Institute of Actuaries of India

Subject SA3 – General Insurance

March 2021 Examination

INDICATIVE SOLUTION

Introduction

The indicative solution has been written by the Examiners with the aim of helping candidates. The solutions given are only indicative. It is realized that there could be other points as valid answers and examiner have given credit for any alternative approach or interpretation which they consider to be reasonable.

Solution 1:

i)   Need for carrying out experience analysis:

- In order to put the data in various cohorts to analyze emerging trends, payment patterns
- To analyze the development and settlement patterns of outstanding claims
- To analyze emerging claims experience and take suitable corrective actions wherever necessary
- To analyze actual vs expected experience and take corrective actions wherever necessary
- To ascertain adequacy of reserves and compare actual vs expected positions
- To analyze gross and net risks and understand various exposures taken and the impact of losses on solvency
- To perform analytics to ensure better risk selection
- To understand deviations, if any from boundary conditions set in the products
- To analyze profitability, efficiency of different channels, products and take suitable actions on the same
- To understand and access capital requirements
- To quantify and analyze adequacy of reinsurance and see if the retention limits are adequate or not
- To analyze various issues with respect to concentration of risks
- To ascertain cross subsidies between different products, channels or within products – for e.g. New business vs Renewals
- To review premium rates and for pricing/re-pricing of various products
- Monitor the ALM position and suggest changes if any basis emerging cashflows and ascertain the liquidity position
- To compute if any PDR requirement arises on the unexpired reserves
- Monitoring exposures taken
- To understand various leading indicators for fraud management
- Provide sales/management various inputs to drive business in a specific direction including different product mixes, geographies etc.

                                        [0.75 mark for each valid point]   **[Max 10]**

ii)   Professional indemnity: [0.5 marks for each point, Max 2.5]

- Depends on which profession is covered
- High variation in frequency is observed for this class of business
- Higher for doctors, accountants, advisors
- Different professions may have different terms and conditions
- Advisors giving opinion on a company which has become insolvent can lead to large claim sizes

        Product Liability: [0.5 marks for each point, Max 2.5]

- Can lead to property damage claims or bodily injury claims
- Eg. Pharma companies can have large claims due to side-effects of various drugs
- Product recalls can also lead to large claims . e.g. automobile sector
- Can have impacts on aggregation of claims and large individual claims
- Litigations are pretty common in these products and the claims may have a long tail

and actual estimation of liability can be difficult

Employers' liability: [0.5 marks for each point, Max 2.5]

- Claims are normally provided for bodily injury
- Large individual claims and aggregation of claims can happen if the same cause affects lots of individuals for e.g. lack of proper working conditions
- Catastrophes are a less feature in this class of business
- The claims are likely to differ basis the occupation type covered
- Cap of medical limits can lead to reduced claims

Impact on reserves: [Max 4.5]

- Large claims can distort the run off triangles if left unadjusted in the analysis of reserves
- If the large claims have differing settlement patterns than the attrition claims the development patterns may be distorted
- The same logic applies to aggregation of few claims due to catastrophes
- In case of regulatory intervention in case of catastrophes and requirement by the regulator to settle these claims faster, the overall distorted payment patterns
- Large claims may trigger XOL recoveries which smaller attritional claims may not trigger leading to distortion of results
- Hence it is better to analyze reserves without the effect of large claims and doing separate analysis on the same.

[12]

[22 Marks]

Solution 2:

i)   Assumptions Made: [3 marks]
- Frequency average of 2020 and 2021
- Severity assumed to increase will inflation
- Target Loss Ratio assumed at 85%

Calculation   [7 marks]

	2020	2021	% change	Recommended
Freq	28%	30%	7.1%	29%
Attrition Claims	27.58%	29.70%		29%
Large Claims	0.42%	0.30%		0.36%
Severity	34,286	39,000	13.8%	
% of large claims	5%	2%	-60.0%	
Attrition Claims	33,067.44	38,606.06	16.7%	39,764.24
Large Claims	1,14,286	78,000	-32%	96,143
Average Premium	12,000	13,000	8%	11,734.59
Risk Premium	9,600.00	11,700.00		11,388.48
Attrition Claims	9,120.00	11,466.00		346.11
Large Claims	480.00	234.00		
Loss Ratio	80%	90%		13,805

Price Inc: 106%   **[10]**

ii)   Shortcomings of the current data

     a.   The data available is only for 2 years and does not give credible information

     b.   There is no internal or external benchmarking on the data provided

     c.   Nil claims: No specification whether nil claims are included or excluded

     d.   Any changes in policy conditions (Excess or any other changes) not provided

     e.   Any changes in claims processing or settlement times not included

     f.   No split between paid, outstanding, IBNR etc

     g.   No specification of reasons for large losses

[0.5 marks per point, Max 3]

Additional Data Required

     a.   Nil claims: Data needs to be split up by Nil and non-nil claims. If there are any changes in settlement logics and times these should also be included –   [1]

     b.   The data should have the split of Paid claims, outstanding claims , IBNR or IBNER. The latest accident year might be undeveloped or relatively under developed –   [0.5]

     c.   Any changes in reinsurance should also be included-   [0.5]

     d.   Changes in salvage value for total loss claims should be included-   [0.5]

     e.   Having more insights on the individual components of various claims would help understand the movement in claim costs better-   [0.5]

     f.   Individual large claims may distort the results. Or there might be a single large loss event which led to aggregation of claims. Additional information pertaining to the same can provide for further analysis-   [1]

     g.   Larger historic performance-   [0.5]

     h.   Analyzing claims by loss type may provide further insights-   [0.5]

     i.   Any changes in processing of claims-   [0.5]

     j.   The split between Renewal and New business might provide further information on the loss ratios. There might be some subsidy amongst the same. The new business might have lower loss ratios and renewal might have higher loss ratios. –   [1]

[Max 5]

[8]

iii)   Impact of reducing the top-line:

     a.   There is more likelihood of meeting the targets –   [0.5]

     b.   Reducing the top-line can increase productivity if the hiring is reduced. This can lead to reduction in overall expenses and better bottom-line results-   [0.5]

     c.   The reduction of top-line can have effects on loss ratios as well. The company would need to analyze the impact of the same on the loss ratios of individual lines of business.   [1]

     d.   The expense ratios might increase as fixed costs need to be spread over a smaller premium base. This can cause problems with existing expense of management regulations and compliance with the same.   [1]

     e.   The company might have minimum obligatory requirements for different lines of business. The company might have to relook if these obligatory requirements are met.   [1]

     f.   The company may have relook at the reinsurance arrangements sought. The reinsurance might increase the costs as the cost of blocking the capacity for the reinsurer might increase   [0.5]

     g.   The overall impact on the bottom-line needs to be seen considering the impact of expenses, loss ratios and investment income   [0.5]   **[5]**

iv) Impact of closing down:

Advantages:

a. No additional risk on these policies
b. The loss on the existing policies might be relatively easily quantified
c. Additional cost of reinsurance might be saved as the losses are now known
d. The company can start to sell again easily once the situation improves

Disadvantages:

a. The times might lead to increase in the customer base as people become more aware of need of insurance. The company might lose out on this additional customer base to which they can additionally cross-sell, up-sell other products
b. The regulator may come down harshly on the insurer of stopping a line of business
c. The reduction in top-line can led to overall increase in expense ratios
d. The people handling/managing the health insurance line of business would need to be reduced as there are no longer enough volumes to support
e. It might be relatively difficult to restart sales if they are suspended for a prolonged period of time
f. Reputational risks

[0.5 marks for each point]

[Max 5]
[28 Marks]

Solution 3:

i) **a)** In the current accounting approach:

- Acquisition charges are recognized upfront whenever a policy is written. Given that the most policies are expected to have a policy term of 10 years, the commission paid upfront pertains to the entire 10 years. In the Year 1 of the policy, there will be a strain due to commission payment.

  Since year 1 of the launch of this product is expected to have high volumes, there will be strain which will slowly reduce from year 2 onwards. This is because year 2 onwards will have some earned premium from business written in the previous years.

  [2]

- In this policy, premium for entire policy term is payable upfront. This will earn a considerable amount of investment income, especially in the initial years of the policy. Due to this aspect, initial years get a favorable impact.

  Year 1 will have the highest benefit and this benefit will slowly reduce from year 2 onwards.

  [2]

- Assumption that risk is uniform is not entirely valid. This is because there is no underinsurance in this policy. As a result, the claims outgo is expected to be in line with the inflation. So risk is greater towards the end of the policy period compared to initial years.

  Year 1 will have the highest benefit and this benefit will slowly reduce form year 2

onwards.

[2]

- Other aspects:
  - Operating expenses could also be higher in Year 1 due to IT launch of the product, sales trainings etc.
  - Any proportional reinsurance may come with reinsurance commission which could reduce the impact of strain due to acquisition expenses

[1 mark each]   **[Max 6]**

b)

Results will be different because the above aspects will be addressed differently under IFRS 17:

- General Measurement Model will be applicable since these are long term policies   [1]
- It measures an insurance contract by breaking it down into individual blocks such as:
  - Future cashflows that arise from the provision of insurance contract
  - Discount rate to reflect the time value of money
  - A risk adjustment element for non-financial risks
  - Contractual Service Margin (CSM) that represents unearned profit

[2]

- Under this approach, the overall financial results will be less volatile and more reflective of true underlying performance. This is demonstrated below.

[1]

Acquisition Costs:
- Only one cashflow of acquisition costs since it is paid upfront
- The CSM derived is after the impact of these costs.
- CSM gets released uniformly, assuming actual claims are equal to expected claims
- Hence there is no variation in profit / loss across years on account of acquisition costs

Investment Income:
- Discounting of cash flows accounts for investment income

Uniformity of Risk:
- Insurer can project expected claims separately for different time periods within the policy term with due consideration to claims inflation etc.

Risk Adjustment:
- Release of risk adjustment of claim estimates (both in liability for incurred claims and liability for remaining coverage) may happen in the later years
- However, this could happen in the existing approach also to some extent if risk margin is held in the reserves towards unpaid claims

[0.75 mark for each point]

[Max 10]

ii)   **a)** The amount of limit, deductible and number of reinstatements are primarily driven by the risk appetite and risk tolerance of the company.   [1]

Company can use catastrophe models to assess the level of vertical cover required to protect against a single severe event and the number of reinstatements required for each layer to protect adequately.   [1]

Company can also use the catastrophe models to compare the technical prices of outward treaties and the effectiveness in risk mitigation of a range of alternative programs. [1]

For example, insurer ABC may want to ensure that the protection under CAT XoL treaty is adequate with 99.5% probability (i.e., 200 year return period). Insurer ABC may also want to have a deductible which is not greater than a certain proportion of their available capital. For example, say, 5% of the available capital. [1]

[4]

b) Catastrophe reserve is a reserve built up over periods between catastrophes to smooth the reported results over a number of years. The purpose of a catastrophe reserve is smoothing profit and not solvency. [2]

Advantages are:
- Catastrophes are difficult to allow for in a financial plan, but they do happen from time to time, especially on a property portfolio. By holding a catastrophe reserve, it would build contingencies in the plan in the event that they do occur
- Reduces volatility in financial results due to catastrophe events

[2]

[4]

c)
- Catastrophe reserve may not be considered under taxation purposes
- The amount of gross earned premium wr.t. CAT perils is not a significant amount for a catastrophe reserve, especially in the first year
- Catastrophe reserve equal to the deductible might be a good idea because the lower layers are more likely to witness claims than higher layers
- It would depend on the insurer's capital position. If there are more than adequate capital available, then insurer can consider CAT reserve
- The amount help towards CAT reserve may be held in short term, fixed-interest securities which are highly liquid in nature. Because these reserves might be required in their entirety as and when required.
- May require regulatory approval
- Output of catastrophe model provides loss estimates at various return periods. However, the company is entering into this LOB first time.

[0.5 mark per each point; Max 3]

PROs:
- Insurer can opt for a slightly higher attachment point of the CAT XoL Treaty
- Insurer can benefit from reduced premium towards CAT XoL reinsurance which may have higher profit loadings due to greater uncertainty, especially since this is a very new book
- Could help in achieving optimize the catastrophe protection
- Business volumes in year one could be uncertain. Company is venturing into the property line of business for the first time. If volumes achieved are not very high, the minimum premium deposit required could be on the higher side.

[0.5 mark per each point; Max 2]

CONs:

- o Difficult to establish the extent of savings
- o If it is not to be considered for taxation, it would be an additional strain in the initial year; also benefit of cat reserves reduces on account of taxation
- o Does not offer complete protection and CAT XoL treaty is still required albeit with a high deductible
- o CAT reserves only help towards smoothing of profits and not solvency protection solvency. So CAT reserve is not a substitute for a CAT XoL Treaty.
- o Further, claims within the attachment point of the CAT XoL treaty would reduce the CAT reserve. So the CAT reserve amount could fall below the desired levels

[0.75 mark per each point; Max 3]

[8]

[32 Marks]

Solution 4:

i) Possible advantages to Customers:

- Get to be aware of the average industry premium and can help decide whether to shop around for lower quotes or not
- In the long run, this could lead to greater trust in the insurance market
- Customers get aware of vehicle models which cost higher for insurance. This could lead to better informed decisions at the time of purchase of cars as they can have a better assessment of the cost of ownership
- Existing customers can know if they paid anything extra or less compared to an average policyholder with the same vehicle

[0.75 mark for each point; Max 3]

Possible advantages to Insurers:

- Can help identify segments where their premium rates are higher or lower when compared to the competition
- Can help insurers with low business volumes in benchmarking their rates

[0.75 mark for each point; Max 1.5]

Possible advantages to Other stakeholders:

- Better competition to improve market efficiencies
- Can also help in policy decision making for regulator
- Can help track assess the trends in premium rates etc.

[0.75 mark for each point; Max 1.5]   **[6]**

ii)
- Premium varies by IDV. Hence a premium rate (ratio of premium to IDV) could be a better measure. However, it would require customers to do additional calculations and may defeat the purpose
- For this, premium rate may need to be shown separately by age of the vehicle and the vehicle model
- The level of granularity of the index may be low. As a result, this could be influenced to some extent by the mix of risks, e.g., geography
- Extent of add-ons also influences the OD premium rate. Add-on information is captured in the data but the average OD premium rate does not indicate the extent of add-ons underlying the rate
- Driver details are not collected which heavily influence the risk but may or may not have influenced the pricing by the insurers
- Data quality could also be an issue

[0.75 mark for each point; Max 4]

iii)
- The organization could provide the average premium amount by age of vehicle, make and model and geography, add-ons selected to overcome some of the limitations   [2]
- The organization could also compile a separate rate index based on a model to track premium rate changes after accounting for some of the factors such as Age of vehicle, Geography, and Add-ons selected (Zero deprecation being the most common one):
  - This index could be based on a GLM applied on the policy data with premium rate (premium divided by IDV) as the target variable with policy year being the control variable
  - This control variable would pick up the rate changes
  - This will help indicate rates are going higher or lower

                                                                                                                                    [2]
- Or provide a calculator, web based or app based, rather than a report where the average premium amount is shown depending on as many rating factors and add-on coverages the customer may choose to enter among a fixed list of important rating factors that the organization collects from insurers
  - Customers can already verify their rate with quotes from other insurers on the web aggregators. But the rates could vary by channel as well. Hence channel also can be one of the parameters
  - This will help insurers and customers alike
  - But utilization of this tool by customers could be on lower side due to awareness which incidentally is the main problem this exercise aims to address

                                                                                                                                    [2]
- Since data is not collected with respect to the Driver details, it is not possible to overcome the last limitation mentioned above   [1]
- Standardised data formats to overcome data quality and also frequent data quality checks

                                                                                                                                    [1]
- Premiums may not be available at individual add-on level, so difficult to overcome

                                                                                                                                    [1]
    [2 marks for any reasonable solution; 1 mark for challenge not mentioned above]

                                                                                                                            [Max 8]
                                                                                                                            [18 Marks]

                                         ****