Institute of Actuaries of India

Subject SA3 – General Insurance

September 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)   Advantages:
  a. It may be a market practice
  b. Agents and intermediaries understand it easily
  c. System implementation is simple
  d. For motor OD, natural perils do not pose very high risk except during flood events; hence pricing can be relatively simple
  e. Rate for residential property can be advertised in prospectus / brochure which can help public make better informed decisions and also compare rates across different insurers very easily

(2)

  Disadvantages:
  a. Risk to natural perils varies quite significantly by location, hence premium charged is not commensurate with risk:
    • Cyclone peril is mostly prevalent to coastal parts of the country
    • Earthquake peril is not uniform across the country
    • Flood peril is very local, also depends on the height of the property being insured; which floor it is located in, etc.

(1.5)
  b. Insurer may end up with high concentration of exposure in areas which are more prone to natural perils which could impact profitability: (1)
    • Catastrophe reinsurance cost would be higher as compared to an even spread of risk   (0.5)

[5]

ii) Company is now gaining foothold in the residential property market. So company needs a detailed assessment to avoid major dislocation in terms of business plans and strategies. (1)

  There are also other stakeholders involved such as agents / intermediaries, claims personnel, regulator, reinsurer etc. (1)

  Having a clear view of the changes and their impact and advance communication with stakeholders could lead to a smooth transition. (1)

[3]

iii)
  • Identify rating factors which may be required by the CAT model and check if they are present in the existing data:
    o e.g., construction type for EQ; if unavailable, age of building serve as proxy
    o Floor level for flood risk
    o Exact location with latitude, longitude. If not the exact coordinates, can the address be geocoded to the extent possible

(1)
  • Price the historical book as per CAT model using the data to the extent of the details available:
    o Compare premiums charged vs premiums indicated by CAT model. Overall amount of premiums as per CAT model is same or more or less?
    o Do this at the region level

(1)
  • Impact on agents and intermediaries due to rate changes:
    o If the rate increase is too high in any region, business volumes may reduce especially since market may be following current approach
    o If the rate decrease is too high in any region, the quantum of commission would reduce per risk for the agent / intermediary
    o Agents / Intermediaries may also need to collect more risk related information

(any 2 points: 1 mark)
- Revised premium rates may require approval from the regulator (0.5)
- Company's business projections may need to be revised. (0.5)

- Movement of Claims personnel across regions may be required, if business mix by region changes (1)
- Company may implement it in phases. For example, in the transition period, divide country into various rating zones for EQ, Cyclone & Flood; and use introduce highly important rating factors such as floor level (1)
- Monitor if exposure is getting concentrated in specific pockets due to the changes (1)

[7]

iv) Advantages:
- Faster settlement helps insured with financial assistance immediately after the damage (1)
- Reduced claims settlement costs, which can be passed on to the customers in the form of lower premiums (1)

(1 mark for any of the following)
- Regulator & customers will be satisfied with faster claims settlement
- May help improve insurance penetration if the initiative is a success and other insurers follow; will also help improve public perception of insurance as a whole
- Insurer can get good image as a pioneer of this initiative, if it works well

[3]

v) Basis risk is the main challenge; however it need not be fully eliminated for this to work. (1)

Challenges (1 mark each):

a) Difficult to establish the water level after a flood event. Photographs of pictures before and after the event could give a reasonable estimate but not necessarily accurate. Also pictures of water could be old also. In the case of Cyclone also, wind speeds can vary especially depending on distance from coast. Therefore, establishing the exact wind speed could be a challenge but the figure in nearby area may be reasonable enough.
b) Arriving at claims severity (as a proportion of exposure) as a function of the event severity. This is essentially the role played by "vulnerability" module in the CAT models
c) The overall claims outgo (excluding loss adjustment expenses) could increase. Since the loss estimate from this parametric approach could be higher than what would be normally payable, at least in some cases. This could lead to higher claims ratio if premium rates for the pilot product are same as the standard product. But this would be offset to some extent by reduced loss adjustment expenses
d) If the pre-defined amount of payment is on the higher side, claims ratio can increase

Mitigation steps (1 mark each):

a) A video verification of the property at the time of underwriting and claim could reduce scope for fraud
b) Produce a highly simplified version of 'vulnerability' module of a CAT model. This could be the basis for arriving at the loss amount based on event severity.
c) Validating the above vulnerability module with a statistical analysis of loss events could help, particularly for Flood & Cyclone. EQ events are less prevalent in comparison, hence may not be possible

d) Do an extensive this approach on the past CAT claims which were settled by the insurer. Insurer would have collected all the details during claims settlement

Monitoring (1 mark each):

a) What proportion of claims are going through this settlement route? Are they smaller in size compared to the claims which are not going through this way?
b) Take a sample of claims which got settled through this route and assess the actual damage, purely for validating the settlement amount
c) However, this performance of this approach may never get tested in real life until there is an actual CAT event.

[Max 10]

vi)

Overview:
This industry data cannot be directly used for pricing even if it spans 10 years. This is because events such as Earthquake can occur at return period of 100 years etc.
Therefore, CAT models are a preferred approach to price the natural perils.

(1.5)

It needs to be assessed whether the data is available at the individual risk level or only statistics have been provided. If only statistics are available, it restricts the extent of utility of the data. (0.5)

Validation of Pricing:
The industry data can help make an additional check on the output of the CAT models. For example:

• Run the CAT model on historical CAT events on the in-force industry exposure at the time of the event to arrive at the loss estimates. Are the loss estimates in line with the actual claims paid based on industry data? (1.5)
• Insurer can also run the CAT model on historical CAT events on the in-force insurer's current exposure to arrive at the loss estimates. This estimate can be gauged for reasonability. (0.5)

Claims Settlement Exercise:
Establishing the pre-defined claim amounts under the claim initiative would require highly detailed data whereas industry data may not be so granular. (1)

However, it could help validate at a very broad level. This could be relatively easier for Cyclone than Flood. (1)

For past CAT events, data may need to be gathered in terms of flood water level / wind speed etc. in various localities. The claim payout formula may be applied based on these parameters on the in-force industry exposure to get claims estimate. This estimate could be compared with the actual claims paid out. This working would involve many assumptions due to lack of detailed data, but could serve as a high level reasonability check. (1.5)

[Max 7]
[35 Marks]

Solution 2:

i) Risk Attaching basis and Loss Occurring Basis:

- Risk attaching basis covers all policies which have been underwritten and incepted during a given period, irrespective of when the losses occur in the future periods. There are chances that the losses in such policies can emerge several years later and the insurer would be liable to pay for such losses
- In loss occurring basis the insurer agrees to indemnify losses occurring during a given period irrespective of when such policies were written

(2)

ii)   Advantages:
- For professionals losses occurring basis may not be relevant as they will be not be protected for future liabilities for e.g liabilities that might arise post retirement in the absence of cover for what has happened in the past
- The loss occurring basis may offer lower premiums due to less uncertainty attached to the same
- From insurer standpoint the loss occurring policies will have a smaller tail

(3)

iii)   The following points need to be considered:
- Splitting of claims in large claims and regular attritional claims
- See what is typical time to settlement. The claim triangles would be able to typically point that out. Since the company has experience in writing the business the triangles should be available
- Attrition claims may not undergo a huge change in terms of treatment
- Large claims may need to be analyzed or projected separately
- Reinsurance needs to be taken into account for the same. The proportional and non-proportional reinsurance arrangements would have differing impact on the gross and net reserves
- The interlinkages between different reinsurance contracts may also be need to be looked at
- It may so happen that claims which were below the threshold level are now eligible for reinsurance recovery
- If there are changes in reinsurance in between different UW years the same needs to be accounted for
- The reinsurance treaties need to be looked at to see if recoveries would change in the future or not
- The court judgement may not just impact the amount of the claims but may lead to more claims being reported as well
- For existing claims the claim details may need to be looked at to understand if the court judgement can lead to higher payouts
- See if a particular profession or geography has a disproportionate exposure to the judgement
- The reinsurers considering they have significant exposure may have already come up with certain benchmarks of the impact of the same. The same can be made available for the re-estimation of the reserves

(10)

iv)   The calculations are as per table below:

Assumptions:

- No deficiency in premium charged
- Claims occur uniformly throughout the periods
- No changes in reinsurance conditions
- Incurred losses has a provision for IBNR

(2)

Year	GWP (1)	Incurred Losses (2)	Average Rate (Average Premium/ Average SI) (3)	Rate Index-Premium (4)= {20% (Value in 2023)/Respective Value in column (3)}	Premium Index (5)=(1) x (4)	Losses-Standardized (6) = Claims inflation compounded * (2)	Loss Ratio-Indexed (7)= (6)/(5)	Ceding Commission (8)	Expenses (9)	Combined (10) =(7)+(8)+(9)	Profit Commission (11) =15%*max (100%-Column(10)),0)	Total Combined (12)= (10)+(11)
2015	175	80	9%	222%	389	128	33%	20%	5%	58%	6%	64%
2016	260	120	10%	200%	520	180	35%	20%	5%	60%	6%	66%
2017	420	200	11%	182%	764	284	37%	20%	5%	62%	6%	68%
2018	570	290	12%	167%	950	388	41%	20%	5%	66%	5%	71%
2019	635	360	14%	143%	907	454	50%	20%	5%	75%	4%	79%
2020	700	435	15%	133%	933	518	56%	20%	5%	81%	3%	83%
2021	740	920	17%	118%	871	1,034	119%	20%	5%	144%	0%	144%
2022 (Full year forecasted)	850	600	19%	105%	895	636	71%	20%	5%	96%	1%	97%
2023			20%		**6,228**	**3,622**	**58%**	**20%**	**5%**			**83%**

(8)

Issues to consider:

- More explanation is needed as to why the experience in 2021 showed an aberration
- Was It because of the pandemic which caused a sudden increase in losses or were there few large claims reported. In case large losses were reported the losses should be uniformly spread across the different periods under study to smoothen out the effect of the same
- Exposure analysis is required to see if they have remained constant and also to check if the business mix has remained constant throughout the period
- The forecasted loss ratio for 2022 is worse off. Need to investigate the reasons for the same. It could be because of increased underwriting relaxations
- From the reinsurer standpoint the reinsurer is making around 12% profit on the book before the profit commission. Does the same satisfy his internal rate of return required on capital deployed
- No investment income has been assumed here. Incorporating the same will make it further viable
- Overall, seems a profitable arrangement from a reinsurance standpoint

(5)
[15]
[30 Marks]

Solution 3:

i)   The following are the requirements within an ALM policy:
- Risk appetite
- Risk Management philosophy
- Market risk framework
- Regulatory requirements
- ALM Governance framework
- Risk limits, risk tolerances
- Escalation matrix
- Sources of ALM Risk
- Methodology for calculation for both assets and liabilities
- Operational policies

[0.5 marks for each, max 5 marks]

Management of ALM:

- The objective of any investment policy is to maximize returns within the given constraints of the risk appetite
- Liabilities should be matched ideally basis the nature, term and their currency.

- Some lines of business on the retail side like health insurance and motor own damage insurance would have short tailed liabilities which Liability insurance lines including motor third party liability will have long tail
- For short tailed business the assets should be invested in cash or cash equivalents or liquid instruments or else the requirements of this business would have to be financed by working capital or selling longer duration assets
- The assets held should ideally provide a protection against inflation
- The investment of assets should conform to the regulatory guidelines and there might be limits in place on minimum and maximum investment in each asset class and sublimits on composite exposures as well.
- The level of mismatch and risk appetite would depend on how much free cash the insurer has. The more the free cash the more risk the strategy which can be adopted
- Regulatory aspects or group company aspects need to be considered. For e.g. What is the maximum amount of mismatch allowed. Has it been defined
- From a regulatory standpoint certain assets may not be considered admissible from demonstration of ALM.
- From a solvency standpoint the ALM in the current solvency regime may not provide any reduction in capital requirements. However, a matching strategy where movement in interest rates would be absorbed by a suitable strategy may reduce economic capital requirements in the future
- Considering that the company is writing international exposure as well it is important that currency exchange risks are also managed.
- The overall business strategy would also define the investment of free assets. A more liberal approach might be taken to investment assets which are not earmarked for solvency purposes
- In falling interest rate regime there might be situation where the company may want to put investments in higher duration bonds to lock in higher yields. However, the same may not be coherent with the duration matching. As such the extent of mismatch also needs to be defined.

[0.5 marks for each point, Max 5 marks]

[10]

ii)

- The downgrade is because of overall economic slowdown. A downgrade would increase the yields to take into account higher risks. The selling pressure would be huge on the bonds. If the same has happened for a lot of companies the overall bond yields can sharply rise. An increase in yield would lead to fall in asset values. Since liability discounting is not allowed it can show as ALM mismatch   (3)
- If large scale downgrades happen it can lead to downgrade of sovereign debt as well which can have cascading impact on liabilities dominated in foreign currency   (1)
- The company may find it difficult to deploy money as the relatively safer instruments might not be available

(1)

[5]

iii) The following stress scenarios can be formulated by the regulator:
a. Rise in yields- say 20% rise and fall in equities   (2)
- Asset values will fall
- Since discounting of liabilities is not allowed the impact the liabilities will not fall subsequently
- Solvency might be significantly lower as negative fair value change would have to be realized
- Capital call may be required

b. Fall in new business volumes   (1.5)
- The companies might not be able to achieve its top-line targets
- Expense ratios may increase and overall loss may increase
- Capital call may be required

c. Increase in loss ratios for affected lines of business   (1.5)

- If the companies are exposed to credit guarantee kind of products the loss ratios may increase significantly
- The increase in loss ratios will severely dent the profitability of the companies
- Solvency will be significantly lower

[5]
[20 Marks]

Solution 4:

Product Design & Distribution: New product in the market. New for insurers, intermediaries, customers alike. New types of cyber risks could emerge rendering the cover obsolete. Claims assessment and exclusions should be clear to avoid any disputes. Given the complexity of risk, arriving at simple product will be a major challenge.   (2)

- Clearly convey exclusions, and items which are payable and not payable
- Perhaps separate specialized sales personnel can be trained in this product and they can interact with customers with explaining this product
- Before launch: Check if coverage is as per industry features. Do an extensive survey of similar products in both India and aboard to find latest evolved coverage features
- Before launch: Take reinsurance support in product design and pricing
- Before launch: Are the customers able to understand the product and the need for it, finding coverage adequate?
- After launch: If no extensive market survey was done before launch, company can enquire these aspects with customers who purchased, those who did not show interest after understanding the product

(1 mark for each point above)

Pricing: No relevant data in the market. Base Office premium rates could be heavily dependent on assumptions, rating factors could be complex and difficult to obtain. Regulator will require adequate justifications of pricing assumptions for approval.   (2)

- Before launch: Check rates by coverage features, across the world
- Before launch: Take reinsurance support in product design and pricing
- Before launch: Survey to find if the customers finding premium reasonable and something they would pay?
- After launch: Conversion of quotes to policies and survey of customers who took quotes can help

(1 mark each for above points)

Reserving: financial loss from unauthorized transactions may be identified very early. But identity theft cases can take time to emerge

- Expected Loss ratio method may be used for reserving for indemnity theft cases   (1)

Loss Prevention Measures: Adverse selection, moral hazard could be difficult to identity

- Educating customers about safety measures, antivirus tools etc.
- Are they any early claims, indicating adverse selection?

(1)

Business Mix and Volumes: Are the business volumes going as per expectations? Is the mix of business highly concentrated in any risk segments? How to segment business based on risk factors, and what are those risk factors?

(1)

Capital: Risk based capital requirement could be higher than the statutory requirement. Accordingly, the profit margin may need to be higher than typical products.   (1)

[Max 15]

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