

Institute of Actuaries of India

EXAMINATION

6th November 2008

**Subject ST3 — General Insurance
Specialist Technical**

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.

(a) Risk attaching basis: A basis under which reinsurance is provided for claims arising from policies commencing during the period to which the reinsurance relates.

The insurer knows there is coverage for the whole policy period when written.

(b) First loss: A form of insurance cover in which the sum insured is less than the full value of the insured property, so that the policyholder has to bear any loss in excess of the sum insured.

It is appropriate in circumstances where the policyholder considers that a loss in excess of the sum insured is extremely unlikely or the item is effectively priceless.

Commonly used in fire business/ commercial property.

This approach is used to establish a more relevant figure for the sum insured on which to base the policy coverage.

(c) Discovery period: A time limit, usually defined in the policy wording or through legislative precedent, placed on the period within which claims must be reported. This term is used in policy wording to provide certainty regarding the length of time the (re)insurer is exposed to the risk of receiving claims, i.e. it limits the (re)insurer's exposure.

It generally applies to classes of business where several years may elapse between the occurrence of the event or the awareness of the condition that may give rise to a claim and the reporting of the claim to the insurer, e.g. employer's liability or professional indemnity.

(Total 6 Marks)

2.

Cost structure changes will include:

IT development costs — recruitment and equipment costs.

Overheads may fall as efficiency gains are achieved.

Advertising costs may increase in the short term to help achieve the desired target level of business, though may fall in the longer term where less expensive means are available on the internet.

Cheaper claims handling may become possible where smaller claims are handled over the internet and by use of e-mail.

Broker Arrangement:

Brokers' fees should fall overall as less business is put through them.

However, the costs per policy may rise where less cost effective deals are struck (i.e. the costs fall less than the business going through the brokers).

Effect on broker relationship.

Capital efficiency should improve as the balance of premiums with the brokers should fall.

This will free up a portion of the insurers assets which were otherwise tied up. Shift to fixed expenses from variable.

The cost structure will change as more of the expenses (maintaining an infrastructure) are fixed and less (commission) are variable.

Premiums calculation:

Another complete set of premium rates will be required.

and different rating structure

It should be easier and more cost effective to update these periodically to take account of new experience.

More frequent updates will become possible.

More sophisticated premium calculation system may be possible.

More extensive policyholder information can possibly be captured via this medium by developing easy to use system.

Also greater flexibility in data collection enables potential new rating factors to be collected and tested.

Test the market with the rates

and take account of competitors' rates

Business mix and volumes:

The mix of business will change as those purchasing insurance via the internet will have different characteristics.

Likely to be more sophisticated.

Different geographical spread

Possibly increased proportion of policyholders in the 20–40 age range.

Thus an increase in the concentration of risk is likely.

The projected volume of business is highly uncertain.

A lot will hinge on advertising

the design of the website and

social trends towards the increasing use of the internet at home.

Persistency may increase due to the ease of renewal via this medium.

This in turn may help to reduce costs per policy and thus premiums.

With this sales medium likely to become more popular in the future, early entrance to this potential market may reap rewards in the longer term through generating customer loyalty.

Reinsurance arrangements:

Premiums may need to be negotiated where reinsurers perceive an increase in risk: perhaps due to potential increased concentrations.

New aggregate excess levels may be desired due to the increased concentrations.

Any quota share arrangements may need to be renegotiated as the reinsurer may be less comfortable with the change in approach.

There may be increased risk of fraud early on as the system developed will still be in its infancy.

Technical help from reinsurer

(Total 12 Marks)

3. (i)

Let growth in business = k

Premium in previous year = P

Premium this year = $P * (1 + k)$

Post tax profit = $P * (1 + k) * (1 - 0.7 - 0.1 - 0.1) * 0.7 * 0.9$

= $P * (1 + k) * 0.063$

Solvency margin required = $P * (1 + k) * 0.5$

Profit generated = additional solvency margin

$P * (1 + k) * 0.063 = P * (1 + k) * 0.5 - P * 0.5$

Solving for k gives 14.4%

Assuming no investment return

Commission, management expenses, loss ratio and profit distribution continues at same rate.

Calculation is done annually

No reinsurance

No complications in the calculation by considering progress of underwriting reserves etc.

3 (ii)

Grow more quickly by:

Charging higher premiums for the same exposure

or reducing cover for the same premiums

subject to price sensitivity

Stricter claims control.

Improved UW / risk selection

Reducing expenses and policy acquisition costs.

Reduce premiums with increase loss ratio more than offset by the reduction in per policy expenses

Reducing the dividend that it pays out / not pay out a dividend at all.

Raising additional capital.

Buy additional quota share reinsurance.

A suitably structured financial reinsurance deal

Change investment strategy to increase investment return.

Incorporate in a tax haven.

Incorporate in a country with lighter insurance regulation.

(Total 11 Marks)

4. (i)

The company must have an insurable interest in the risk being considered.

- The risk must be of a financial and reasonably quantifiable nature.

- Also, ideally the risks should be independent of each other

- Should be an ultimate limit

- Should minimise moral hazard

- And the probability of incidence should be relatively small

Although in practice insurance can be provided even when these ideal criteria are not met

4 (ii)

Employers liability

- Indemnifies the insured against legal liability to compensate an employee or their estate for bodily injury, disease or death suffered, owing to negligence of the insured, in the course of employment.

Public liability

- Indemnifies the insured against legal liability for the death of or bodily injury to a third party or for damage to property belonging to a third party, other than where covered by other liability insurances.

Fleet motor 3rd party liability

- Indemnifies the insured against compensation payable to third parties for personal injury or damage to their properties.

Product liability

- Indemnifies the insured against legal liability for the death of or bodily injury to a third party or for damage to property belonging to a third party, that results from a product fault.

Property (General)

- Indemnifies the insured against value of loss or damage to the property or its contents, subject to any limits or excesses.

Commercial Property

- resulting from pre-specified perils, e.g. fire, storm, lightning, flood, theft, explosion, etc.

Fleet motor property

- resulting from accidental or malicious damage, fire, theft, etc.

Marine & Aviation property (if oil industry then own tankers etc.) and Goods In Transit

- resulting from fire, explosion, jettison, piracy, etc.

Professional Indemnity

- if professionals in the company are negligent in the provision of their services

Directors and Officers

- for protection against company being sued for acts performed by directors and officers

Fixed Benefits

- for medical benefits / sickness scheme

Pecuniary Loss

- Protects the insured against bad debts or failures of a third party

Fidelity Guarantee

- covers the insured against financial losses caused by dishonest actions by its employees

Business Interruption

- indemnifies the insured against losses made as a result of not being able to conduct business

Other valid types e.g. Project Insurance in case project to expand costs more than expected

4 (iii)

The extent to which risks are already covered for this company

The extent to which similar risks are covered in respect of other companies

Relationship with insured and past profitability

Likely profitability of additional business

How will the cover be structured? Will the company be looking for a multiyear contract?

Any other potential concentrations of risk

- by class of business

- geographically

Current level of free reserves. What scope is there for new business.

Reinsurance / co-insurance arrangements in place

- Do these risks fall within existing treaties
- If not, how easy will it be to arrange additional cover, facultative or additional treaties

Any legislative requirements / restrictions

The Board's attitude to risk

The potential for long-term involvement/desire to maintain existing involvement

Current classes of business authorised

Willingness to extend classes authorised to write

Business strategy

Staff expertise in areas of potential insurable risks

Competition: clearly this would bring in a considerable volume of business / premium income

What data are available to assess the risks to be insured

4 (iv)

Large company, so quota share treaties unlikely to be used

Surplus may be needed for large commercial property risks if insurer does not write much of this business

Need to determine retention and number of lines for each risk

However, likely to use the full range of non-proportional reinsurance products available.

XOL policies cover the insured for losses arising above a pre-specified lower limit up to a pre-specified upper limit

Risk XOL relates to single risks

Aggregate (clash) relates to accumulations on multiple risks, due to a single event, or from a single cause through time

Cat XOL relates to losses arising within a pre-determined time span from pre-specified events

Stop Loss relates to cohorts or portfolios of risks

These policies will often have a Stability Clause (particularly for liability business) . i.e. indexed limits

Risk XOL is likely to be arranged to cover risks such as marine & aviation property damage.

Aggregate XOL may be arranged and include several layers;

- for each class of business separately
- aggregated over several-classes
- aggregated by insured

Place business with different insurers to spread risk of reinsurer default

Cat XOL may be arranged to cover against specific pre-defined events, such as Hurricane, Earthquake, etc.

Stop Loss may be arranged, though for a large multi-national it may not be available

4 (v)

If the risks fall under existing treaties then they will be automatically covered.

However, if not....

The current relationship they have built up with your company

Their confidence in the ability of the multi-national's underwriters to accurately assess the risks

Confidence in insurer to deal with claims in acceptable manner

Influence of business written by insurer

Availability of reinsurance for business it accepts

Availability of profit sharing arrangements

The quality of data provided

The cover already provided in respect of:

- the insured in question from all cedants
- other risks with your company
- each class of business for all cedants
- within the company's geographical regions of operation

Available capacity

Claims experience in respect of each of the classes/ risks

Whether it is authorised to cover all of the classes required

(Total 28 Marks)

5

Liability outgo is gross claim payments less reinsurance and other recoveries plus expenses less outstanding premiums received plus tax and dividend payments

Each of these items can be projected in the same way as for reserving calculations

It is individual period by period projections that are important

Calculations should at least initially be done on a quarterly or monthly basis to take account of any seasonal effects

Project the future cash flows for existing business (to date) by developing run-off triangles

We may use "year business written" as origin year to develop the cohort.

Make realistic assumptions about future experience for the run-off triangle, e.g. about future inflation for the inflation adjusted chain ladder.

Project other outgo in each future period on a consistent basis.

Project the proceeds from the existing assets for the same time periods as for the liabilities.

The starting point is the current annual income from each of the different asset categories (i.e. equities, fixed interest etc).

Project the current income amounts to calculate the future asset proceeds-

For fixed interest, use the known coupon and redemption proceeds.

For equities assume a future growth rate consistent with the inflation assumption

Compare these asset proceeds with the liability outgo for each period

A deterministic model with capability for varying assumptions (using parameters) may be used

Alternatively, we may use a stochastic method, using random variables for the key parameters (but this is much more complex!).

Analysis of the past variation of these parameters will help us decide on the distributions to use.

In either case, we have to run the projection many times to assess whether the asset distribution is robust to changing assumptions
Change the distribution of assets between the main categories until we find a distribution that is appropriate.

Also test the expected market value of assets against the liabilities at future times.
Use assumed yields at future dates to convert the income streams back into market values.

(Total 10 Marks)

6(i) (a) Basic principle to follow.

Ensure that they correspond, i.e. the claims included in any analysis are related to precisely the periods and policies from which claims in that grouping could have arisen.

(b) Main purposes of claims and exposure analysis

- estimating the cost of outstanding claims to set reserves
- monitoring the actual run off of outstanding claims against estimated amounts
- monitoring the adequacy and use of reinsurance
- To assess the performance of different underwriters. For classes where risks are non-standard
- To assess the quality of business from different distribution channels: whether any of the sales outlets need to be reviewed.
- reviewing present premium rates, and for pricing new or amended products
- financial planning
- monitoring the insurer's asset/liability position

(c) Main points:

1. The purpose of the investigation?
2. For some analyses, the differentiating factors do not have much of an impact on the results.
3. Adequacy of reliable data to support detailed analysis by risk group

6(ii)

Check for consistency over time, so that past patterns can be correctly identified and projected:

Definitions: e.g. when dealing with multi-claim events

Admin changes: e.g. changes in speed of processing claims affect payment pattern and IBNR)

Nil claims: whether included or not

Large claims: distortions to be identified

Concentrations: distortions to be identified

Unsettled claims: whether suitable estimates have been included

Unreported: any information about IBNR (overall, not individually!), e.g. speed of reporting claims is known to have increased, so less IBNR

Re-opened: need a suitable allowance, which depends on claim closure criteria

Part settlements: whether they are included in data

Recoveries: whether figures are net or gross of reinsurance recoveries

Handling expenses: whether figures include allowance for these expenses

If there have been changes, then enough needs to be found out to make suitable allowance in the analyses.

If items have been consistently excluded then analyses will have to incorporate suitable loadings.

6(iii)

Aim is to ensure that randomness in the data doesn't distort the rates.

The exact level at which to truncate large claims depends on many factors, including:

- how much data you have, both overall and in individual cells
- how common large claims are
- how much the "crude" rates from the analysis are to be smoothed before use.

If individual claims are limited by XOL reinsurance then may consider truncating claims above this limit

6(iv)

Partial payments will distort the average cost of claims and claim payments

Payments on settled claims and payments on claims which are still outstanding should be distinguished

Recoveries should be adjusted against the claim payments

Reinsurance recoveries should be recorded separately so that analysis can be carried out gross and/or net of re-insurance

Claims handling expenses

Consistency of treatment is the most important factor

Direct expenses are usually included in individual claim costs

Separate recording of these expenses will enable separate analysis to determine allowance for expense inflation

ALAE are allocated to individual policy and usually form part of cost of incurred claims

ULAE form part of estimated incurred expenses

(Total 21 Marks)

7(i)

(a) The underlying assumptions may be incorrect and/or there may be bias in the source data

and/or the assumption that there has been a stable pattern to the way that claims have been reported and settled in the past, and that this stability will continue into the future may be invalid

(b)

Possible sources of error from using statistical estimates include:

- change in the mix of business (where different mixes have different run-off speeds)
- policy conditions may change (again affecting speed of settlement or reporting)
- insufficient data generally (so random fluctuations are magnified)
- reporting delays may change, e.g. due to new procedures, postal delays
- settlement patterns may change, e.g. new procedures on partial payments
- large claim distortions, i.e. one off large claims being projected
- past and future inflation assumptions may be wrong
- further claims outstanding from earlier origin years
- secular or social trends not projected properly

- random fluctuations within the two sharp corners of the triangle (i.e. claims settled most recently from the first and last origin years) are magnified by the methods
- change in the average cost of claim or definition of a claim will invalidate the average cost per claim method
- if assumed run off pattern or ultimate loss ratios are inappropriate, this will invalidate the B-F method.

7(ii)

Accident-year accounts

The period of exposure will primarily be for events occurring in 2007.

This may be distorted by adjustments in 2007 relating to prior years' exposure, e.g. there will be a deficit from prior years if the claims reserves brought forward at the start of 2007 were not sufficient.

There may also be a distortion if an additional unexpired risk reserve is set up in relation to exposure after 2007.

Three-year accounts

The exposure will relate to policies written in 2005. For annual policies, this means exposure to claim events relating to these policies, which may have occurred in 2005, 2006 or 2007.

There may be some distortions, e.g.:

- losses recognised early in respect of 2006 and 2007 underwriting years
- any under or over provision in respect of prior years' reserves that were carried into the 2005 account.

7(iii)

Office premium = Rs 100

Capital required = $100 \times 75\% = \text{Rs } 75$

Shareholders' required return @18% = $75 \times 18\% = \text{Rs } 13.5$

Less investment return on low risk assets @ 10% = $75 \times 10\% = \text{Rs } 7.5$

profit required = $13.5 - 7.5 = \text{Rs } 6$

Loading required on office premium = $6 / 100 = 6\%$

(Total 12 Marks)

*****END*****