

INSTITUTE AND FACULTY OF ACTUARIES

EXAMINERS' REPORT

September 2012 examinations

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.

D C Bowie
Chairman of the Board of Examiners

December 2012

General comments on Subject ST7

Candidates who are well prepared generally appear to perform reasonably on ST7, with the more challenging questions tending to occur on SA3. Candidates should consider the following advice however (if they are not already):

- Lists are hugely valuable for breadth of point generation but candidates should always exercise judgement when applying them.
- Calculation questions will come up on a regular basis with 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 and time period issues).
- 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.
- 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.
- It is important to always read the question properly.

Comments on the September 2012 paper

There were a number of disappointing areas on this paper, with failing candidates simply not displaying any capacity for independent thinking on question specifics. Depth was often lacking, with many candidates creating general lists for some questions rather than applying to the question specifics, although this may reflect a failure to read the question properly. Comments can be found under each question, but the most concerning areas of weakness were:

- Q4 – many candidates struggled with the mitigation question, displaying an excessive tendency to focus on cover changes that would clearly be at best inappropriate and at worst illegal for compulsory covers; these candidates were fortunate that the marking system does not allow negative marks to be given. These candidates also generally failed to consider any of the wider engagement that a company could have with coverholders or any of the internal exposure management processes that could mitigate accumulation risks.
- Q5 – typically for capital questions, this was poorly answered. While many candidates clearly have no direct professional experience with capital modelling, broad knowledge of general insurance and product lines should have been sufficient to e.g. identify possible sources of correlation.

*Subject ST7 (General Insurance: Reserving and Practical Modelling Specialist Technical) –
September 2012 – Marking Schedule*

- Q6 – many candidates seemed to have an incredibly superficial understanding of key concepts which fell over when they were asked to apply those concepts. For example, many candidates thought that there was no insurable interest seemingly because the proposal was to fully insure the losses.
- Q7 – this was the worst performing question. Candidates were generally unable to consider any nuances of Net to Gross ratios and showed flawed understanding of the mechanics of reinsurance contracts. Most disappointingly, only a small minority of candidates were aware that net to gross premium ratios are often negative for very immature years due to timing differences.
- Q8 – this was broadly reasonably answered, but a significant number of candidates did not seem to pick up on the very clear instruction to “recalculate”, sacrificing a number of marks that were generally high scoring for the candidates who had read the question.

1 *Expenses uncertainties:*

Broker mergers/ change in mix of brokers
... lead to changes in commission payments
New distribution channels / markets / lines of business
... costs of these may not be fully understood
Aggregators
... Various examples, e.g. may have entry criteria or different commission structures such as a per policy charge
Accounting changes
... Can lead to additional costs for training / consultants
Offshoring/outsourcing
... can have high set up & redundancy costs & uncertain savings
Taxes / levies / regulatory
... any example of changes to these factor
Economic factors
... any relevant example e.g. inflation / RPI / changes in rates of exchange
M&A activity
Other strategic decisions e.g. aggressive marketing campaign
Number of policies/volume of business
Changes in levels of claim/ reinstatement costs
Management fees
Changes in mix of business
Profit commission to brokers/profit related pay
Changes in pension arrangements
Lack of data
Any other reasonable sources

Generally well answered. Poorer answers simply tended to get fewer of the points than good answers. Occasionally people answered about what expenses might arise rather than sources of uncertainty and a few went off into answers about model uncertainty in general.

2 *When to use the Bornhuetter-Ferguson method*

The Bornhuetter-Ferguson method is very useful where the available data for the particular cohort are sparse.

This is often the case with more recent cohorts, cohorts from longer tailed portfolios (for example, liability excess of loss reinsurance) or where claims activity is expected to be extremely volatile.

It can also be used when a blend of experience and an exposure based estimate is deemed appropriate.

The Bornhuetter-Ferguson is most effective when the current data are too immature to be developed on a projection method,
... but we believe the experience data to date still gives some indication of the level of ultimate claims.

Problems with using the Bornhuetter-Ferguson method

More complex to apply and explain
Need reliable source of exposure-based assumption, e.g. IELR

In some cases, the data being projected may develop with a negative tail. In these situations, we may consider the assumed percentage developed unsuitable as a weight in this credibility method.

...We may use different weights, or where the incurred development displays a negative tail, we may consider it is more appropriate to apply the Bornhuetter-Ferguson method to the paid development.

In practice it would be unusual to use the Bornhuetter-Ferguson method after the first few development years. A chain ladder or case estimate approach would be preferred at longer durations.

Any generic problems applicable to all reserving methods, e.g. large claims

Reasonably answered. Most candidates got the most important points but few gave enough to get full marks.

3 Possible disadvantages of regulation:

The cost in terms of resource and finance to comply with, supervise and interpret the rules

,,, in particular for changes to the rules

The loss of business opportunities that arise from any restraint on a free market e.g. minimum/maximum premium rates.

The inability to maximise investment returns when there are controls on the investment decision.

The quantum of regulatory bureaucracy deterring new entrants.

The difficulties and hence potential inaccuracies in complying with complex (risk-based) liability and capital calculations.

The increased premium cost to the public arising from levies and the general increase in insurer expenses.

The inability of companies to benefit from economies of scale and cost reduction due to anti-competitive legislation.

The failure of insurance to reach certain sectors of the population due to the increased cost of and restrictions on methods of distribution.

Inflexibility of rules: one size fits all

Check list mentality/ false sense of security if all boxes are ticked

Rules may act against the principles of insurance: e.g. no sex discrimination on premium rates which also increases overall premium rates

Any other reasonable disadvantage

Probably the best-answered question with quite a few full marks. Some candidates just listed restrictions and regulations without saying why they were disadvantageous.

- 4** (i) Macroeconomics/ changes in legislation
- (a) Fleets may be parked or based in a similar geographical area.
And therefore prone to multiple claims from natural catastrophes e.g. storm/flood/hail damage.
Or a single large loss such as an industrial estate explosion or fire.
Risk management policies of large fleets e.g. drivers not taking regular breaks
 - (b) Exposure to a single profession can give rise to aggregations
e.g. property surveyors at a time of falling prices
Systemic bad advice/ control failings
Any other valid point under (a) or (b)
- (ii) Encourage and support insurance risk management
Carefully and regularly monitor aggregations of risk by geography/profession in management information.
..supplemented by purchasing specialist software/data such as that which models flood exposure
..and when defined limits are reached stop underwriting.
May need to non-renew or significantly increase rates if current aggregations too high
Purchase additional reinsurance that protects against aggregate events
Or enter into a quota share arrangement to reduce overall exposure
Consider amending terms, conditions and exclusions e.g. reducing policy limits for certain events
Increase diversification by writing more classes, or new geographical areas including overseas, new professions.
Keep fleet cars at drivers' homes
Any other reasonable method

Part (i) – Moderately answered. A lot of candidates gave poor examples of accumulations such as the possibility of motorway pile-ups involving more than one car in a fleet. In (b) too few got the point about concentrations arising from specialisation in a particular profession with a systemic problem.

Part (ii) – Too few got the points about monitoring concentrations so they do not arise or encouraging good risk management. Too many suggested inappropriate cover changes, such as limits on claims that would be illegal in the case of motor or changes that would make the insurance very unattractive, such as disallowing claims that arose from concentration. Most candidates got the points about diversification. Some candidates did not mention reinsurance whereas some others concentrated wrongly on all types of reinsurance.

5

- (i) **Equity risk**
the risk that there is a significant reduction in the value of an insurers equity portfolio
(including dividend income)
- Property risk**
the risk that there is a significant reduction in the value of an insurers property portfolio
(including rental income)
- Foreign Exchange risk**
the risk that exchange rates move in an adverse manner, reducing the value of the insurer's assets.
- Interest Rate risk**
The risk that interest rates move in an adverse direction leading to a reduction in the value of bond portfolio
- Spread risk**
The risk arising from the change in the relationship between interest rates in different market sectors.
- Concentration risk**
The risk from holding bonds or other investments from a limited number of counterparties.
- Mismatching risk**
The risk from holding investments that do not match expected liabilities by amount, timing etc.
Also:
Counterparty/issuer defaults
Severe economic or market downturn or upturn leading to adverse interest movements and/or equity market falls
Inadequate valuation of assets
Liquidity risk that cash is not available when claims need to be paid
Any other reasonable risk
- (ii) ***Motor and household***
- Claims inflation may be higher in both classes in times of high inflation
Large single events may cause losses in both (e.g. residential fire, damaging nearby vehicles)
Weather events and natural catastrophes may cause damage to both (e.g. floods, earthquakes, hailstorms)
- Household/motor and creditor***
The insurance cycle may reduce premium adequacy in more than one class at the same time (e.g. competitive new entrant into both markets)

Economic environment

E.g. increased unemployment may lead to both increased creditor claims and increased theft / fraud in the household and/or motor books

Operational issues within the company may impact more than one class e.g:

- Systemic poor underwriting
- Systemic poor claims control e.g. due to staff stretch
- Management strain leading to poor oversight
- Poor strategy at company level

Other external factors:

- Legislative environment
- Propensity to claim

Any other reasonable potential source of correlation

- (iii) A recession could lead to losses on the company's investments
..and unemployment that will cause more creditor claims and crime/fraud for household/motor.
A significant fall in property values could lead to investment losses
..and increased arson/other fraudulent claims on property policies.
A particularly large catastrophe could trigger market falls.
A significant change in exchange rates could impact the value of reserves held
..particularly the case if assets and insurance liabilities are not matched.
The company may have investments in companies whose collapse could lead to insurance as well as investment losses
..for example if creditor policies are offered to employees of a particular large company.
Mis-valuation of assets could also mean mis-valuation of the reserves
...perhaps due to systematic control and governance problems in the company.
Inflation correlated with interest rates
Any other reasonable potential source of correlation
- (iv) Setting regulatory capital.
Reinsurance: optimising the purchase of reinsurance by testing alternative structures.
Assessing profitability of new lines of business/existing business is evaluated using the internal model
Projecting future profit and loss accounts enabling testing of actual experience compared to expectations.
Informing, managing or reviewing risk appetite
Reviewing investment portfolio and testing alternative strategies.
Regular and evidenced Board review of internal model output.
Capital allocation to individual underwriting units.
Aggregation monitoring/ assessing catastrophe exposures.
Designing and monitoring risk management systems: identifying key risks and assessing the impact of mitigation
Setting bonuses/performance related salary for underwriters/management
Pricing: assessing return on capital for pricing and performance measurement

Reserving: quantifying the uncertainty in claims reserves
Planning: assessing different plans in terms of their risks, not just expected profits
Strategy: assessing the risks and diversification benefits of new strategies
Any other reasonable application

Part (i) – Some good answers, and others where the main fault was not covering enough of the points. Too few adopted the structure of naming the risk then explaining what it was. Too many concentrated on general economic factors rather than the components of market risk. A few went off on the wrong track, e.g. writing about how to model risks.

Part (ii) – Not generally well answered. A significant number did not understand what creditor insurance is. Quite a few failed to distinguish between the three classes in respect of inflation, which would not increase creditor claims. Few candidates got the points about general company issues affecting all classes.

Part (iii) – Very poorly answered. Most candidates made only one or two points and these were often confused. Too often they gave sources of correlation within each of the two categories, insurance and market risk, rather than between the two categories.

Part (iv) – Reasonably well answered. Most candidates got a good number of points and there were a few full marks. Occasional scattergun approaches listed a few things an internal model cannot do.

- 6**
- (i)
1. The policyholder must have an interest in the risk being insured, to distinguish between insurance and gambling.
 2. A risk must be of a financial and reasonably quantifiable nature.
 3. The amount payable by the insurance policy in the event of a claim must bear some relationship to the financial loss incurred.
 4. Individual risk events should be independent of each other.
 5. The probability of the event should be relatively small. In other words, an event that is nearly certain to occur is not conducive to insurance.
 6. Large numbers of similar risks should be pooled to reduce the variance and hence achieve more certainty.
 7. There should be an overall limit on the liability undertaken by the insurer.
 8. Moral hazards and possibility of should be eliminated as far as possible because these are difficult to quantify, result in selection against the insurer and lead to unfairness in treatment between one policyholder and another (loss events should not be under the control of the insured)
 9. There should be sufficient existing statistical data/information to enable the insurer to estimate the extent of the risk and its likelihood of occurrence.
- (ii) *Proposal A*
1. The school does have an interest in the risk because they will have to pay if someone rolls six sixes.
 2. The risk is easily quantified (as long as the dice are not biased).

3. The amount paid by the insurance company is linearly related to the amount raised or lost from the event.
4. Each set of dice rolls is independent from the others.
5. Probability of each risk event is small ($1 \text{ in } 6^6 = 1 \text{ in } 46656$).
6. 100 competitors may not be considered a large enough number of risks to reduce variance and highly unlikely to get even 100 with £10 fee or insufficient income for an insurer to be interested.
7. There is no limit to the payout as several competitors might win although highly unlikely (if no fraud).
8. This criterion is not easily satisfied as there would be potential for corruption.
9. The basic probabilities are easily computed but existing data as regards the profitability of the event (which might include a factor for moral hazard) may not be available.

Proposal B

1. Policyholder does have an interest in the risk.
2. Risk is financial and quantifiable.
3. The amount payable linearly related to bill.
4. There may be some independence between gas, electricity and water prices, although there is likely to be correlation between gas and electricity as they are both energy related, but different policyholders' bills for each utility are likely to be highly correlated.
5. Probability of price increases exceeding RPI is quite high.
6. Likely to be a large number of risks but no reduced variability as per point 4.
7. Possible for there to be claims from all policyholders.
8. Moral hazard could occur in that the policyholders use more electricity, gas or water.
9. Probably possible to analyse past gas, electricity and water rate increases for different suppliers but more likely to rely on fundamentals.

(iii) *Proposal A*

Reduce entrance fee to £1 and the prize to £2500 (for example) (or get sponsorship from a car dealer for a car as the prize), which is likely to result in a larger number of individual attempts and thus a greater pooling of risk, and reduction in variance

Increase the number of dice from 6 to 7 to reduce the probability of a claim

Limit the cover to the first win or a fixed number of wins only.

Shared prize if more than one winner

Protect against moral hazard/fraud by having an adjudicator on site or videoing the whole event, having the insurer supply the dice and having robust exclusions for negligence/fraud.

Using one of the very few insurance companies that write this form of insurance and who therefore have a large pool of such risks

Any other reasonable amendment

Proposal B

Specify that the cover applies to increases in unit rate not overall cost of consumption.

Limit maximum payout per policyholder.

Limit cover to those buying from particular companies

Change the trigger for the cover from the current rate of RPI to some adjusted alternative, such as allowing for historic utility inflation being higher, to reduce likelihood of a claim.

Any other reasonable amendment

Part (i) – Generally very well answered with quite a few full marks.

Part (ii) – Generally well answered for (a), with a few problems. A few did not read the question properly assuming that the number of dice thrown was 1, 2 or 3 which was not sensible given the monetary amounts involved. A large number said that the school did not have an interest in the insured event, even when they stated in (i) that this was to distinguish insurance from gambling, because if it was insured they made no loss if someone won. Candidates also often stated that there was no moral hazard which it is clear there is as if the event is insured then the school could well act differently. A lot of candidates said that the attempts were independent unless the dice were biased which is not true as so long as the same dice are used: biased dice have the wrong probability of success but the same probability for each attempt and every attempt is independent. The notion of pooling was somewhat confused: pooling will exist if the insurer can find a lot of independent events to insure, which may not be identical but that will have low probabilities of big payoffs. The point about a maximum loss was also somewhat confused; clearly it is £25,000 times the number of entries but that is a very big loss and might be considered extreme, if not unlimited, although with low probability. (b) was reasonably answered, with most candidates realising that events were not independent, although it was not always well expressed. A very good number made the point about moral hazard and over-using utilities.

Part (iii) – The main fault here was brevity. Most candidates made one or two good points and left it there. A surprising number suggested limiting the number of entrants in (a) although the question does not state that the premium would be fixed. There were some impractical suggestions.

7 (i) (a) *Reserving using data gross and net of reinsurance*

Reserve as normal on a gross basis and then apply same techniques to net triangles

+ves

Can compare the resulting gross and net projections with the difference being the reserves for reinsurance.

Simple to apply and understand

Simple to add to semi-automated reserving process

Can be used to assess the volatility of the net outcomes

Appropriate for proportional covers and low working layers (and, according to core reading, for very high excess reinsurance)
Appropriate where reinsurance programme has been stable over a number of years

The method can be adjusted to allow for major catastrophes
{Credit given if the negative statement is given as a disadvantage}

–ves

Possibility of inconsistent (including negative) reinsurance recoveries
Full historic triangulations of net data may not be available at the equivalent granularity

..particularly if there are whole account or grouped lines of business covers

Lack of direct link between gross and net experience could lead to inconsistent results for capital/ERM purposes.

Does not permit accurate assessment of credit risk

Other reasonable valid advantages/disadvantages

(b) *Applying net/gross ratios to gross reserves*

Derive a net to gross ratio using historic experience and details of RI programme

...then multiply ratio by gross reserves to obtain net reserves or by gross ultimates to obtain net ultimates depending on which is considered appropriate.

... or, rarely, can calculate gross from net by dividing by the ratio

+ves

Simple to apply, particularly for proportional covers

No need for full triangulations of net data – just latest positions

Ensures consistency of gross and net results (no negative recoveries)

–ves

May be difficult to derive a single ratio that is appropriate for a particular class of business.

..particularly when complex (non proportional) features to reinsurance programme.

Other reasonable valid advantages/disadvantages

Under (a) or (b):

Cannot accurately allow for some features of reinsurance such as aggregate limits, aggregate retentions and profit commissions.

Cannot accurately allow for claims that exhaust vertical cover.

Other reasonable valid advantages/disadvantages

- (ii) A net/gross ratio can be derived that is appropriate to apply to the gross IBNR to obtain an estimate of the net IBNR.
Key point: the selected IBNR ratio may be based on a different financial for each underwriting year based on the recoverability that is most similar.
For the oldest underwriting years, outstanding may be most appropriate given small number of claims remain or IBNR may be taken as zero
(Comment: here and following probably you should give suggestions as to which years from the table are appropriate)
For more recent years, incurred claims may be most appropriate.
For the newest underwriting years, use net/gross premium ratio (if reasonable) as unlikely to be enough claims notified to be stable.
... although as a large insurer there may be sufficient claims
But cannot use premium ratio for 2011 as negative: may need to obtain from other source such as business plan but not given in question data
Alternatively, averages of ratios may be used.
Adjusting the data for any known catastrophes or unusual events
And allowing for changes to the reinsurance cover (e.g. commuted covers).
Alternative approach may be reasonable

- (iii) A negative net/gross ratio implies that the reinsurance cost is greater than gross premiums received..
..often due to the reinsurance having to be paid for in advance of premium receipt e.g. as minimum and deposit premium

- (iv) 2005
n/g premium 80% n/g paid 80% n/g outstanding 80%
2006
n/g paid 75% n/g outstanding 75%

Profit commission receivable : $(70\% - 50\%) \times 0.2 = 4\%$
Therefore n/g premium $75\% + 25\% \times 4\% = 76\%$

Assumptions

Figures quoted are net of ceding commission

Profit commission payable as a premium refund rather than claims deduction

Commission calculated as percentage of reinsurer's premium

Actual gross loss ratio equal to expected

Note that alternative answers may be applicable if the assumptions given are reasonable e.g. 75%, 75%, 79% or 74%, 74%, 75% or 71%, 71%, 75% or 75%, 75%, 75% the latter only if the profit commission is calculated and stated to be included in a net to gross analysis as a separate item

- (v) Reinstatement premiums will increase the cost of reinsurance programme in the event of losses..
...therefore would expect net/gross premium ratio to be lower.
For known losses, would be able to calculate the reinstatements exactly and add to the reinsurance cost.

For future losses, should consider the reinsurance IBNR that has been estimated
..and use the reinstatement terms to estimate the cost that relates to that recovery.
Some approximation may be required to allocate RI IBNR between different layers/programmes.
Alternatively could use a simulation model that could estimate mean reinstatement costs based on a distribution of gross losses.
Any other reasonable valid points/(interpretation)

- (vi) Applying a net to gross ratio may give some indication of a net range
..but is likely to be too crude to give a reasonable range, particularly towards the tails of the distribution
May be higher recovery rate at higher percentiles as retention eroded on any aggregate excess of loss reinsurance protection so additional gross losses are fully recoverable.
..or lower if significant reinsurer default due to a large market event
..or through top of programme
Therefore deriving a distribution of net/gross ratios to apply at different percentiles could be appropriate..
which may be done by simulating recoveries from different combination of gross losses
Need to consider possibility of future management actions such as purchase of further reinsurance after large event
..to model these dynamically would require much more complex methodology
Any other reasonable valid point

Part (i) – A large number of candidates did not outline the approaches as requested, just giving the advantages and disadvantage. Most people described (a) well and most got a few valid advantages and disadvantages. Too few of the points was the most common reason for not getting marks. (b) was answered adequately, although even when “outlined” they often did not specify what the ratios were applied to or just said applied to gross claims. Too few candidates (if any) seemed to realise that net-to-gross ratios could vary by year and could be used after diligent investigation.

Part (ii) – This was not well answered. Almost no-one actually referred to the table given in the question or pointed out that different ratios would be used depending on underwriting year taking into account the different stages of development they had reached, despite the fact that we do not introduce red herrings in questions so they should have realised that the table had some purpose. Too many of the candidates suggested that the ratios be applied to ultimate claims rather than IBNR and quite a few seemed to think that they needed to calculate net paid and incurred. There seemed to be little appreciation that this is actually a sensitive method of netting down gross reserves that can allow for a great many things.

Part (iii) – Surprising poorly answered: it should have been a free mark for everyone. A lot of candidates thought it was something to do with commission or an error or made suggestions that made no sense at all.

Part (iv) – Poorly answered. Most got the 4% commission but many seemed to think that the insurer would pay it to the reinsurer and nobody at all remembered that only 25% would be

received because the treaty was only 25% ceded. A fair number of candidates gave answers that were plausible alternative interpretations but did not explain enough to demonstrate that they were not simply on the wrong track.

Part (v) – This was poorly answered This was left fairly open in the marking so that candidates who demonstrated that they understood reinstatements receive marks but in general they did not demonstrate any understanding.

Part (vi) – Not very well answered. Most candidates seemed to understand why it was probably a poor procedure but few were particularly clear and only a very small number thought about the possibility of reinsurance exhaustion at the upper end. Very few said that as a first stab it was probably reasonable. Very few made reasonable attempts at suggesting an alternative approach. Some suggested netting down the gross distribution so the mean is equal to the mean of the net distribution which is essentially the same as applying net/gross ratios with the same disadvantages. A large number explained how to get from a gross reserve to a net reserve or suggested individual projections of large losses without explaining how this gave a range.

8 (i)

Diagnostics

Development factors:

<i>Uw Yr</i>	<i>1–2</i>	<i>2–3</i>	<i>3–4</i>	<i>4–5</i>
2007	1.4753	1.1956	1.0835	1.0021
2008	1.5010	1.2013	1.0765	
2009	1.5305	1.1898		
2010	1.5573			

Development factors 1–2/ percent of ultimate for dev year 1 for 2007 to 2010

Suggest that there is a trend in the 1–2 development

All other figures look reasonable: no trend over u/wtg years,

percent of ultimate/ development factors increasing in reasonable fashion,

year 3 and 4 % of ult/ later development factors suggest may not be a tail or a very small tail e.g. up to 1.0021

Adjust method by adjusting 2011 for trend

e.g. average difference 2008/2007; 2009/2008; 2010/2009 is 0.0273

added to 2010 1–2 ratio gives 1.5847

Other reasonable ratios with satisfactory explanation

*Subject ST7 (General Insurance: Reserving and Practical Modelling Specialist Technical) –
September 2012 – Examiners' Report*

Development Factors:

Year-on-Year	1.5847	1.1955	1.0799	1.0021	1.0000
Cumulative	2.0502	1.2938	1.0822	1.0021	1.0000

<i>Uw Yr</i>	<i>Ultimate</i>	<i>Future Claims</i>
2007	6,125	0
2008	6,624	14
2009	6,690	508
2010	7,501	1,703
2011	7,797	3,994
		<u>6,219</u>

(ii) Interpolation formulae, assuming linear:

<i>As at 31/12</i>	<i>Diag</i>	<i>Uw Yr</i>	<i>Interpolation Formula</i>
2010	4	All	$1/5 \times 31/12/09 + 4/5 \times 31/03/11$
2008	2	2007	$5/18 \times 30/11/07 + 13/18 \times 31/05/09$
2008	1	2008	$12/17 \times 31/05/09$
2007	1	2007	$17/18 \times 30/11/07 + 1/18 \times 31/05/09$

Restated Annualised Triangle of Claims Paid:

	<i>1</i>	<i>2</i>	<i>3</i>	<i>4</i>	<i>5</i>
2007	1,841	2,848	3,595	3,868	3,940
2008	1,766	3,187	3,749	4,201	
2009	2,405	3,730	4,578		
2010	2,431	3,865			
2011	2,810				

Development Factors:

Devfs	1.6142	1.2209	1.0988	1.0187	1.0000
Cum	2.2059	1.3665	1.1193	1.0187	1.0000

<i>Uw Yr</i>	<i>Ultimate</i>	<i>Future Claims</i>
2007	3,940	0
2008	4,279	78
2009	5,124	546
2010	5,282	1,417
2011	6,199	3,389
		<u>5,430</u>

Diagnostics

Development factors:

<i>Uw Yr</i>	<i>1–2</i>	<i>2–3</i>	<i>3–4</i>	<i>4–5</i>
2007	1.5468	1.2625	1.0759	1.0187
2008	1.8045	1.1762	1.1207	
2009	1.5509	1.2274		
2010	1.5897			

Linear interpolation (and extrapolation) used

... as only reasonable choice given the data supplied

If non-linear interpolation is used by a candidate then marks should be given if assumptions are given and are reasonable

Diagnostics OK except:

4–5 development factor of 1.0187 suggests there may be a tail but 9 month ratio from 31/03/11 to 31/12/11 of 3,940/3,936 or 1.0010 contradicts this and suggests no tail is reasonable (or very small tail)

Although this also might suggest that linear interpolation is not reasonable and that some other method of interpolation be used the simplest being graphical

And also 2008 dev year 1 not good: interpolation factor (here extrapolation) strongly suggests linear interpolation not applicable

Recalculate with sum/sum ignoring 2008 dev yr 1

Development Factors:

Year-on-Year	1.5639	1.2209	1.0988	1.0187	1.0000
Cumulative	2.1371	1.3665	1.1193	1.0187	1.0000

<i>Year</i>	<i>Ultimate</i>	<i>Future</i>
2007	3,940	0
2008	4,279	78
2009	5,124	546
2010	5,282	1,417
2011	6,005	3,195
		<u>5,236</u>

Part (i) – Generally reasonably well answered. A small number went on entirely the wrong track discussing everything under the sun that they might do to reserve this business sometimes without doing any calculations despite the question asking for a recalculation. Those who calculated RTRs normally got most of the points required. Generally marks were not lost if a tail factor higher than that suggested in the model answer was used although marks were lost if RTR factors were calculated to only 2 decimal places.

Part (ii) – Many candidates constructed a standardised triangle of claims data from the data given and calculated future claims more or less correctly but almost no-one looked at RTRs as they did in part (i), and consequently did not adjust the development which they were

*directed to by the question stating “making any adjustments that you consider necessary”
and the fact that part (ii) carried 6 more marks than part (i).*

END OF EXAMINERS' REPORT