in place
- Composition of the portfolio – large industrial clients like ours may require a small multiplier as they are likely to have been targeted initially, much before claims were made against smaller companies and are hence, expected to have a more mature loss experience
- Loadings used by competitors – to be comfortable that we are not out of line with the market

- Loadings used on similar accounts
- If there is a company strategy / practice to commute with direct policyholders, where it may be possible to do so, then it is likely that the remaining portfolio is less mature on average and would require higher IBNR loads

iv.

Claim Nbr	Date of Loss	Ultimate Loss Cost	Non-Ranking Deductible	*Ranking Deductible	Trailing Deductible	Residual claim to insurer	**Insurer's liability
1	09/04/2002	145,800	25,000	120,800	0	0	0
2	28/04/2002	275,600	25,000	250,600	0	0	0
3	04/06/2002	119,400	25,000	94,400	0	0	0
4	12/02/2002	520,000					
5	23/07/2002	372,600	25,000	325,000	0	22,600	22,600
6	16/08/2002	917,500	25,000	325,000	0	567,500	500,000
7	25/09/2002	304,525	25,000	279,525	0	0	0
8	06/11/2002	128,750	25,000	103,750	0	0	0
9	20/01/2003	55,725	25,000	925	0	29,800	29,800
10	17/03/2003	200,115	0	0	25,000	175,115	175,115
							727,515
*Ranking Deductible subject to AAD							
**Insurer's liability subject to per-occurrence limit and policy limit							

The expected loss to our insurance company on the EL policy commencing 1/4/2002 from the provided claims experience is Rs 7,27,515

The annual EL policy commencing 1/4/2002 operates on a loss-occurring basis. So, the loss occurring on 12/2/2002 falls outside the 2002 policy period.

[Check calculations done for claim 4]

The insurer's liability on claim number 6 is limited to the per-occurrence limit of Rs 5 lakh.

[Check insurer's liability calculations for claim 6]

The non-ranking deductible of Rs 25,000 operates first, leaving the remaining Rs 3.25 lakhs as the non-ranking that adds up on individual occurrences to erode the Rs 15 lakhs AAD.

[Check ranking deductible calculations done for claims 5/6]

After claim number 8, most of the AAD has been eroded with Rs 925 left as the ranking deductible on the next claim.

[Check calculations done for claim 9]

No ranking or non-ranking deductible applies to claim number 10 as the AAD has been entirely eroded. The trailing deductible of Rs 25,000 is applicable though.

[Check calculations for claim 10]

The policy limit of Rs 1 crore has not been breached

- v. Increasing the per-occurrence captive retention should increase the annual aggregate deductible (AAD) too.

The AAD is representative of the total cumulative losses retained by the retail company's captive in a policy year, after accumulating all individual losses falling within and up to the chosen per-occurrence deductible (ranking only). Retaining a greater amount of each individual loss would obviously imply the cumulative retention within the policy year to have gone up.

The risk premium charged by the insurance company is only for the loss costs borne above the deductible levels.

Breaching the AAD makes further new individual losses fall within the insurer's liability, even if they were within the insured's retention levels previously.

Getting rid of the trailing deductible removes all of the insured's retention post AAD erosion, and practically makes the cover from ground-up on all future loss development. The costs for this will have to be accounted for in the premium calculation.

If the AAD does not sufficiently increase in response to client's suggested changes to the individual deductibles, then it will take fewer claims to erode it than it takes currently. So either the premium charged will have to reflect the additional loss cost or the AAD will have to be set by the insurer at an acceptable confidence level of not being breached, say at the 99th percentile of total loss costs falling within the individual deductible.

The approach to follow should look at claim frequencies and severities separately. A distribution must be fit to the claim frequency and the total expected number of claims should be obtained. A loss distribution must be fit to the total claim amount and the limited claim amount after applying the deductible.

The data used for fitting the distributions should be reflective of the number of claims and loss severities specific to the client.

We could collect its historical claim experience over say, the last 5 years, taking care to trend and develop the ground-up loss experience.

Claim frequencies should be modelled per unit of exposure to capture any changes in the wayeroll / employee headcount.

Several iterations should be run, simulating the cumulative loss cost falling within the layer from the non-ranking deductible up to the individual occurrence deductible.

By choosing the 99th percentile of this loss cost, the AAD could be set at a 1 in 100 chance of being eroded. This would be sufficiently higher than the resulting expected loss cost for the layer up to the deductible.

[Total 30 Marks]
