Institute of Actuaries of India

Subject SA3 – General Insurance

May 2010 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

1.   (i) Changes to be considered with respect to

    1   UW process: to highlight difference between class rated and individual rated products. Process for underwriting large and medium risk to be different than existing process.
    2   UW skills: Specialised skill required to underwrite different manufacturing industries. Knowledge of safety and hazard conditions in different manufacturing process varies. The underwriter has to be flexible in his approach to underwriting the risks by adjusting the covers to meet the insurance needs of the client and also the risks faced by them.
    3   Claims settlement process experienced surveyors: Compared to uniform policy conditions and claims settlement process in retail business, in commercial business policy conditions vary and hence claims settlement process would be dependent on specialized skill of the surveyors and claims personnel. If the company does not have the required skill set then the claims settlement work may be outsourced.
    4   Distribution channel – sales channels would be different. It would be important factor in the success of the new venture. Compared to retail distribution, commercial insurance sales have to be driven more by brokers or visit of the marketing personnel to the client companies and making presentations. The choice of distribution channel can affect the commission / business acquisition costs. In turn, individual quotes and overall acquisition costs of portfolio would be subject to variations.
    5   Business strategy – Lead insurer or co insurer.
    6   Capital requirements – capital requirements would be higher, if the retention limit is higher for the commercial business. The proposal to enter commercial business should be weighed by also evaluating cost of capital and opportunity cost of capital.
    7   Reinsurance requirements – Surplus treaty, XL and Catastrophic covers would be required. The reinsurance terms may vary depending on the confidence the reinsurers have on the UW capability of the company in commercial business. With no previous experience, company may have to depend on reinsurer's expertise with cost implications?
    8   IT requirements – New policy and claims system –
    9   Actuarial skill sets – Rating of retail products depends on GLM models. For commercial products pricing the actuarial methods are different
    10 Business environment –
    11 Understanding the client –
    12 Customer service ability –
    13 Reasons for getting into commercial business, is there a synergy somewhere business in other LOBs? Does this really increase profit/ reduce fixed costs?
    14 Risk management implication – The risk measurement and control environment has to change significantly. The Chief risk officer has to develop controls to monitor the risk accumulation due to underwriting of large risks. There might be underwriting licensing limits set for the company.
    15 UPR calculations – For some commercial policies the risk is not uniform across the policy duration. In such case the company has to arrive at an actuarial formula for calculation of UPR based on the risk accumulation of each such policy. There should be system capability to handle this.
    16 Reserving – IBNR and IBNER reserve methods may be different from those for the retail lines of business.
    17 Market perception about the company – Does the market feel that the company is a retail specialist. If yes, then big commercial clients may not be willing to offer business to this company.
    18 If the company is with a foreign partner then the extent of expertise that the foreign partner would like to bring in. if the foreign partner is a commercial business specialist then the Indian counterpart can benefit from the expertise.

19 Future business plan to show whether investing and setting up the commercial section will yield the required level of return to capital

20 Board approval of the underwriting philosophy – The Board has to approve the segments in which the company wants to grow its business, the risk selection process and the risk monitoring process. Profitability would vary by market segments. The Board has to approve the UW delegation of authority. The quarterly reporting format of commercial business also has to be approved by the Board.

21 File and use of the new products – specific reference to Form C; rating factors, overall expected loss ratio
   a. The new products have to be filed with the regulators with rating logic and rates to be charged for different risk categories
   b. The risk categories may be as per the erstwhile tariff or new slabs

22 Financial viability certificates and the assumptions that Appointed Actuary will base his / her certificate.
   a. Commission
   b. Expense ratio
   c. Expected loss ratio

(ii) a)

Market conditions post detariff – due to fall in rates post detariff for the commercial products, there might not be adequate rates received for the risks underwritten. In turn, could have significant impact on overall profitability levels of company.
Other effects:

- Companies specialising in certain properties
- Greater participation in coinsurance especially by smaller companies
- Some companies setting up risk advisory services to attract business

(ii) b) Pricing

1. Description of retail pricing which would be based on GLM models with sufficient data. On shifting to commercial business the company has to develop new pricing methods.
2. Commercial pricing based mainly on exposure rating and experience rating
3. During the period of tariff in Fire insurance business the rates were outlined in the tariff and hence there has not been a need for developing pricing models for fire line of business. Hence there may not be ready expertise available in the market pertaining to Indian scenario.
4. In India , the fire tariff was based on different base rates for different industries. The base rates may be modified based on exposure analysis.
5. UW to decide the risk matrix for doing risk inspections, at what SI level risk inspections should be done or for what industries
6. Actuaries may have to help the UW develop the rating system for discounts based on the UW judgement, guidance from tariff, industry experience, loss reports of commercial losses, inputs from reinsurers.
7. Methods of pricing commercial risks
8. Operating environment
9. professionalism issues
10. The role of the actuary in a commercial business environment is different from that of the an actuary in the retail business.
11. Accumulation control
12. Negotiation with third parties to explain rates e.g large clients and reinsurers

13. Consequence of mistake is severe loss to the company?
14. availability of data will be an issue
15. Alternate sources of data : client, broker, reinsurer, insurer or its foreign partner
16. Data characteristics

(iii)   The company may start this new area of business provided the Board and the management understands the various risks involved in the new venture and as highlighted in the parts i and ii.

The Board has to agree on the reporting formats that should be presented before the Board for monitoring of this new portfolio. The Board has to agree on the frequency of the reports also.

The Board has to approve the capital protection plan incorporating the reinsurance arrangements of the new business and the risk and compliance monitoring framework.

The fire insurance market in India has been under tremendous price pressure with discounts being offered up to 90% of the erstwhile premium. However, with increasing focus on underwriting profitability the prices are expected to increase based on the risk inspections carried out at the time of insuring the risk.

Moreover, it is expected that there would be pressure from the reinsurers to force the insurers to write more profitable books in Fire and hence the insurers will be forced to correct the prices in the fire line of business.

Hence with correct portfolio monitoring in place and with clear business and underwriting direction, it may be a opportune time to enter the market and build up the client base in anticipation of turn around of prices in near future.

(iv) Directors and Officers Liability policy

Coverage: D&O cover is a form of liability insurance which will indemnify directors or senior managers of a company against them, or their company being sued for the acts they have committed. E.g they may have unfairly dismissed an employee. Deliberate frauds by the directors or the senior managers are not covered under this policy.

Rating: Most commonly used measure is the turn over of the business. Another measure that may be used is the net assets and liabilities. The nature of the company will be an important factor in assessing the level of the premium. Since this is an individually rated product the underwriters judgement plays an important role and the premium levels may depend on his subjective evaluation of risk.

Reinsurance: This product is a reinsurance backed product since underwiritng large risks may result in large claims which may pose a risk for the capital of the insurance company. Hence the reinsurance program should be a mix of surplus and XOL with the max retention level being approved by the board. The reinsurance team should also monitor the accumulation risk at a group level for any corporate they are insuring.

Synergy with existing business: D&O is a specialised product involving specialist underwriting capabilities and reinsurance support. Unless the company can demonstrate sufficient business

potential investing in speciality team will not be cost effective, neither will the company able to get support from reinsurer. Given the company's existing expertise in retail lines only it may be sometime before the company can establish itself as a diversified insurer. So till such time, this product seems to have less synergy with the existing business.

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2. **2nd Year of operation:** In the 2nd year of operation the company will have data available for 4-7 quarters only. By that time, there may not be enough credible data available with the company to apply any statistical methods of reserving based on its own data, apart from for the very short tailed LOBs such as Health.

Expected loss ratio (ELR) method can be applied to set-up IBNR reserves in absence of any credible development pattern. Expected LR on the earned premium is used to estimate the expected ultimate claim in the method. The IBNR reserve is then calculated as ultimate less incurred.

As there is no published market statistics of claim development available in India, we cannot use market factors.

For the short tailed retail LOBs Motor OD and Health, the claim development pattern available may be used.

For these LOBs, Bornhuetter-Ferguson (BF) method is more suitable in this case as it will give weight to the expected loss ratio and any distortions in the Chain-Ladder link ratios due to lack of data will be reduced.

Even for short-tailed LOBs, the triangle may not be fully run-off. A subjective selection of a tail-factor may be needed in that case.

As the company would be new, there are chances of under-pricing due to lack of any market statistics available for many LOBs….

There may be aggressive discounts given during the initial growth phase

A pattern for such a case should be looked for. If the combined ratio based on the actual claim experience and loaded expense levels is more than 100%, a Premium Deficiency Reserve (PDR) or Additional Unexpired Risk Reserve (AURR) may be required.

However, even one large claim in the Fire LOB may make the loss ratio (LR) very high.

Judgment should be applied to understand if those large claims should be included in the PDR analysis. Based on the assumption of the return period of a large loss experience (in how many years such a large claim takes place), the experience may be smoothened out to estimate the adjusted LR.

6th Year of operation:

By this time there will be enough credible data to estimate link ratios.

Motor OD and Health:

Based on the size of the business sub-segments, dividing the data into two-wheelers, private cars, commercial small vehicles, commercial large vehicles etc may be considered.

The business sub-segments in case of health could be Individual and Group health, Personal accident and Travel insurance.

There should be enough experience in each of the sub-segments so that statistical methods can be applied. A small segment with small amount of data may be aggregated with another similar segment.

Traditional statistical methods such as the Chain-Ladder, Average Cost per Claim (ACPC), BF method or a blend of these can be used.

There are some caveats while estimating link-ratios using a run-off triangle which should be kept in mind, such as:

- The claim processing pattern may change making the past period link-ratios invalid for the recent years.

- The first period may not be fully run-off.

- In case of amounts triangle, the past inflation may not be appropriate to use as future inflation estimate.

- There may be premium rate changes so that past period expected LR may not apply for recent periods.

- The level of underwriting or discounts may change from the past to recent years.

If the triangle is not fully run-off, a suitable tail factor should be selected. The tail factor may be based on judgment in lieu of any market link-ratios in India.

The loss ratio assumptions to be used for the BF method should be validated using past claim experience, rate changes and changes in underwriting guidelines.

Fire: Fire LOB should also be broken down into Personal, Commercial and Industrial segments.

Fire claim frequency is not as high as Motor OD and Health. So the number of claim development may not be reliable if the portfolio size of the sub-segment is small.

For personal fire segment, methods similar to Motor OD and Health can be used.

Commercial and Industrial segments are prone to some large claims which may distort the claim development in the triangles.

Large claims should be taken out of the data and dealt separately by case-by-case discussion with the claim managers….

Large claims can be defined as either above a certain percentile of the claim amount distribution or above a certain percent of PML.

For Fire, the insurer is likely to buy additional reinsurance on top of the obligatory 10% Quota Share cession with GIC Re.

The reinsurance treaties in the past will affect the claim development patterns. The reserving analysis should be done keeping the effect of the applicable treaty in a year in mind.

Reserving may be done using the net triangles or it can be done using gross triangles and then aply adjustment for reinsurance.

Motor TP: The reporting is very delayed in this LOB. As there is no market statistics available exact tail behavior is not easy to predict in the sixth year of operation.

Claims running in courts may continue up to more than 10 years in some cases.

The settlement pattern also depends on the company's philosophy about out-of-court settlements.

In the sixth year, reporting delay pattern may be estimated reliably. So, pure IBNR number of claims can be estimated. The above points make the estimation of IBNER difficult.

A suitable tail factor with sufficient margin for prudence be used for estimating the ultimate claim amounts and the IBNR.

BF method will be suitable in this LOB so that claim development can be blended with the Expected Loss Ratio.

Liability: This line may be a combination of Worker's compensation, Public liability, Product liability, Error and Omissions, Directors and Officers or other liability sub-segments.

Depending on the size of each of the sub-segments, there may be sufficient claim experience to little claim experience.

For segments with little claim experience, either ELR (as described above) method can be used.

For segments with credible claim data, similar methods as described for Motor TP can be used.

For the LOBs and sub-segments with credible claim experience:

For all LOBs and sub-segments with credible claim experience data, stochastic methods such as bootstrapping and Thomas Mack method can be used to derive reserve ranges. Reserves estimates can be calculated at a certain percentile of the reserve ranges.

9th Year of operation:

The reserving methods will not change much from 6th to 9th year.

Pattern of occurrence of large claims on Fire will be more credible due to bigger exposure in the recent years and the related claim experience. This will enable better estimation of the expected loss ratio for the recent years.

Motor TP and Liability lines will have more claim development and the tail behavior of the claims may be clearer.

The claim run-off triangles may be made on a yearly basis now. This will bring smoothness to the link ratios by removing the noises due to quarterly claim developments.

Due to more data available, stochastic methods can be used for

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3.

i) A form of proportional reinsurance where the proportions are determined by the cedant for each individual risk covered by the treaty, subject to limits defined in the treaty.

The treaty specifies the maximum retention (say R) for the insurer and the maximum cover available from the reinsurer, which is generally a multiple of R.

ii) For risk 1, the proportion ceded is 50%.
For risk 2, the proportion ceded is 90%.

iii) The ceded proportion in this case is = 50%
The amount paid by the surplus reinsurer is 50% of 15,000,000 i.e. 7,500,000.

Out of the retained amount of 7,500,000, a part of the claim falls in the excess of loss layer.

7,500,000 – 5,000,000 = 2,500,000 will be paid by the excess of loss reinsurer.

The final retained amount of loss by the insurer is 5,000,000.

Iv)

Points to consider in reserving on gross of reinsurance basis:

The loss development for a year will not be affected by the treaty structure.

So the average link ratio will not be distorted due to changes in the treaty structure over the years.

But adjustments to the gross reserves to calculate the net reserve for an occurrence or underwriting year will be difficult.

Generally, the proportional treaty is based on underwriting year and XoL is based on occurrence year.

If the claim cohorts for the reserving is based on underwriting year, the adjustment for Surplus treaty may be easier based on the treaty effective in that underwriting year….

Even in that case the ceding proportion for each risk will vary depending on the size of the risk and an approximate ceding proportion may need to estimated and applied to estimate the net reserve.

If the claim cohort is on occurrence period basis, estimating an approximate ceding proportion for a cohort may be difficult.

A more accurate ceding proportion per risk may be calculated and applied on each claims. For developing a single claim to ultimate, the overall link ratios derived using the gross triangle can be used. The ceding proportion can then be applied to the gross ultimate claim…..

This accurate method will work well for both the underwriting and occurrence period cohorts.

Points to consider in reserving on net of reinsurance basis:

The claim development in a year will depend on the treaty structure in place for the year.

If the claim cohort is occurrence period basis, two different treaty structures might be applicable on different claims in the same cohort.

The smaller claims will keep developing till final settlement. Some large claims will not increase any further after reaching the XoL attachment point. As these claims are also large, due to the higher weight, it may potentially distort the link ratios.

The Chain-Ladder link ratio is a volume weighted average of age-to-age factors. The net claim amounts in a year depend on the treaty structure. In such a case, even if the gross claim is high, due to a high proportion of ceding the weight for that year will become less as the net claim will become low. This may bring potential aberration to the calculations.

OR

Even if there are no large claims which breach the XoL attachment points, the link ratios calculated based on gross and net basis will be different due to different treaty structures across the years (and hence different weight to different claim years).

Consideration applicable to both methods:

As the XoL is with high attachment point, only the large claims will breach the attachment point. These claims may be removed from the reserving analysis and treated on case-to-case basis.

If possible, reserving should be done using both the gross and the net triangles and the results should be compared for consistency.

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[Total Marks 100]

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