

INSTITUTE AND FACULTY OF ACTUARIES

EXAMINERS' REPORT

September 2015

Subject ST7 – General Insurance: Reserving and Capital Modelling Specialist Technical

Introduction

The Examiners' Report is written by the Principal Examiner with the aim of helping candidates, both those who are sitting the examination for the first time and using past papers as a revision aid and also those who have previously failed the subject.

The Examiners are charged by Council with examining the published syllabus. The Examiners have access to the Core Reading, which is designed to interpret the syllabus, and will generally base questions around it but are not required to examine the content of Core Reading specifically or exclusively.

For numerical questions the Examiners' preferred approach to the solution is reproduced in this report; other valid approaches are given appropriate credit. For essay-style questions, particularly the open-ended questions in the later subjects, the report may contain more points than the Examiners will expect from a solution that scores full marks.

The report is written based on the legislative and regulatory context pertaining to the date that the examination was set. Candidates should take into account the possibility that circumstances may have changed if using these reports for revision.

F Layton
Chairman of the Board of Examiners
December 2015

A. General comments on the *aims of this subject and how it is marked*

1. The aim of this General Insurance Reserving and Capital Modelling Specialist Technical subject is to instil in successful candidates the ability to apply, in simple reserving and capital modelling situations, the mathematical and economic techniques and the principles of actuarial planning and control needed for the operation on sound financial lines of general insurers.
2. Candidates who are well prepared generally appear to perform reasonably on ST7, although a number of candidates do not appear to be adequately prepared or, show poor exam technique. The following points are always worth considering to improve performance:
 - 2.1. Lists are hugely valuable for breadth of point generation but candidates should always exercise judgement when applying them, in many instances questions will be specifically designed to render a number of the standard points inappropriate and marks (often generous multiple marks) will be available for identifying and articulating these nuances well.
 - 2.2. Calculation questions will come up on a regular basis within ST7, as candidates can clearly observe from examination of historical papers. Candidates should always be prepared for such staples as balance sheet preparation, triangle manipulations & projections and reinsurance layer calculations (along with being able to carry out any necessary adjustments including inflation, exposure, earning distortion and time period issues).
 - 2.3. Capital questions should be expected on every paper and represent a sufficient proportion of the course content that candidates should not expect to be able to pass on their reserving knowledge alone. Those who do not encounter capital work in their professional lives should be particularly careful to ensure that they take time to familiarise themselves with this element of the course.
 - 2.4. Candidates should aim to be able to give near exact glossary definitions as incoherent or vague descriptions will be marked harshly. If candidates struggle to remember definitions verbatim they should take the time to properly analyse the glossary definition to ensure they have fully absorbed all the nuances of the definition.
 - 2.5. It is important to always read the question properly.
 - 2.6. Always assume that question content is there for a reason. If something is pure bookwork, it should be obvious as such as it will generally go straight to a question with little or no specific context. These are the only sorts of questions where you should expect to provide generic answers. Otherwise you will need to make reference to the situation posed in the question to score well, i.e. if lines of business, types of insurance entity, a specific set of regulatory requirements or anything else is mentioned they have been chosen as they have an impact on the answer. If numbers are mentioned, they are there because we expect you to look

at them, think about them and offer some comment or display some ability to notice unusual features of a table of numbers (a key skill for an actuary). Every exam there will be a significant number of candidates who are clearly extremely well prepared, who write very long answers that clearly display all the base knowledge one might require to be able to think intelligently about a question, but because the answer is purely generic with no obvious attempt to actually think they score poorly.

B. General comments on *student performance in this diet of the examination*

1. Candidates performed extremely badly on question 5, displaying minimal ability to think about liquidity or cashflow issues at all. Question 7 parts (iii)–(v) also caused a great deal of difficulty which suggested that they struggled to translate their likely familiarity with projecting IBNR using standard techniques into thinking about underlying concepts and the different types of IBNR.
2. On other more challenging parts of the paper, there were some relatively good performances, notably question 4 part (ii), question 6 part (iii), and question 7 part (ii).
3. Some bookwork was extremely solidly answered, particularly question 2. Question 1 and question 3 were perfectly answered if the candidate realised what the question asked, but some misunderstood in spite of carefully chosen wording. Definitions were disappointingly answered however, particularly question 4 part (i) and question 7 part (i) which covered extremely standard general insurance concepts which candidates should have been able to articulate clearly even if they hadn't taken time to learn glossary quality definitions.

C. Comparative pass rates for the past 3 years for this diet of examination

Year	%
September 2015	37
April 2015	34
September 2014	43
April 2014	34
September 2013	35
April 2013	31

Reasons for any significant change in pass rates in current diet to those in the past:

The pass rate for this examination diet is within the normal range for this subject. Some variation in the pass rate between sessions is expected as different cohorts of students sit the examination.

Solutions

- Q1** Losses occurring..
...provides cover for losses occurring in the defined policy period no matter when reported.
- Claims made..
..policy covers claims reported during a period rather than arising from occurrences during that period.
- Risk attaching basis..
..for reinsurance policies..
...where cover is provided for claims arising from policies incepting during period to which reinsurance relates.
- Underlying may be on different basis if reinsuring

A number of candidates misinterpreted the question, and wrote about accident year vs underwriting year classifications. This was a misinterpretation that had been considered in the question setting process and the wording of the question was revised to specifically refer to “policy wordings” which in our view removed any ambiguity – these would be insurer groupings for their own internal management & monitoring, not something that would ever be articulated in a policy wording. Those that read the question and realised what was asked tended to score full (very easy) marks.

- Q2** In the past it has been observed that insurance premium rates have varied in ways that do not reflect the underlying cost of providing the insurance.

This is most common in large commercial and industrial insurance; for example, that placed in the London Market, but it affects all classes of insurance.

In general, the cycle can be described in the following terms, although describing it as starting from a position of general profitability is purely arbitrary: the sequence could be entered at any point.

Insurance is generally highly profitable. This position is commonly known as a hard market.

The level of profits attracts new entrants to the market and encourages existing insurers to write more business.

To fill the extra capacity, premium rates are reduced to attract business.

Eventually premium rates fall to the extent that insurance is generally loss-making, ...this position is commonly known as a soft market.

Insurers leave the market in response to the level of losses, or reduce the amount of business they write.

With restricted availability of insurance, premium rates increase.

Eventually premium rates rise to the extent that insurance is generally highly profitable.

External factors may affect the duration, timing or amplitude of the cycle, for example:

Macroeconomic factors such as interest rates

Alternative capital

Regulatory activity

CAT events

Policy wording strength may follow the cycle

Different classes may have different timing / length / amplitude

Reinsurers often drive direct business cycle

Capital may be required for soft market

Almost everyone scored full marks on this question.

Q3 Linking assumptions.

If two assumptions are linked by a formula this introduces an implicit correlation between them.

e.g. inflation

Explicit correlation between distributions.

Apply correlation factors/matrices between parameters in a model.

Copulas

Mathematical relationship between individual distributions of random variables and joint distribution of their variables.

Allows more complex/flexible non-symmetric dependencies.

Many different copula structures based on different probability distributions
e.g. Gumbel Copula which gives stronger tail dependency.

Deterministic allowance for diversification.

Use standard methodology for summing variances of distributions.

Can use correlation matrix to extend to more than two risks.

Implicit correlations.

These can arise as a result of a single event (e.g. earthquake) impacting a number of different risks.

Fair amount of confusion. The question referred to “methods of allowing for” in the model. Some candidates chose to explain what diversification is or types of diversification that should be considered or how to go about parameterising, scoring no marks for this unexamined content. Those that read the question tended to score full (very easy) marks.

- Q4**
- (i)
 - (a) The total premium attributable to the exposure to risk in an accounting period; they can be gross or net of adjustment for acquisition expenses and gross or net of reinsurance.
 - (b) The portion of the premium written in an accounting period that is deemed to relate to cover in one or more subsequent accounting periods.
 - (c) The amount set aside from premiums written before the accounting date to cover risks incurred after that date.
 - (d) Contractual agreements setting out the scope of delegated authorities, allowing cover holders to enter into contracts of insurance and to issue insurance documents on behalf of the delegating party (frequently a Lloyd's managing agency)
 - (e) The face-to-face system used within the London Market to co-insure risks. Proposed risks are described by a broker on a standard form (slip); terms and the premium rate are added after negotiation with a lead underwriter (who also signs for a certain proportion of the risk), before the slip is circulated by the broker amongst other underwriters who sign the slip to confirm the proportion of risk that they will accept.
 - (ii) Binders will report premium written during a period at the end of that period, typically each month
...the insurer will use an estimate of the premium until they receive the update from the binder.

A deposit premium may be payable at the start of the policy with adjustment premiums payable at the end of the policy year
...if the exposure is not known in advance

e.g. based on the ultimate cost of the construction project, EL premium based on average turnover during the insured period, total hours worked

Construction may over-run or delay

May be a PC element payable

which would reduce gross net but not gross gross premiums

Policy may be signed down (although likely would happen before inception)

...if the premium is swing rating and depends to some degree on the experience during the insured period.

If the insurer reports in a currency different from the currency of the policy the value of the policy in the reporting currency will not be known until after the written date if premium receipt is delayed

...due to credit terms or instalment premiums.

Default may affect premium received

Fraud may affect premium received

Either could arise from policyholder, broker or coverholder

The insurer may not receive the expected premium due to

...payment default by the policyholder

...fraud by the binder, broker

There may be processing delays in the insurer resulting in premium not being recorded against the policy on the commencement date.

There policy may be cancelled during the coverage period requiring a return of some of the premium.

The coverage may change during the policy terms requiring an adjustment to the premium.

There may be a processing error requiring a restatement of the recorded premium e.g. premium recorded in wrong currency.

Some shockingly incoherent definitions given. While it is understandable for candidates to not know glossary wording, it was really surprising that any candidate would lack the clarity of understanding of core insurance terms necessary to give a coherent definition. Tautological answers of "earned premium is premium that is earned" did not score well. Easy, marks available here.

Reasonable effort on part (ii) but some candidates gave far too much focus to signing down issues (at the expense of breadth of coverage), partial credit was given but signing down should generally occur before inception. A number of students did take the time to think of why those particular classes were chosen and generated points, this is good exam technique.

Q5 (i) Optimise return.

Match by term
... currency.

Real / fixed.

Provide sufficient liquidity / ability to meet obligations
Consistent with risk appetite / tolerance
Meet stakeholder expectations / ethical
Meet regulatory constraints / capital efficiency
Other sensible suggestions e.g. control concentration, minimise fees, avoid overlap with insurance risk

- (ii) If experience is within reasonable levels then it should be possible to hold the funding requirements from the premiums received
... although adds to risks if there is a delay in receiving premiums from the policyholder / broker

Creates very significant liquidity risk exposures if experience is materially adverse however

... requirement to fund full gross losses could even result in a funding requirement over and above the capital requirement
... if there is significant reinsurance in place
... and this is the key driver of tail outcomes for the syndicate
... will depend how significant a part of their portfolio this is

Property is quite volatile with high CAT potential
Also often heavily reinsured
So all these factors will be relevant
CATs are often uncertain if recently incurred so may post prudent initial reserves

May be exacerbated if there is a tendency to post prudent initial reserves for a major event
... to help manage market perceptions.

If reinsurance terms allow the company to draw down on reinsurer funds for the expected liabilities in advance of a request for payment being presented, this may reduce the issue.

This is not market practice however and would be unusual.

Potential for funding requirements to exceed available assets in extreme circumstances means that investment strategy alone may not be sufficient to manage liquidity risks.

Company may need some form of contingent credit facility to draw down on in extreme circumstances (or other similar sensible suggestion).

For less extreme outcomes, a liquid investment strategy may be sufficient
... for example focusing on cash or very liquid bonds
... otherwise there could be a requirement to liquidate assets at short notice to meet trust fund requirements
... this could be especially costly if non USD assets need to be converted to meet the trust fund requirements.

May be additional impacts to investment strategy to meet whatever asset restrictions are imposed by the trust fund for assets held in trust.

Half marks for sensible examples (e.g. USD only, cash or govt bonds only, corporate above particular rating, use of letters of credit etc.).

If the company has high free reserves or margin may not be an issue
Timing to post may have an impact – if not required to post until e.g. a period after quarter end then have more time for funding arrangements

- (iii) Clearly introduces an additional level of correlation between underwriting risk and liquidity risk
... particularly catastrophe risk which is likely to be the main driver of extreme outcomes
... and is most likely to have significant reinsurance protection against extreme outcomes.

Relationship may be relatively complex to model as it would only tend to materialise in the tail
... with any outcomes that are within ULR expectations
... or below any level of additional free assets required
... or that do not have any specific reinsurance recoveries that need additional funding
... not being likely to generate significant liquidity risk issues.

Correlation would need to apply at a gross level.

Depending on presence of any mitigating credit facilities this may need capturing within the capital model
... or alternatively may address this issue so that simplifications can be made on proportionality grounds.

If model is designed on a cashflow basis, this may add additional complexity as the assets will be required at an early stage but will still earn investment returns while in trust.

Indirect impact from changes to RI / investment
Could use deterministic allowance
Possibly based on stress test
May not allow for if considered immaterial / or allow for simplistically

- (iv) This does marginally reduce the value of reinsurance as it does not provide liquidity protection as well as risk transfer
... at least in the tail of distributions where liquidity is going to be a challenge
... minimal level of impact likely at lower return periods
... no impact to non-US strategy.

However it is unlikely that a business would really want to reduce the level of reinsurance protection beyond what may be appropriate for their overall volatility management.

A more realistic solution would be to implement the appropriate credit facilities, parental guarantees or other mechanism to allow draw down of funds if an extreme event occurred
... or to accept the liquidity risk and borrow against the expected recoveries in the open market if such a situation arose
... this is likely to be more expensive than a pre-arranged facility
... and this should be appropriately recognised within the capital model parameterisation.

Depending on market conditions and reinsurance relationships, may be able to negotiate some kind of revised payment terms to reduce this exposure.

Alternatively may be able to arrange some kind of financial guarantee insurance or credit insurance that might kick in.

Significantly the weakest question on the whole paper which was disappointing since it addressed core concepts albeit in a slightly different way to previous papers. Part (i) was generally answered well and some reasonable answers were given in part (iv) but the middle sections were weak (even from candidates who did pick up on relevant issues in part (iv)).

The question wording in part (ii) was clear that it was the implications of the "funding requirement" being examined. Generic comments on investment considerations did not score anything. Surprisingly few students even identified that the primary implications of the funding requirement were on cashflow / liquidity.

Many were confused about what a trust fund is and assumed it is like an investment fund. The question wording should have prevented this confusion as it did refer to "holding assets . . . within a Trust Fund", but this did not seem to help.

A number of candidates were extremely flippant about the availability of funds and the need to earn an appropriate return on capital, and their response to any cashflow implications was just to hold whatever assets are needed to meet all the gross liabilities.

In part (iii), the inability to identify the key issues in part (ii) undermined any attempt to answer this section well.

In part (iv), some candidates did recognise that this funding requirement impacted the cashflow management benefits of reinsurance (even if they didn't mention this at all in parts (ii) or (iii). A disappointing number then suggested operating without reinsurance, which didn't display the broader thinking we are keen to see from candidates.

Q6 (i) Assess reserve adequacy in absolute and relative terms.

Compare the reasonableness of different sets of reserve estimates.

Compare different datasets.

Monitor performance to see if claim movements are material.

Allocate capital.

Inform the management/Board of the company to assist with ongoing decision making.

Provide information to investors.

Inform discussions with regulators.

Price insurance and reinsurance policies.

(ii) This is the range of estimates that could arise if a large number of actuaries provided their best estimate of reserves using appropriate actuarial methods and reasonable assumptions using the same dataset and information.

The definition therefore includes model and parameter error but excludes process error.

The bootstrap model includes parameter and process error but makes no allowance for model error

.....though it could be adjusted to exclude process error and make a broad allowance for model error thus making it more suited for this purpose.

The stochastic model may produce unsuitable result if the underlying data lack homogeneity or credibility, the risk of this is increase for a start-up with limited own data.

It may require data be aggregated at a high level before fitting a reserve risk model increasing parameter risk.

The data will not reflect the range of possible or even all likely outcomes due to the company being in existence for a relatively short period.

Data relating to the early year may be unreliable due to the low level of reserves and later data lack credibility as it is relatively underdeveloped particularly for motor liability losses.

The range may not reflect fully the impact of new classes of claims may have emerged which are not present in historic data e.g. PPOs.

It might be necessary to exclude from the data and hence this range the impact of outliers, such as events or claims with very low frequency and high severity, as the definition of reasonable might exclude such extreme occurrences though it may be difficult to identify outliers in a small dataset.

A percentile approach is easy to define and explain
.... and you can ensure consistency over time.

It is not clear how you would justify why the range of reasonable best estimates is defined by the 25th and 75th percentile.

The assumptions of the model may be invalidated if there are too many negative incremental claims which is possible for these classes when using incurred claims data
...e.g. case reserves reductions due to successful court cases for large motor liability claims, subrogation against a third party electrical contractor responsible for insured fire loss.

Other stochastic model such as the Mack or the normal approximation to the negative binomial which may prove a better fit to such data.

A Bayesian stochastic reserving model could be more suited to a small company with limited historic data as it could incorporate prior information and expert judgement.

A range derived using deterministic approach, based on a range of models and assumptions might be easier to justify,
....it could also be used to validate the stochastic approach.

May be better to consider net reserve range
Small company so RI may be significant
Unclear exactly how calculated, assume ranges for each on standalone
If aggregated, how aggregated? Combined triangle not ideal
If done separately then aggregated for range, how correlated?
Even standalone, is there sub-analysis e.g. damage / injury?

As this is a small company it is likely to have reasonable levels of reinsurance it may be more informative to provide a net reserve range.

- (iii) The model used should be appropriate for its intended use,
... perhaps the same model should not be used to produce a range of
reasonable best estimates which might model reasonably foreseeable outcomes

... and the reserve risk capital required for solvency purposes which should
model all possible outcomes.

The mean of the individual risk distributions are different to the held reserves,

... which is not surprising as one has been derived deterministically and the
other stochastically.

The mean of the stochastic reserves should equal the held position,
...as the purpose of the range is to show the degree of uncertainty around the
held reserves.

An adjustment can be made to the stochastic model to align the two estimates.

The total reserve risk at each percentile is the sum of the component parts
implying no allowance has been made for diversification.

On its own this is likely to overstate the amount of capital required
...as it is unlikely that the two classes will be perfectly correlated being
different classes of business with different underlying risk drivers.

In both cases the 50th percentile is equal to the mean, which is surprising as
you would expect the mean to be greater than the median

...for a right skewed distribution with a low frequency of high severity
adverse results.

This might suggest the tail is too flat which may make the model unsuitable
for assessing risk of insolvency.

The percentiles seem very narrow for both classes
...particularly when you consider gross reserve for these classes liable to
significant adverse reserve deteriorations
... e.g. losing large court case, change in Ogden tables.

As this is a small company with relatively low levels of reserves you would
expect increased variability due to lower levels of diversification.

Motor - held is below 25th percentile
Sensible comments on uplift factors
Net result should be considered

- (iv) All terms should be fully defined and explained, particularly as this is
the first time these figures are being presented to the Board

...examples might help e.g. the 99.5th percentile represents the worst result in 200 years or if there were 200 identical companies in a market the worst result.

The modelling approach should be explained but be careful to ensure this is pitched at the right level.

The key assumptions should be identified with sensitivity analysis employed to show the impact of changes in these assumptions.

The results of scenario tests can also be included to examine the impact of extreme conditions and their interdependency.

The limitations of the model should be stated with explanation of the impact of these limitations and how they are mitigated.

Where expert judgements have been relied upon to overcome deficiencies in the model or data these should be explained together with their impact.

A well explained and annotated graphical representation of the distribution of outstanding claims showing the key percentiles may help to reinforce the results, particularly to the less technical members of the Board

...this should be readily available from the bootstrap results.

A deterministic model with alternative assumptions may add further insight to the stochastic model and may assist understanding of the more complex stochastic model.

Could include any relevant feedback from regulators or auditors.

Though the company has limited history it might be helpful to show a comparison against past adverse results.

A comparison to other companies with similar business and risk profiles or industry benchmarks could be helpful, if available.

Consider validation output

Compare against real uncertainties

Relatively reasonably answered. Some candidates talked in part (i) about ways of modelling rather than uses of models. Many had learnt some standard facts about bootstrapping and ODP and picked up some marks in part (ii), although broader thinking about reasonableness of ranges wasn't particularly in evidence.

Part (iii) had some encouraging efforts with most candidates offering at least some comments on numbers, and spotting some of the carefully planned out quirks of the numbers presented. When tables of numbers are presented, they will generally contain some unusual elements or relativities that we are hoping to test that candidates are able to spot, this is an extremely key actuarial skill.

Part (iv) also had some good answers with many candidates knowing some key things relevant to presentation to a Board.

Q7 (i) *IBNER*

A reserve reflecting expected changes (increases and decreases) in estimates for claims reported at the valuation date only (that is, excluding any “true” or “pure” IBNR claims).

Pure IBNR

A reserve to provide for claims that have been incurred before the valuation date but not reported to the (re)insurer by the validation date.

(ii) *Personal Accident*

Significant proportion of claims will be for defined benefits leaving limited scope for IBNER as a result
e.g. a specific amount for loss of limb.

May be more IBNER potential depending on case reserving philosophy
e.g. if notifications do not have case estimates against them until verified.

For some cover there may be potential IBNER if there is uncertainty on extent of injury, e.g. Permanent vs Temporary total disablement.

Overall likely to be predominantly Pure IBNR with limited IBNER.

Professional indemnity

Claims made cover determines the basis on which claim is incurred, so should be minimal scope for IBNR.

Some allowable reporting delay depending on discovery period provisions but is likely to be minimal.

Some events may not be notified until towards end of policy period though (laundry listing)
IBNER potential is very high

Court awards, uncertainty, complexity etc.
Extent depends on reserving philosophy

Overall likely to be predominantly IBNER with limited IBNR.

Employers' Liability

Significant level of reporting delay potential as it is written on a Losses Occurring basis.

Reporting delay can be significant, e.g. if there is uncertainty as to the level of injury.

Potential with this class for latent claims to arise many years after date of injury with employees not even aware that there may be a claim.

However, class is weighted towards high value injury claims that can be highly uncertain and may develop over a long period.
Likely to be a reasonable balance between the two (*or other sensible comment that recognises that both elements are material for this class*).

Balance would be affected by the number of years in operation.

Long established portfolios likely to have a greater weighting to IBNER as relative volume of open reported claims against likely delayed reporting is likely to be higher.

Extent of history also affects latent claim potential, which is generally weighted towards IBNR not IBNER.
Case reserving philosophy may impact IBNER however
e.g. an insurer with a tendency for prudent case estimates may have comparatively low IBNER as the prudence in actively monitored cases offsets the potential for unexpected deterioration on other notifications (*or similar / equivalent comments*).

Excess Layer Commercial Property

Property business so events will be known quickly by the insured with limited scope for latency.

Particularly for the large events likely to give risk to reinsurance recoveries.

Some potential for slower realisation e.g. subsidence

Depends on quality of reporting, but generally would expect broker to issue precautionary advice to all layers likely to be affected, including layers well above likely claim.

For risk losses would therefore expect predominantly IBNER rather than pure IBNR as a result.

CAT losses likely to be known by insurer even before any reporting, so no true unknowns.

Case estimates for event losses likely to be set at an early stage, but this could potentially be treated as either IBNER for the event or pure IBNR for the balance of insureds yet to notify they have been affected.

Overall likely to be more IBNER than IBNR

- (iii) If claim count triangles are available, these could be used to help estimate the pure IBNR on a standalone basis.

Have to be accident period triangles
... underwriting year triangles would not work as they would be distorted by reporting from additional earnings.

Projecting this would give an indication of the likely numbers of delayed reporting claims at a valuation date.

Multiplying these by expected ACPC would give the overall quantum of pure IBNR.

Should be ultimate ACPC not incurred

Could get ACPC from a simple historical ACPC
... but should ideally check that there is no bias towards larger or smaller claims at a particular point of emergence
... e.g. could be that large claims are known earlier as more significant
... could get this from reviewing ACPC by reporting by banded reporting delay
... may also need to apply relevant inflation or other generic adjustment.

Once pure IBNR is assessed, difference between that and a typical projection to ultimate (e.g. incurred / BF) would be IBNER.

Relevant sensible comments about data challenges, distortions etc.

- (iv) Get earned amounts by month

Advanced method only:

... Due to limited volume of data, incurred amounts will not be entirely consistent as the later months will not have seen the 2+ month delayed claims come through in the data, so observed balance between different delay periods will not be representative

... can use earnings by month to make an approximation of the extent of potential under-representation and put the months on an even footing
 ... re-organise to view earned premium with potential to generate each level of reporting delay
 ... adjust the incurred up to be on a consistent basis by scaling to the same level of premium as the 1 month reporting delay.

Either method:

Compile the proportion unreported by month of delay.
 Apply to earned premium amounts by month.
 Remembering to also apply the 90% expected ULR.

Additional mark for fully correct – basic method.
 Additional marks for fully correct – advanced method.

Assumptions:

Ignore any IBNER.
 Ignore any tail factor.
 Annual policies.
 Earn evenly over policy period.

Base method - no adjustment for under-representation of longer reporting delays

Reporting delay (months)	Incurred	Proportion unreported	Month	Written	Earned	Unreported %	Unreported amount	90%
1	3.5	65%	1	2.5	0.21	0%	-	
2	2.5	40%	2	2.5	0.42	0%	-	
3	1.5	25%	3	2.5	0.63	0%	-	
4	1.0	15%	4	2.5	0.83	0%	-	
5	0.7	8%	5	2.5	1.04	0%	-	
6	0.5	3%	6	2.5	1.25	1%	0.01	
7	0.2	1%	7	2.5	1.46	3%	0.04	
8	0.1	0%	8	2.5	1.67	8%	0.12	
9	-	0%	9	2.5	1.88	15%	0.25	
10	-	0%	10	2.5	2.08	25%	0.47	
11	-	0%	11	2.5	2.29	40%	0.83	
12	-	0%	12	2.5	2.50	65%	1.46	
	10.0			30	16.25		3.18	
LR implied:								81%

Advanced effort - adjustment for under-representation of longer delays

Reporting delay (months)	Incurred	Earned premium that could generate delay	Adjusted incurred	Proportion unreported	Month	Written	Earned	%	Unreported amount
1	3.5	16.3	3.5	76%	1	2.5	0.21	0%	-
2	2.5	13.8	3.0	55%	2	2.5	0.42	0%	-
3	1.5	11.5	2.1	41%	3	2.5	0.63	0%	-
4	1.0	9.4	1.7	29%	4	2.5	0.83	0%	-
5	0.7	7.5	1.5	18%	5	2.5	1.04	0%	-
6	0.5	5.8	1.4	9%	6	2.5	1.25	4%	0.04
7	0.2	4.4	0.7	4%	7	2.5	1.46	9%	0.11
8	0.1	3.1	0.5	0%	8	2.5	1.67	18%	0.27
9	-	2.1	-	0%	9	2.5	1.88	29%	0.49
10	-	1.3	-	0%	10	2.5	2.08	41%	0.76
11	-	0.6	-	0%	11	2.5	2.29	55%	1.14
12	-	0.2	-	0%	12	2.5	2.50	76%	1.71
	10.0		14.5			30	16.25		4.53
LR implied:									89%

(v) *Comment on results:*

Basic method:

Implied only 81% ulr.

Difference may be down to IBNER.

If IBNER is material though, the method itself may be limited as would mean that latest incurred position is not necessarily representative.

Would not expect meaningful IBNER for mobile phone insurance however.

Any comments identifying that they may have missed a key step.

Advanced method:

89% ULR implied.

Very close to 90% ULR expected.

Consistent with estimated adjusted incurred.

Suggests IBNER may not be material.

Suggests method overall may be acceptably credible.

First half was fairly well answered. Again definitions were of variable quality. In part (ii) there was some confusion between PA and other personal accident products and about the claim reporting basis of Professional Indemnity. Also some candidates wrongly assumed that excess layer claims would not be reported until they were in the excess layer, in practice it is more likely that brokers would issue precautionary notifications to excess layer insurers.

The second half was extremely poorly answered. Part (iii) should have been familiar to candidates, but even with a question telling candidates outright to base their methods around claim count triangles many struggled with this. We were expecting many candidates to miss the subtleties of using accident year rather than reporting year triangles, but were really surprised how many struggled even with the basics of the approach given the clear steer in the question.

Part (iv) was not a technique that we expect candidates to be familiar with (although it can be quite useful). It was not surprising that many were slightly unsure how to tackle it, nor that very few even considered the possible need to adjust for under-representation of longer reporting delays in the data. The number of candidates who didn't adjust to remove unearned exposures was a surprise however. Part (v) was impacted by inability to address part (iv).

END OF EXAMINERS' REPORT