Actuarial Society of India

Examinations

November 2006

ST3 - General Insurance

Indicative Solution

1(i) In general should attempt to find out why experience is so bad,
Is it due to: adverse claims experience
too high commission
too high expenses
The financial effects on the company of an across the board increase of a substantial amount will depend on the competitive situation
and the experience of other offices in this market.
If the company's experience is not typical a substantial increase in premium rates could result in a substantial loss of business
and could result in the overall operating ratio hardly falling because of the element of fixed costs

Even if other companies are making a loss, if they are not going for the same level of increases this could have the same effect.
The rate of increase which the market would bear has to be considered
and it may be that the company has to accept a loss for the following year
Could still be selected against because of bad areas

[6]

1(ii) The second suggestion would be more appropriate obviously if it leads to a significant decrease in the overall loss ratio
It could well lead to a substantial change in the makeup and mix of the portfolio

But would be much more likely to ensure that the company's overall premium income did not reduce significantly.
The question does not indicate the current spread of claim-free years
and does not state how the scheme would be introduced
but assuming that everyone is given the benefit of their claims-free experience immediately, this should help to retain existing policyholders with better experience

What are competitors doing?
May discourage small claims as numbers based rather than amounts
Danger of giving premium away).

[4]

1(iii) The question does not indicate on what basis the company actually insures household contents

It could be on a straight indemnity basis or combined with new for old
and would probably have some accidental loss cover
The company should look very carefully at its experience
both by area
and by type of claim
It may be found that rates should be increased substantially for inner city areas and be reduced for country areas where claims frequency may be considerably lower.
Particular types of claims may be causing concern
e.g.. theft of videos
Introduction of some form of exclusion may help to reduce the claims ratio

Other alternatives would be to go on to a different rating basis,
restricting business to certain types of property,

an alternative package may be put together with different sectors of the market,

or. building societies
A decision on whether new for old should be continued needs to be looked at

and also the claims experience on accidental damage needs to be reviewed.

[7]
[Total 17]

2(i) Functional costing is used to split policy and claim processing costs.
Time sheet analysis would then be used to split all (or most) other costs.
Functional Costing:
In this system a standard weight is allocated to individual tasks

e.g, time weighted by salary
e.g., setting up motor new business policy

The number of times each particular task is carried out within a given period is counted
probably by analysing the number of computer inputs made

The standard weight is multiplied by the number of times the task is carried out to give a total weight for the particular activity.
The total relevant processing are then split in proportion to these total times for each activity.
including where appropriate an allocation of off-line expenses

Time Sheets
Individuals will fill in time sheets showing what percentage of their time they spend on individual classes.
(other than those who have been covered by functional costing)

These times will then be used to split their employment coats between the different classes.
Rather than using time sheets some personnel costs may be split on other bases, e.g, senior management time may be split by premium income.
Other costs will be allocated on an appropriate basis
e.g, computer running costs may be allocated in proportion to the number of policies in each class.

[7]

(ii) Advantages - is objective
does not overstate expenses for small classes

is consistent from year to year
does not use staff time in estimating expenses

Disadvantages - does not automatically recognise changes in work methods
only directly useful for some categories of expense

[3]

This would be useful when considering results on a class by class basis
Allocating only variable expenses to each class gives a contribution to fixed expenses for each class;
overall the total of the contributions from every class must exceed fixed expenses for a profit to be made.
If a class is making a positive contribution then it is at least contributing to profit on a marginal basis.
Thus showing contributions by class does clearly indicate whether or not the company's profit is enhanced by the writing of that class.

[2]
[Total 12]

3 **Similarities**
The role of ? is the same for both models,

it characterises the underlying distributions of the processes being modelled – the aggregate claim distribution for each year of business.

Assumptions about the unconditional distributions of the X_j s are the same,
they are identically distributed in each case.

Assumptions about the conditional distribution of the X_j s given ? are the same,

they are conditionally independent in each case.

Differences
$E[X_j \mid ?]$ is some function of ?, m(?) for EBCT Model 1

but is just ? for the normal/normal model.

So V[m(?)] in EBCT corresponds to s_2^2 = V(?) normal/normal.

$V[X_j \mid ?]$ is a function of ?, $s^2(?)$ for EBCT Model 1

but is a constant s_1^2 for the normal/normal model.

So $E[s^2(?)]$ corresponds to $s_1^2 = V[X_j \mid ?]$

The normal/normal model makes precise assumptions about the distributions of X_j given ? and ?.

EBCT Model 1 makes no such distributional assumptions.

The risk parameter ? is a real number for the normal/normal model

but could be more general quantity for EBCT Model 1.

[Total 8]

4 Pricing for new business

… to ensure business is suitably priced to achieve profitability / volume goals

… whilst avoiding adverse selection

And profit testing of existing business
… to identify areas of loss making / profit making business
Reserving – to determine value of liabilities
… for statutory / management accounts and regulatory returns
Capital modelling
… for regulatory and management purposes
Cat & exposure analyses
… to determine appropriate reinsurance
ALM
… to determine appropriate investment strategy
Exception analyses
… to ensure no undesirable concentrations or adverse selection
Portfolio movements analysis
E.g new business, lapse, endorsements and mid-term cancellations
… to identify business volume trends
… and ensure a good understanding of why they have occurred
Sales volumes analysis by ISP, geographical region, etc.
… in order to target future new business strategies
Loss ratio trend analysis
… to ensure early indications of pricing out of line with market
Expense analysis
… to ensure operational costs allocated appropriately between different policy cohorts

Analyses will need to be split by bodily injury and property damage
… to ensure clear identification of any underlying trends
Claims analyses by rating factor
… to ensure rating factors used remain the most appropriate
Investigation into possible use of new rating factors
Tail analyses

[2]
[Total 12]

5. If the direct writer retains the maximum amount, the reinsurance company would pay the minimum.

S.N.	Expected Max Loss	Maximum retention	Amount Ceded	Proportion ceded	Claim amount	Minimum Reinsurance payment
1	200,000	100,000	100,000	50.0%	12,000	6,000
2	500,000	100,000	400,000	80.0%	12,000	9,600
3	100,000	100,000	-	0.0%	80,000	-
4	800,000	100,000	700,000	87.5%	600,000	525,000
5	80,000	80,000	-	0.0%	100,000	-
6	160,000	100,000	60,000	37.5%	200,000	75,000

[3]

If the direct writer retains the minimum amount, the reinsurance company would pay the maximum.

S.N.	Expected Max Loss	Maximum Retention	Minimum Retained= 1/9 of the EML	Amount Ceded	% ceded	Claim amount	Maximum Reinsurance Payment
1	200,000	100,000	22,222	177,778	88.9%	12,000	10,667
2	500,000	100,000	55,556	444,444	88.9%	12,000	10,667
3	100,000	100,000	11,111	88,889	88.9%	80,000	71,111
4	800,000	100,000	88,889	711,111	88.9%	600,000	533,333
5	80,000	80,000	8,889	71,111	88.9%	100,000	88,889
6	160,000	100,000	17,778	142,222	88.9%	200,000	177,778

[3]

(ii) Medium sized motor insurer is most likely to use

- Excess of loss reinsurance
  - Covering any one risk (e.g. A large Single Liability claim)
  - or any one event (e.g. pile up with a number of Liability Claims)

Lower limit depend upon the companies attitude towards ability to withstand risk….sufficient layers to minimise the possibility of claims coming back to direct writer.

[2]

(iii) Stop loss is more likely to made available to a direct writer where

- there is close relationship between insurer and the reinsurer.

- where the underwriting behaviour has less impact on the outcome of the insurance (e.g. where claim events are entirely random (bad weather)

- where the quality of claim handling can not prejudice the total claim bill.
-

[2]
[Total 10]

6.

(i) **P&I Clubs**

Mutual association of ship owners that cover, as a pool, risks not traditionally insured by commercially marine hull policy e.g. damage to harbour, removal of wrecks, pollution, loss of life and personal injury.

They also provide ship owners with technical assistance in the marine market and advise on issues coming before the shipping industry.

[2]

(ii) **Captive:**

An insurer wholly owned by a industrial or commercial enterprise and set up with the primary purpose of insuring the parent or associated group companies and retaining the risk within the enterprise.

Some insurers are set up to sell with the primary purpose of selling insurance to the customers of the parent. They are also often referred. …….However, they write third party business, should not be so called.

[2]

(iii) **Deferred Acquisition Cost (DAC)**

Acquisition cost relating to the contracts in force at the balance sheet date, which are carried forward as an asset from one accounting period to subsequent …….

…. in the expectation that they will be recoverable out of future margins within insurance contracts after providing for future liabilities.

[1]

(iv) **Rate on Line**

For non -proportional reinsurance…..
The total Premium charged for the reinsurance (Ignoring the reinstatement premium) ……divided by the width of the layer.

[1]
[Total 6]

7. **The approach that can be used to protect the policyholders following the insolvency of a general insurance company :**

In the event of solvency there will be two broad categories of policyholder liability outstanding, outstanding claims not yet settled and unexpired periods of risk

Appoint insolvency practitioners, with any excess outstanding liabilities to be met by the Government from taxes.

This offers the maximum protection.
But is unfair as the cost is met by all tax payers.

Meet outstanding liabilities via levies on the insurance Industry.
As above, but unfair on those policyholders who are more astute and companies which better run.

Require deposits to be held in an insolvency fund which can then be used in the event of insolvency.

As above, but to a lesser degree since the insolvent insurer will have contributed at least in part to the outstanding liability.

Could apply the above system to just specific types of insurance or outstanding liability which are deemed of greater importance.
e.g. outstanding claims, rather than unexpired risk.

or liability claims rather than property damage.

Apply the above approach to only outstanding claims.

Insured lose out to the extent of cover not then provided.

May not be able to get such advantageous rates on new cover

May need to cover a specified period after failure as insureds would otherwise without realising be without insurance cover

Could give refund in respect of unexpired period of risk

By covering all remaining period of risk….ensure little or no risk period of non insurance

[7]

8. **Reserve Calculations:**

There was a typographical error in the question paper and the correct question would have asked for the reserve at end of 2005. Students could have interpreted the question literally or assumed that the data provided implied that the question should have asked for reserves at end of 2005. In view of this the examiners gave credit for either interpretation.

Assumptions:

- The loss ratio for 1998-2000 data is appropriate for 2001-2005.
- alternatively the loss ratio of the most recent years may be based on the underwriters view.
- Underwriting years 2000 and earlier years are fully run off.
- The development of the claims has been stable in monetary terms.
- Future inflation is weighted average of the past inflation.

[2]

Method :
The reserve under BF method is = Loss ratio* earned Premium * (1- 1/udf)
where udf is the ultimate development factor

[1]

Estimating Loss ratios:

Loss Ratios	Ultimate Claims	Earned Premium	Loss Ratio
1998	9,450	22,800	41.4%
1999	11,025	27,150	40.6%
2000	14,925	37,500	39.8%

The loss ratio for the year 1998 to 2000 suggests a loss ratio of 40% is appropriate.

[1]

Calculating development factors:

	0-1	1-2	2-3	3-4	4-5	5-6	6-7
Dev Factors	1.13	1.08	1.03	1.00	1.00	1.00	1.00
cumulative Factors	1.257	1.110	1.026	1.001	1.000	1.000	1.000
% paid	0.796	0.901	0.974	0.999	1.000	1.000	1.000

Estimating reserves:

AY	Ultimate Claims Based on 40% LR	(1- 1/ UDF)	Reserve
1998	9,120	0.00%	-
1999	10,860	0.00%	-
2000	15,000	0.00%	-
2001	13,200	0.00%	-
2002	15,060	0.09%	14
2003	22,200	2.56%	569
2004	18,000	9.95%	1,790
2005	20,850	20.44%	4,262
	Total		6,635

[1 for reserve for each year]

[4]
[Total 8]

(ii) Advantages and disadvantages of paid Bf method:

Aadvantages:

- The method is easily modified by using loss ratios for each accident year
- It can take account of extra market knowledge and judgement
- The use of loss ratio adds stability against the distortions in development patterns.
- This method can be useful in providing the estimates before the final data is available.
- This method can also be used even when the data is scarce and other statistical methods are not reliable.

- The method can be used to provide as one of many to provide means of comparison to give a feeling for the range of possible uncertainty in the reserve needed.

Disadvantages:

- The stable Loss Ratio of 40% assumed in part (i) is subject to judgement and may not be appropriate.

- The run off may not be complete

- The development of the claims paid in the table may not be as stable as the claims incurred
- This ignores the information contained in the case estimates.

- Affected by the changes in the claim settlement procedure.

- Ignore the information contained in the claim number.

[5]

(iii) Why results differ from case estimates:

- Methods are different

- Case estimates do not allow for IBNR (new reports) or IBNER (deterioration in existing estimates)
- Case estimator will make use of detailed knowledge and experiences.
- Claims inflation assumption may be different

- There may be possibilities of consistent under or overestimation by case estimators

- Case estimators may not apply a consistent standard from one year to next.
- statistical data may be distorted by errors, omissions, distortions, large or catastrophic claim event.

[4]

(iv) Which of the methods is likely to be most appropriate for this book of business:

- The Book of business being large; case estimates may be impractical and costly
- Household building insurance does not have high frequency like content insurance and hence statistical estimation may be volatile and unreliable.

- However, for a large block of business the volatility of claims may still provide a sufficiently sound basis for statistical estimation.
- The triangle data in this particular case appears to be stable enough for the statistical estimation.
- Given the information above the BF method can be used for majority of claim to provide most accurate estimate.
- .. however for low frequency / high severity claim (e.g. subsidence) some claim estimation may be retained.
- Choice of method will also depend on how long the company has been in operation.

[3]

(v) **Issues that need to be considered :**

- Legislation and prevailing accounting rules that allow or restrict discounting techniques.
- Nature of business ..Long tailed or short tailed … investment income on long tail reserves is significant.
- The asset type in which is invested in and the asset type that the company is permitted to invest has a bearing on the discount rate to be applied.
- The extent to which the realistic picture of the financial condition of the insurer need to be shown. There is a strong argument to use discounting when preparing published accounts or account for solvency control for the purpose of rating.
- allowance for the assets not available for investment and because of the money held with intermediaries and reinsures.
- is discounting being viewed by investors as sign of weakness
- the extent discounting helps insurer solvency level and profitability by reserves reduction.
- Margin for prudence ….it is prudent not to discount.

[4]
[Total 24]

7. **Ratios:**

Claim Experience:

Can be assessed by calculating Claims Ratio

Claimed Ratio = Claims Incurred / Earned Premium

Total Expense Level

Can be assessed by calculating expense ratio

Expense Ratio = Expense and Commission / Written Premium

Investment Return can be assessed by calculating

Investment return = Investment income / Average Assets

Insurance Profitability can be assessed by calculating

Profit Margin = Insurance Profit / Earned Premium

Financial Strength can be assessed by calculating

Solvency Margin = Free Reserves / Written Premium

Rate of return on shareholder's capital can be assessed by return on capital

Return on Capital = Post -tax profit / Free Reserves

[Total 3]

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