

EXAMINERS' REPORT

June 2013 examinations

Subject F103 — *General Insurance* Fellowship Principles

INTRODUCTION

The attached report has been prepared by the subject's Principle Examiner. General comments are provided on the performance of candidates on each question. The solutions provided are an indication of the points sought by the examiners, and should not be taken as model solutions.

QUESTION 1

- i. Traditional rating approaches such as burning cost and frequency / severity work well for a high frequency, low severity risk. However, they are much less appropriate for a low frequency, high severity risk, e.g. natural catastrophes such as earthquakes.

This is because the observed losses may not reflect the true underlying risks, as the period over which losses have been observed may be much shorter than the return period of the losses under consideration. In some cases certain event scenarios under consideration may not have occurred in history.

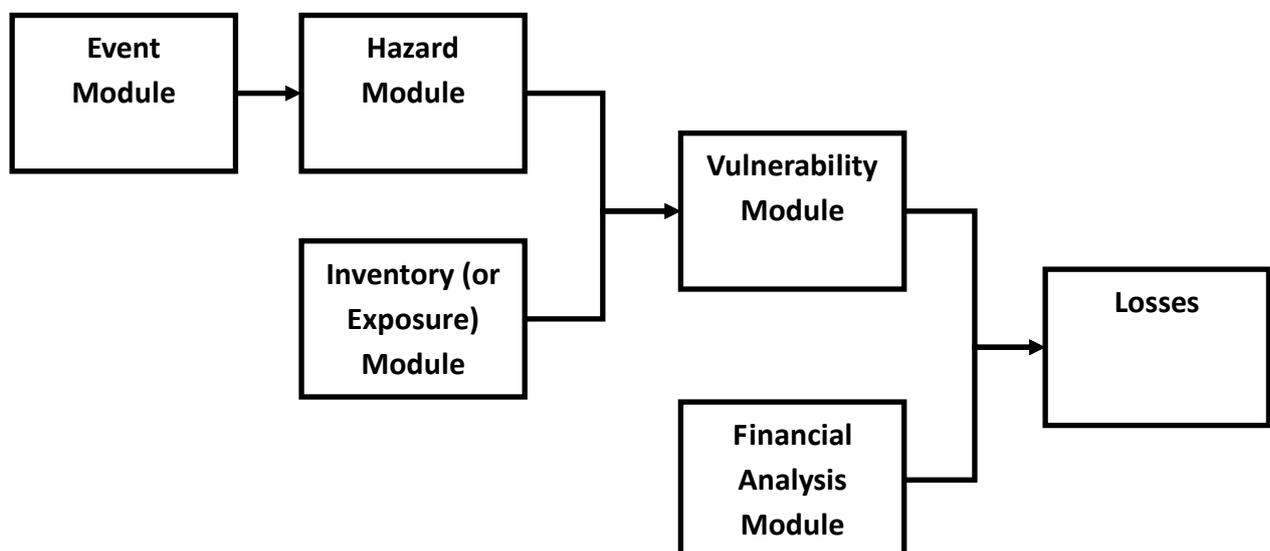
The main actuarial assumption that is used when modelling high frequency, low severity risks is that the past is a reasonable guide (with some adjustment) to the future. This assumption is not so justifiable when it comes to events that are rare or uncertain in terms of either frequency or severity such as catastrophes.

In simple terms, a ten-year burning cost model (or a frequency / severity approach based on ten years of observed losses) is unlikely to be a reliable method of pricing for earthquake risk on a fault with a 250-year return period.

- ii. Catastrophe models all tend to follow the same generic structure, consisting of a number of interlinked modules:

- event module;
- hazard module;
- inventory (or exposure) module;
- vulnerability module and a
- Financial analysis module.

Diagrammatically:



A starting point would be to see if the reinsurance company already has a catastrophe model in place. If it does, a review of the model should be carried out in order to determine if the model can be reused, possibly after modification and updating of the assumptions.

If there is no in-house expertise available for earthquake modelling, identify whether a commercial modelling product for earthquakes could be purchased. Also consider earthquake models from other countries, e.g. Earthquake models are well established for the USA and Japan, and determine if these could be adapted.

Consideration should be given to the latest research in areas such as seismology (the study of earthquakes and their effects). This can be used to determine the type of damage that can be expected and whether loss of life is expected. A review of all past earthquakes should be conducted.

Need to consider the form of the input data and how this will be used in the model. For each of the earthquakes within the event set, the model will include a number of parameters such as:

- The moment magnitude (measuring the energy release).
- Focal depth (shallow fault ruptures are more damaging for a given value of moment magnitude).
- Total area of fault rupture.
- Fault type (convergent plate boundaries are highest hazard).

Need to consider what parameters and variables to include in the model. Are these variables/parameters deterministic or stochastic?

Given that Catastrophe XL coverage is for an accumulation of losses due to a specific event, it is very important to specify what losses are covered in the policy.

The output of a catastrophe model will usually be a distribution of events. The form of this output is therefore important and how it will be used in pricing of excess of loss reinsurance and if any additional information is needed from the model. For example, does the policy cover property insurance business or life insurance business. This will affect the inventory (or exposure) module and the estimated maximum loss in the vulnerability module.

Part (i) was phrased as a general theory question rather than being specific to a new reinsurance company to determine if candidates understood what data was used in the more traditional models such as the burning cost approach and how catastrophe claims data would differ. Candidates tended to focus on the fact that it was a new reinsurance company and therefore would not have any claims experience or very limited past data, rather than looking at the differences in characteristics of high frequency / low severity claims normally used in traditional approaches compared to those of low frequency. Very few candidates actually considered the characteristics of the data needed for the traditional approaches and why this method would not be appropriate for catastrophes.

In part (ii) most candidates went on to “Describe the five modules that typically make up a catastrophe model” as in the April 2011 ST8 examination question (simply regurgitating old solutions rather than reading the question) – this was not required. The first part of the question specifically asked candidates to “Describe the basic structure of a catastrophe model” and hence required candidates to list the five modules that form the basic structure of a catastrophe model and to describe how they were inter-linked or alternatively draw a diagram to show how they were inter-linked.

Most candidates did not answer the second part of the question “Discuss the factors you would consider before developing a catastrophe model for earthquakes”. A number of candidates listed some points, but did not discuss the points.

QUESTION 2

i. Advantages:

- The calculation is straightforward, as net written premium is easily determined.
- It is an objective figure, and so cannot easily be manipulated by a company to show an improved position.
- The SMSM is broadly proportional to the level of risk accepted by the insurer (i.e. the more business written, the greater the risks).
- Small insurers are forced to hold a monetary minimum, to cover the risk of their losses exceeding their written premium in any year.

Disadvantages:

- The formula is not sophisticated enough to reflect all risks faced by the company, especially relating to long tail claims from business written many years ago.
- Many of the risks that could lead to insolvency are excluded from the calculation, for example:
 - investment risks,
 - credit risks, and
 - operational risks.
- Does not allow for the scale of business and reduced variability of total claims for bigger business volumes.
- This could lead to excess capital being held by large companies.
- The SMSM is inversely proportional to the risk of insolvency due to inadequate premiums – it perversely penalises insurers with prudent premium rates.
- It does not consider the quality of risk management in the firm (risk of insolvency is related to this).
- The minimum of R10m is very small, and one large liability claim could exceed this amount.

ii. Comments:

- Outstanding claims would be a better indication of the risks associated with the long-tailed claims from business written many years ago.
- It would lead to the anomalous situation that if an insurer has underestimated its outstanding claims then it will be required to hold a lower SMSM than would a comparable company with more prudent outstanding claims reserves.
- Even if based on outstanding claims, many of the risks that could lead to insolvency would still be excluded from the calculation, e.g. investment risks, credit risks, operational risks.
- Companies are unlikely to be consistent in the calculation of their outstanding claims, and may even try to arbitrarily weaken their reserves to produce a lower SMSM.
- It may thus be necessary to control the reserving basis, but this would be difficult to achieve and would add to costs.

iii. Reasons why the insurer should hold more solvency capital than the minimum specified by the regulator:

- To reduce the risk that the available capital falls below the regulatory requirement, which would hamper the firm's business activities.
For example, if the insurer held only marginally more capital than the regulatory minimum it would be exposed to the risk that a fall in asset values would result in it being declared insolvent.
- To give a greater degree of security to policyholders than implied by the relatively weak regulatory minimum.
- To maintain its credit rating.
- To meet the requirements of other stakeholders such as debt providers, whose interests may be subordinated to those of the policyholders.
- To allow a buffer between the actual profitability of the business and the dividend stream paid to shareholders (who prefer less volatile returns).
- Ratings agencies and investment analysts may not believe that the statutory minimum is sufficient given the inherent risks associated with general insurance.
- The insurer typically holds additional financial resources for reasons other than solvency e.g. working capital for investment in business development.

iv. Considerations:

- The insurer firstly needs to decide on an acceptable risk tolerance level (e.g. 1/300 probability of insolvency over a 1-year period).
- The risk tolerance level can be based on:
 - The desirable credit rating (and cost of capital).
 - Attitude to risk of the shareholders (especially if there are large shareholders).
 - Attitude to risk of the directors.
- The way the business is run and decisions are made (e.g. relating to new product launches, investments, etc.) needs to be consistent with the risk tolerance level.

- The desired level of capital and coverage of the SMSM can be calculated only once the acceptable risk tolerance level has been agreed on.
- This is done using an asset and liability projection model on a best estimate basis.
- The model can be deterministic, but should ideally be stochastic to show the range of solvency outcomes over the desired projection period and associated probabilities.
- The level of solvency capital should be adjusted until the projections show a probability of insolvency that matches the acceptable risk tolerance level.
- This result may show that a capital coverage ratio of higher or lower than the previous level might be suitable.
- The regulator may expect insurers to hold capital in excess of the minimum, and may intervene if capital breaches this higher level – this higher level then becomes the minimum for the company.

This question was generally not well answered, which was disappointing given its simplicity. It demonstrated a weak understanding of capital requirements.

For part (i) most candidates got the point that it is an easy and straightforward calculation, but most could not come up with many other relevant points. Many thought that R10m is too high and a barrier to entry for new insurers, not realising that a single motor liability claim could easily exceed this amount.

For part (ii) many candidates did not think IBNR was part of “outstanding claims”. Candidates did not generate sufficiently many points for this part.

Part (iii) was reasonably well answered by many candidates.

Part (iv) was not answered well. Many candidates realised that a cashflow model would be required, but were then not able to say how the output should be used to assess a suitable capital coverage level (CCL). Most candidates did not make the link between a company’s own risk tolerance level and the target CCL.

QUESTION 3

i. 2006 is very different – large loss ratio and longer run-off.

Possible reasons:

- Possibly due to a single large contract / group of contracts, with very different experience for this particular tranche of business.
- The increase and subsequent reduction in written premiums could indicate the addition of a large contract/ group of contracts for 2006 – and this business not rewritten the following year.
- May have been a “bad” year – need to allow for large claims and/or longer delays every 5 to 6 years.

Increasing delay trend in year 1 development ratios from 2006.

Possible reasons:

- Slower claims development from year 1 to 2.
- Claims now paid later – with numbers showing an increased trend – does this mean even further delays expected in future years?
- Longer delays likely to increase uncertainty.
- Change in underlying claims emergence – possibly due to change in mix of business or underlying claim type.
- May be related to changes in external circumstances – e.g. regulatory changes.
- Change in contracts – policyholder may have more time to notify.

ii. Adjustments:

- Adjust to allow for revised experience / change in business / underlying claims features.
- Need to allow explicitly for underlying trends in run-off.
- Large claims could be excluded and the reserves for non-large claims determined on the BCL basis.
- Thereafter an allowance for large claims could be made, e.g. via ACPC method.
- Could also group data by incurred claims pattern – as opposed to paid claims.
- This is likely to have a shorter run-off and possibly be more stable.

iii. BCL method:

Devel't Factor	Ultimate Projected Loss (R 000)	Reserve (R 000)	Projected Loss Ratio
2.647 (given)	2.647×1600 = 4235	$4235 - 1600$ = 2635	$4235/4250$ = 99.7%

BF method:

Experience to date (1 / df)	Initial Expected Loss (R 000)	Ultimate Projected Loss (R 000)	Reserve (R 000)	Projected Loss Ratio
38% (1/2.647)	$4250 \times 85\%$ = 3613	$1600 + (1 - 38\%) \times 3613$ = 3848	$3848 - 1600$ = 2248	$3848/4250$ = 90.5%

iv. Comments – development factors:

- Development factors still do not allow explicitly for the (apparent) changing trend in delays.
- Making use of the development factors from 2006 is appropriate if delays are expected to revert to an “average” of what has been experienced over the past five years.

- The inclusion of the 2006 data in the development factors allows for the 1 in (say) 6 year event, and thus implicit allowance for large claims – to set reserves on the prudent side of best estimates.

Comments – projected loss ratios & reserves:

- The BF method stabilises results due to the effect of a priori initial estimate. But this depends very much on the estimate.
- Both projections give an expected ultimate loss ratio that differs quite significantly from the initial estimate. As expected, the BF method dampens the effect.
- May need to review the projected run-off pattern, or in the BF case, the appropriateness of using the particular initial loss ratio.
- The two different projection methods provide quite different results. Particularly in the case of the BCL, this is very dependent on the claims already run off to date.
- The 1600 claims experience for 2011 to date seems relatively high when compared with recent years.
- This could be due to:
 - Claims being paid earlier – in contrast with the trend for longer delays experienced in recent years; or
 - It may be an early indicator of worse than expected experience for 2011. Both the expected loss ratios for the BCL and the BF methods are significantly higher than the initial estimate.

In part (i) most candidates identified the unusually large claims experience in the 2006 Accident Year. Many candidates commented on the longer tail for the 2006 Accident Year, but generally the interpretation of changing development factors (over successive accident years) was lacking. For example, not many candidates picked up that a lower 0 to 1 Development Factor may have meant that more claims were paid in Development Year 0, i.e. quicker claims settlement. Not many candidates made two clear distinct points, and most tended to mix ideas in paragraphs.

Part (ii) was well answered by most candidates. Some candidates discussed different reserving methods, e.g. ACPC or BF method, while the question asked for adjustments to the BCL method.

Part (iii) was a straightforward calculation question, answered well by most candidates. A common mistake was to use the development factors as incremental development factors between development periods, when actually the development factors given were factors to ultimate. Candidates could have checked what the given development factors represented based on the data. Through not reading the question carefully some candidates calculated the total reserve and not just that for the 2011 accident year, wasting time.

In part (iv) candidates needed to comment on the appropriateness of the methods for the given data. Candidates generally either missed the main points or did not give a sufficient number of points.

QUESTION 4

- i. The claims characteristics should be considered separately for each of the categories: insured's property claims, property liability claims, and injury liability claims.

Insured's property:

- There may be many small claims which may arise, e.g. from vandalism to trains.
- Accident claims are likely to be relatively infrequent (compared to motor vehicle claims) as there is less traffic for trains.
- There is the potential for very large claims as trains are expensive and high-speed collisions could potentially cause a lot of damage.
- There is the potential for accumulations of risk, e.g.
 - a crash resulting in damage to more than one train;
 - damage to trains at service station;
 - weather-related damage.
- Claims are likely to be notified quickly.
- May not be quick to settle as the cost of repair/replacement may take some time to be established.
- There may also be some delays in determining whether the accident was due to an excluded event, e.g. the train not being maintained according to required standards.

Property liability:

- Damage to goods of passengers can potentially be large, e.g. if there is a fire on the train or if the train falls into a body of water.
- Damage to public property has the potential for large claims, e.g. damage to a building or infrastructure.
- Accumulations of risk can occur as there are likely to be many individuals on a train at any time.
- Claims are likely to be notified quickly.
- Settlement should be reasonably quick, as the damages should be relatively easy to assess.

Bodily injury liability:

- Injury to passengers brings the potential for large claims (although the maximum may be limited by the insurance policy).
- There may also be numerous small/medium-sized claims in respect of minor injuries (dependent on the size of any excess).
- Legal expenses can be costly.
- Court award inflation creates uncertainty as to the ultimate amount.
- There is the potential for accumulations of risk resulting from a train accident injuring many passengers / members of the public.

- Reporting delays are likely to be short, although some may take a long time for a problem (& claim) to emerge.
- Settlement delays may take some time, due to:
 - having to allow time for the full extent of an injury to be determined;
 - court delays.

ii. Surplus:

- The wide variation in the sizes of risks likely to be insured makes this type of proportional reinsurance more appropriate than quota share.
- It will enable the insurer to choose (within limits) the size of risks it will retain, to fine-tune its exposure.
- It allows the insurer to write larger risks than may otherwise have been possible.
- Allows the insurer to spread its risks, as retaining a proportion of a lot of risks is better than retaining all of a few risks.
- Can provide Tracksion with financing commission which could help with cashflows.

Individual risk excess of loss:

- This allows the insurer to write policies which could result in large individual claims as is the case here (even after proportional reinsurance).
- It stabilises Tracksion's technical results by reducing claims fluctuations.
- It helps make more efficient use of capital by reducing the variance of the claims payments, and thereby reducing the amount of free reserves needed.

Aggregate excess of loss / Catastrophe reinsurance:

- Protects Tracksion against insolvency caused by accumulations of risk.
- Aggregation by event is likely.
- Clash cover may be appropriate (excess of loss cover for liability business, limiting insurers' exposure to the risk that one event gives rise to claims on more than one policy).
- Passing on the accumulation risk to the reinsurer can reduce the insurer's required capital significantly.
- Catastrophe XL cover is another form of Aggregate XL that may be used, e.g. to protect against very large claims resulting from a single catastrophic event.
- Stop Loss, which is Aggregate XL cover for the insurer's whole portfolio against unforeseen losses over a period, may also be an option if available.
- It could also be argued, however, that the recent few years' low claims experience would suggest that this cover was not necessary.

Any type of reinsurance could give the reinsurer access to technical assistance (e.g. for pricing, etc.) from the reinsurer where needed.

iii. Factors that impact decision:

- Volatility of insurers business – all else being equal, the insurer will reinsure more when the claims experience is more uncertain.
 - The potentially large infrequent claims can increase volatility.
 - The more claims insured, the more predictable the results should be (due to pooling).
 - However, the low frequency of accident claims may still result in uncertainty.
- Recent experience may have a big impact on the amount reinsured because it might be considered to be the most relevant data.
 - However, it is possible that the experience of the last few years was untypical or changing.
- Expected cost of reinsurance – value for money (rate-on-line or commission terms). The higher the expected cost of reinsurance, the less the insurer will **want** to cede.
 - In the long run the reinsurer will aim to make profits, so we should not reinsure more than is needed.
- Capital available:
 - Reinsurance will reduce capital requirements, particularly excess of loss reinsurance.
 - This will in turn allow the insurer to write more business, hence more reinsurance may be purchased if the insurer is looking to expand.
- Default risk of reinsurer. The insurer will want to reinsure less with a particular reinsurer where the default risk is higher.
 - Where the default risk of reinsurers is higher in general, the insurer will need to purchase more reinsurance to be satisfied that the desired level of risk has been transferred.
 - This default risk may be impacted by the reinsurer's capital, exposure, diversification, etc.
- Risk appetite of insurer: the more risk the insurer is willing to accept, the less reinsurance will be purchased.
- Regulation: there may be minimum (or maximum) requirements for reinsurance.

Overall this was a fairly straightforward question. Many candidates lost marks by failing to realize that liability claims could comprise bodily injury and/or property loss claims. In such cases it was often not possible to ascertain which claims the candidate was referring to.

Part (i) was answered surprisingly poorly. The question required an “outline”, but many points did not contain sufficient detail to obtain credit, e.g. “there could be an accumulation of risk” with no explanation as to how this might occur.

In part (ii) many candidates lost easy marks by failing to give sufficient justification for the use of the various types of reinsurance. Many candidates, unsuccessfully, attempted a “scatter-gun” approach of listing all possible types of reinsurance.

Part (iii) was answered reasonably well by most candidates. However, several candidates listed the factors to consider rather than describing them (and their impact), and thus did not answer

the question. Some candidates went even further astray by simply providing a list of questions which the insurer should consider.

QUESTION 5

- i. The generalised linear model (GLM) is a flexible generalisation of ordinary least squares regression. The GLM generalises linear regression by allowing the linear model to be related to the response variable via a link function and by allowing the magnitude of the variance of each measurement to be a function of its predicted value. Furthermore, a GLM relaxes the assumption of normality and assumes that the response variable, \mathbf{Y} , is drawn independently from a one parameter exponential family.

The structure of a GLM can be written in matrix form as follows:

$$\mathbf{Y} = g^{-1}(\mathbf{X}\boldsymbol{\beta} + \boldsymbol{\xi}) + \epsilon$$

where \mathbf{X} is the design matrix of factors, $\boldsymbol{\beta}$ is a vector of parameters that need to be estimated, $\boldsymbol{\xi}$ is a vector of offsets or known effects, ϵ is the error term appropriate to \mathbf{Y} and $g(\cdot)$ is the link function.

The linear predictor, $\boldsymbol{\eta} = \mathbf{X}\boldsymbol{\beta} + \boldsymbol{\xi}$, and expected value of \mathbf{Y} are shown as $\boldsymbol{\mu} = g^{-1}(\boldsymbol{\eta})$.

- ii. GLMs can be used to determine premium rates by letting the response variable \mathbf{Y} be the cost of claims, the frequency of claims or the average size of claims and letting the predictor variables \mathbf{X} be rating factors used to determine the premium.

- iii. Reasons why rates may need adjusting:

- Practical:
 - It may not be practical for the broker to collect certain factors as it may impact their relationships with customers.
 - The quotation systems may not yet be able to handle all of the rating factors used in the model.
 - Mores of society impacting rating factors that can be used and/or information collected.
 - Rates may not be competitive and thus the insurer wouldn't sell enough policies to spread overhead costs. This would impact the insurer more in a soft market when competition is tough. Household insurance is a competitive class, so consumers are likely to lapse if premiums are uncompetitive.
 - There may be too large a jump in rates to existing policyholders, which may cause high lapse rates.
 - Certain risks may be unique and as such require adjustments for subjective underwriter opinions (more likely for the largest risks).
 - Appropriate expenses and profit loadings need to be incorporated.

- Strategic:
 - The insurer may want charge lower rates to increase business volumes, with the hope of increasing rates in the future and hence increasing future profits.
 - During a hard market, the insurer may consider charging higher rates up to a level that is unlikely to affect their premium rates. This depends on the elasticity of demand.
 - The insurer may wish to introduce another product, hence cross-selling opportunities arise if more business is obtained through lower rates.
- Not possible:
 - NCD rates might be specified (for marketing reasons) and so it may not be possible to charge the theoretically correct rate – might use offsetting to keep premium rates the same, but charge based on other rating factors.
- Legal:
 - Legal restrictions on rating factors.
 - Legal (regulatory) restrictions on rates.
- Modelling challenges:
 - There may be insufficient data (4 years) to gain certainty in the rates (as this is a new insurer). This would most likely result in a margin being charged over and above the rates suggested by the model.
 - The data may also be inaccurate, increasing uncertainty (new insurer – takes time to train staff, refine processes).
 - Nonsensical impact suggested by certain rating factors due to correlations between predictor variables. One variable on its own might pick up most or all of the variability.
 - May not have accounted for certain factors making rates biased (modelled factors have picked up variation attributable to non-modelled factors).
 - A change in underlying risk (making data irrelevant).
 - Too many rating factors may have been used, making the model fit well, but with low predictive power.
 - Alternatively, the model fit might be poor (perhaps because there is variability in the data that is attributable to unmodelled factors), resulting in low confidence in the model.

Part (i) was straight theory, but was not well answered.

In part (ii) not many candidates gave a good summary of how a GLM can be applied specifically in the context of calculating premiums.

Part (iii) was a fairly straightforward question relating to adjustments to premium rates, but most candidates did not generate enough points.

QUESTION 6

Possible reasons and impact:

- No matter what the cause of growth is, the impact on expenses will be a spreading of fixed costs, perhaps up to a point where the fixed costs increase e.g. where more staff are needed. This spreading of fixed costs would allow lower premiums to be charged, potentially resulting in more policies being sold, more spreading of expenses, and more premiums – a cycle continuing up to a point where economies of scale are reached. The increase in volumes may have been part of this process of reaching economies of scale.
- This process would probably also include periods of increasing fixed costs to cope with increasing volumes.
- Large growth, particularly in such a short period, is likely to impact the solvency position – depending on the regulatory requirements in the country.
- Increases in the number of motorcycles (e.g. cheaper, licence more accessible) and hence more demand for insurance policies. The impact on the insurer would depend on whether the premium rates were sufficient or not. Assuming they were profitable before, this reason would increase profitability. However, cheaper motor cycles may be of a lower quality, resulting in more accidents. Increased traffic may also lead to more claims. A rate review may be required.
- Anti-selection arising from rates being too low for a particular type of policyholder and hence attracting this policyholder. The impact would be greater if competitors' rates were of the correct structure. This would be likely if a recent rate revision had been made, otherwise the effect would have happened earlier. The impact would be a loss for the insurer on these policies.
- Low rates relative to competitors, even though the rating structure is still correct, will not result in anti-selection. Profit depends on adequacy of original rates (see above). The reason premium rates are lower than competitors may be for the following reasons:
 - efficiency, reducing costs: leads to more profit (mentioned above);
 - lower profit margins: leads to less profit per policy, but perhaps more overall depending on volumes sold;
 - loss-leader to attract business: business would be loss making and dig into capital.
- The default of another big insurer in the market may have resulted in policyholders moving to other insurers. Impact depends on existing premium rates.
- An effective marketing campaign may have attracted new policyholders. The impact depends on existing premium rates.
- Legislation may have made insurance compulsory. Impact depends on the new mix of business – likely to include a number of low risk policyholders who previously did not have insurance, so a reduction in anti-selection where present and hence an increase in profitability.
- Improved attitude towards insurance from society so more willing to purchase, perhaps due to:
 - better delivery of insurance: claims being paid on time, value added etc.;
 - education drive on value of insurance e.g. by government.

- Change in sales channel increasing business volumes. Profit would depend on target market reached from new distribution channel and how adequate premium rates are. There would be greater risk of anti-selection in the case of brokers who act in the policyholders' interests.
 - e.g. insurance at time motorcycle purchased may increase sales.
 - e.g. introduction of direct sales.

This question required broad thinking. Creative ideas were rewarded, if substantiated. However, candidates were only given credit if the reason given could have caused unusually large sudden growth in business.

QUESTION 7

- i. An exposure measure is the basic unit used by the insurer to measure the amount of risk insured, usually over a given period of time.
Premium rates are usually expressed per unit of exposure.

- ii. Possible exposure measure:

Average debtor balance (sum of amounts outstanding each day / 365)

Desirable features of exposure measure:

- Proportional to the amount of risk:
The risk should increase approximately proportionately to debtor balances.
- Measurable & easily obtainable:
Theoretically measurable from accounts, but probably not easy to get daily information.
- Objectively verifiable:
Yes, provided accounts are prepared correctly and audited.
- Not capable of being manipulated:
This is satisfied provided accounts are audited.

- iii. Insurable interest in the risk:

- The company's will be directly affected by debtors not paying, so there is a direct interest in the risk (as opposed to gambling).

Financial in nature and reasonably quantifiable:

- The nature of debts is in terms of money and the amount will be quantifiable from the financial accounts.

Amount paid related to loss incurred:

- Here the claim is equal to the loss incurred.

Independent risks:

- It is likely that more claims will happen during tough economic times and hence, claims are dependent on the economic cycle.
- In better economic times, claims may be more due to debtors failing due to poor management or random poor experience.
- Certain industries may experience different cycles.
- To reduce this risk, the insurer could seek to:
 - Insure various industries; or
 - Purchase reinsurance and benefit from the reinsurers' diversification in terms of class and geography.

Low probability of occurring:

- Generally the probability of bad-debts should be relatively low, otherwise companies would not be willing to offer credit.
- But in this case, the term is only 120 days which would increase the probability of claims, even though some of these debts may still be recovered by the insurer.
- The probability of default will be higher in tough economic times.
- To improve this the insurer could consider increasing the number of days before a claim is paid.

Pooled with similar risks:

- Generally debts will be quite unique depending on the unique nature of company debtors, but there will be similarities in terms of size, industry etc.
- However, the principle of pooling falls through to some extent due to the correlation between risks.

Have an ultimate liability:

- Not specified in the question, but the insurer can presumably set a limit on the level of claims that will be paid.

Avoid moral hazard:

- Moral hazards may be created because the loss is paid in full and so insured companies don't have a great incentive to follow-up on debts.
- To improve the situation the insurer could:
 - Require certain debtor-management procedures to be put in place by the insured.
 - Set limits on credit offered.

- Introduce an excess and co-payment for the insured to make sure that the insured bears some of the loss, and hence has an interest in managing the risk.

iv. The product may still be offered, despite the non-independence of risks, because:

- The insurer believes it can still make a profit.
- A broader product offering makes the total insurance “package” more attractive to companies.
- The claims risk from bad debts may still be largely independent of claims arising from other elements of the product “package”.
- If priced to take account of the economic cycle losses should be avoided, otherwise losses in tough economic times will be offset in easier economic times provided there isn’t anti-selection by policyholders not renewing cover when economic times improve and provided other insurers are adopting the same pricing strategy.

v. Rating factors:

- Number of debtors on books: more debtors with smaller balances is less risk than fewer larger debtors – higher numbers will lower premium.
- Average outstanding period before debts repaid – shorter will result in a lower premium as less risk and indicative of better credit management.
- GDP – indicator of economic cycle and hence probability of default allows the company to regularly price the risk according to anticipated experience.

Part (i) was a straight definition. While most candidates stated that it measured risk, many did not state the link to time of exposure or premium rates.

In part (ii) some candidates mentioned amount of debt, but failed to specify if it was a balance at a point in time or an average. Candidates who knew the characteristics of a good exposure measure generally scored well. A number of candidates recognised that turnover did not necessarily indicate debt, but they still suggested it was a suitable exposure measure.

Part (iii) was a straightforward application of theory, and was generally well answered. Few candidates failed to pick up the significant concentration risk linked to recession. Turnover is not a good exposure measure, e.g. all business might be cash based. There was some confusion between the insured and the debtors (the debtors are not directly insured, it is the company with debtors on its books that is insured).

In part (iv) candidates generally identified reasons to still offer the insurance, but many candidates did not identify what they thought to be the greatest barrier to the risk being insurable.

END OF EXAMINERS’ REPORT