

**Subject ST3 — General Insurance
Specialist Technical**

EXAMINERS' REPORT

April 2008

Introduction

The attached subject report has been written by the Principal Examiner with the aim of helping candidates. The questions and comments are based around Core Reading as the interpretation of the syllabus to which the examiners are working. They have however given credit for any alternative approach or interpretation which they consider to be reasonable.

M A Stocker
Chairman of the Board of Examiners

June 2008

Comments

Individual comments are shown after the solutions to each part question that follows.

- 1** *London Market Brokers:*
Act as specialist intermediaries e.g. Lloyd's broker, reinsurance broker
Are agents of the insured
Organisational aspects of their work are important as they are often international organisations and clients and the insured are often in different countries/time zones
Place business using the slip system
Prepare the appropriate slip, which shows the main features of the risk to be insured, in a standard format
Prepare additional information relating to the risk at the request of the underwriter and further technical assistance
Present the slip to a lead underwriter, who on the basis of the slip and additional information will set the rate and terms
Present the lead underwriter's rate and terms to the insured for approval
The lead underwriter with the broker indicates the proportion of the risk (line) he is prepared to accept (by signing and stamping the slip)
If the insured agrees to the rate and terms, the broker will approach the follow market to place the remainder of the risk on the lead rate and terms
Follow underwriters will sign their lines and stamp the slip in a similar fashion to the lead (– they act as co-insurers)
The broker continues until the risk has been over-placed
The broker, in agreement with the insured, signs down the lines of the underwriters so they total 100%
If the broker fails to place 100% of the risk, the insured may retain the remaining proportion or more typically the broker will seek to renegotiate better terms
Collecting premiums from the insured and paying claims
Advising and negotiating the best terms for the insured
The broker also provides an admin role e.g. preparing policy documentation

Comments on Q1: *A bookwork question on which many candidates scored well.*

- 2** (i) Increasing advertising spend will increase overall expenses
However, if it is a successful campaign with high sales volumes then it could decrease expenses per policy as the existing fixed expenses are spread more thinly over the larger book of business.
Increasing profit loading will increase profit per policy.
However this will result in higher premiums and may reduce volumes of business to a level that results in lower total profit
The overall effect on total profit will depend on the effect on the volume of business and hence an assumption around volume of business is needed
The overall effect on profit will also be impacted by changes in the mix of business resulting from varying these two items
The overall effect on profit will also be different depending on the mix of new business and renewals
- (ii) In terms of the model total profit is premiums less expenses less claims
Also any valid alternative profit formula e.g. (per policy profit load \times policy volume)
Set up the model to give total profit as an output
Review past company data on rate changes versus policy volumes

In addition, obtain data from comparison web sites to help determine where the premium currently sits in relation to the rest of the market in order to determine sales volumes

Other expenses will be fixed or overheads that are independent of sales volume and this will also complicate the total profit calculation

Analyse effect on volumes in different groups e.g. age, sales channel or social economic group

Consider correlations between the profit loading and marketing spend

Produce a set of one-way or two-way analysis tables for each selected profit loading showing how total profit varies by marketing spend, i.e. elasticity

and produce a set of one-way or two-way analysis tables for each selected marketing spend showing how total profit varies by profit loading

Select the combination of factors which maximises total profit

Alternatively given that we have an output which is correlated to two variables we could fit a Generalised Linear Model (GLM) to the model outputs

The GLM could then be used to maximise the total profit

Set up the model such that the factors can be easily interpreted and monitored

Comments on Q2: *Most candidates acknowledged that changes in costs and profit loading would affect volumes and many picked up full, or nearly full, marks on part (i). However, in (ii), students tended to trot out the points given in the core reading without thinking through and applying to the specifics of this particular question.*

- 3** (i) + Promotes confidence in actuaries' work, by ensuring that actuaries maintain a high level of training and expertise
- + Being able to demonstrate compliance protects an actuary against litigious criticism
 - + Protects the public by making actuaries accountable
 - + Promotes consistency and greater scrutiny of professional judgments
 - + This in turn can reduce work loads e.g. consistent processes make it easier to review/pick up a predecessor's work
 - + Enables fellow actuaries to be challenged
 - + Provides actuaries with a point of reference for clarification
 - + Consistent with some other professions
 - Above advantages are only applicable if the guidance is well written and not open to interpretation
 - Guidance will never be fully comprehensive
 - Guidance can become out of date
 - Additional bureaucracy and time-consuming
 - Infrastructure needed if not already in place, e.g. overseeing boards
 - Additional costs
 - Potentially restricts use of individual judgment
 - Danger of setting standards that are too high/unrealistic, e.g. listing and justifying every incremental development factor assumption in a reserving exercise

Comments on Q3(i): *A few candidates misinterpreted "guidance" to mean "regulation". Many students failed to generate many distinct points and so tended to score badly on this part.*

- (ii) State the methods used when selecting ultimate for each class of business, type of reserves and year of account
 - Detailed description of the methods used
 - A detailed explanation of the methods underlying assumptions
 - A list and discussion of the key assumptions and judgments used
 - A description of the process by which the assumptions have been identified
 - Highlighting any illustrations based on assumptions that the are not regarded as appropriate
 - The rationale for selecting the methods used in producing results and for each method a statement of key assumptions
 - Where the results of different methods or assumptions presented in the report differ significantly, comments on the likely reasons for the differences and an explanation of the basis for the choice of results
 - Sufficient data and other information to understand the key assumptions made and the process by which the assumptions have been identified

Comments on Q3(ii): *Many candidates failed to restrict their answer to the “methodology and assumptions” section as required and therefore wasted time writing unnecessary points.*

- (iii) Introduction
 - Definition of terms
 - Purpose and scope
 - Information and data used
 - Analysis of emerging experience (comparison with last year)
 - Business conditions over the year
 - Results
 - Sensitivity testing of assumptions used
 - Uncertainty

Comments on Q3(iii): *There was a mixed performance for this part of the question with some candidates scoring well and others answering poorly.*

- 4 Claim payments are almost always the most significant item of the liability outgo
 - Ultimate claims and payment patterns can be taken from the reserving calculations
 - Alternatively , project claim amounts forward using standard techniques (e.g. chain ladder) to derive payment patterns
 - This will depend on the basis required for the projection e.g. claim amount are required on a best estimate or prudent basis
 - Perform any adjustments to the data as necessary e.g. large claims, trends, inflation etc.
 - Projecting forward for the full expected run-off period for the book Individual period by period projections are important
 - Model the motor property damage separately from the bodily injury claims
 - As the bodily injury claims will be much longer tailed and may involve periodic payments

Calculations should be done on a monthly or quarterly basis
to take account of any seasonal effects
Split the business into cohorts written in the same period
Care needs to be taken to ensure that all types of claim amounts are projected e.g.
outstanding, IBNR, URR

For example triangles projected using an accident year cohort will not include URR
Split the business by currency where appropriate
Reinsurance and other recoveries should be included separately as an offset to the
liability outgo taking into the reinsurance programme
Reinsurance recoveries do not usually coincide with the claim payments and hence a
timing difference exists
Future known reinstatement premium, and other reinsurance premium, payments will
be modelled
If large gross claims have been modelled then it may be necessary to calculate the
appropriate reinstatement premium with the necessary delay

Model expense outgo
Fixed expenses can be modelled adjusting for inflation as appropriate
Some items may occur at specific times of year e.g. rates or local taxes
Allow for any one off expenses
Claim handling expenses can be projected with claims
Alternatively, claims handling expenses can be projected separately in a triangle
Taxes must be calculated on estimated profits and the timing will be known
Contributions to the MIB fund for uninsured drivers, or to the Lloyds central fund if
relevant should also be allowed for

Comments on Q4: *Virtually all candidates took note that this question related to a motor portfolio and mentioned the need to split out BI and property damage claims. However, even though the question specified liability outgo, many students wasted time writing about premiums and investment income. Similarly, we are interested in existing liability outgo but some students talked about commission on business which would be written in the future. Some poorer answers failed to discuss expenses, concentrating only on claims outgo, and therefore missed out on some of the easier marks available.*

- 5** (i)
$$\text{BCP} = \frac{\text{Average Claim Amount} \times \text{Claims Incident Rate}}{\left(\frac{\text{Total claim cost} / \text{number of claims}}{\text{Total Exposed to Risk} / \text{number of claims}} \right)}$$

Number of claims cancel out to give the alternative form of BCP, namely
$$= \text{total claim cost} / \text{total exposed to risk} = \text{BCP}$$

Comments on Q5(i): *Answered well by most candidates, although a small minority didn't seem to know where to start with the definition of burning cost, which is a fundamental concept in General Insurance. Also some candidates defined burning cost as total incurred claims, as opposed to ultimate claims, over total exposed to risk.*

- (ii) Analyse the frequency and severity separately
 - Break into homogenous groups if necessary and possible
 - Check for errors in the data
 - Assuming that we have no outstanding and IBNR data project the number of paid claims to ultimate
 - Estimate an average cost per claim and multiply this by the projected number of claims to obtain the estimated claim ultimate amount
 - Because of changes over time may not want to use all 10 years of data, depending on data volumes
 - Adjust for large claims
 - Truncate, remove, spread or add claims cost to bring claims to an average level
 - Adjust for unusually heavy/light experience
- Decision depends on the extent to which such claims (or lack of claims) are expected to recur during the exposure period of the new rating series
- Assume no change in target market or distribution approach
- Adjust for trends in claims experience – bring all data to the mid point of the exposure of the new rating series
- Decide how historic trends may project into the future to allow for them in the projection of the risk premium
- Adjust for changes in risk
- They may show up as trends or as step changes
 - May appear due to changes in the mix of business
 - May be different for different types of claim
- Adjust for changes in cover
- They may show up as trends or as step changes
 - The major changes are likely to involve the perils covered and limits or excesses applied to any claim
 - Perils may be excluded hence claim cost reduced
 - or specific claims excluded
 - or new perils added so an estimate of claims cost added
- Changes in limits or excesses will need the claim cost distribution to be used
- Data will be incomplete as claims below the excess point are unlikely to be reported
- Changes in underwriting or claim settlement procedures will result in similar changes to those for changes in cover
- Adjust for past and future inflation
 - Break down time periods into periods of uniform inflation
 - Adjust for the original period of writing the business and time period of new rating series

Adjust for delays between claim notification and individual payments until final settlement, both for claims occurring in the base period and for those expected to occur during the exposure period of the new rates
Determine the period of exposure containing the base experience
Determine the full period of exposure covering the claims that can arise from the policies written under the new rates
and adjust for the timing difference

Project exposure values

Ensuring that each claim amount corresponds to the premium data

To arrive at a risk premium rate, we need a rate of claims per unit of exposure

Here these exposure units are expressed in terms of monetary units so the base exposure values need to be projected at an appropriate rate of premium inflation

Premium rate increases can be estimated by looking at historic average premium rates (if actual rate increases are not available)

Although this assumes that the mix of business, terms & conditions etc. remain the same in all years

Comments on Q5(ii): *Many candidates tried to answer this part by giving the same answers as in Q4. (Q5 relates to analysing and adjusting past data to make it relevant to the future for the purposes of premium rating whereas Q4 was concerned about the timings of cash flow projections.) Most candidates scored badly because they failed to generate sufficient points for the 13 marks available. The better answers covered the inflation adjustments required for the future rates, which linked into part (iii). Most candidates failed to go into any or enough detail on the projection of exposure values.*

- (iii) Assuming policies are uniformly written over the period
Assuming no change in reporting and no settlement delays
Assuming claims occur on average mid way through the year
Assuming that inflation is uniform over the calendar year

For claims: Inflate from the mid point of historic reporting to expected future reporting date

Historic claims occur on average on 30/06/06

Historic claims reported on average on 31/03/07

Future claims occur on average on 30/09/08

Future claims reporting date 30/06/09

$$= 1.04^{0.75} \times 1.05 \times 1.06^{0.5}$$

$$= 1.113$$

Marks provided for alternative methods for example:

Deflate from reporting date to written date

$$= (1/1.04)^{0.25} \times (1/1.03)$$

$$= 0.9614007$$

Inflation of claim cost between the mid points of writing is

$$= 1.03 \times 1.04 \times 1.05^{0.25}$$

$$= 1.0843460$$

$$\begin{aligned}
 & \text{Inflation from mid point of writing to mid point of reporting is} \\
 & = 1.05^{0.75} \times 1.06^{0.5} \\
 & = 1.0679352 \\
 & \text{So total adjustment} = 0.9614007 \times 1.0843460 \times 1.0679352 \\
 & = 1.113
 \end{aligned}$$

Comments on Q5(iii): A fairly easy projection calculation which most candidates attempted reasonably well. Marks were lost mainly because the projection dates used were inconsistent e.g. projecting from the average incurred date in the past data to the expected average reported date in the future. A surprising number of candidates expected to pick up a mark for making the assumption that policies are annual, failing to notice that this is specified in the question. Some candidates tried to project the claim data from the average date the claims occurred historically to the average date the claims are expected to occur in the future exposure period despite the fact that the question states that the claim data being projected are for claims reported between 30 September 2006 and 30 September 2007.

6

(i) *EBCT 1 assumptions*

The distribution of each X_j depends on a parameter, denoted θ , whose value is fixed (and the same for all the X_j s) but is unknown.

Given θ , the X_j s are independent and identically distributed.

Where θ could be a real number or it could be a more general quantity such as a set of real numbers.

The random variables $\{X_j\}$ are identically distributed.

The X_j s are not (necessarily) unconditionally independent.

EBCT 2 assumptions

The distribution of each X_j depends on the value of a parameter, θ , whose value is the same for each j but is unknown.

Given θ , the X_j s are independent (but not necessarily identically distributed).

$E[X_j | \theta]$ does not depend on j .

$P_j V[X_j | \theta]$ does not depend on j .

Comments on Q6(i): Bookwork, although many students had not learnt this.

(ii) Differentiate equation with respect to a_0 and put the derivative equal to zero. This gives the following equation:

Equation 1:

$$E[m(\theta) - a_0 - \sum_{j=1}^n a_j X_j] = 0$$

Which from the definition of $m(\theta)$ gives:

$$a_0 = E[m(\theta)] \left(1 - \sum_{j=1}^n a_j\right)$$

Next differentiate with respect to α_k where $k \neq 0$, and put the derivative equal to zero. This gives:

$$E[X_k(m(\theta) - a_0 - \sum_{j=1}^n a_j X_j)] = 0$$

which gives:

$$V[m(\theta)] + (E[m(\theta)])^2 - a_0 E[m(\theta)] - \sum_{j=1}^n a_j (V[m(\theta)] + (E[m(\theta)])^2) - a_k E[s^2(\theta)] = 0$$

Rearranging this last equation gives:

Equation 2:

$$a_k E[s^2(\theta)] = (1 - \sum_{j=1}^n a_j) (V[m(\theta)] + (E[m(\theta)])^2) - a_0 E[m(\theta)]$$

This equation holds for $k = 1, 2, 3, \dots, n$. An important point to notice is that the value of a_k does not depend on k . In other words:

$$a_1 = a_2 = \dots = a_n.$$

Now denote the common value of a_1, a_2, \dots, a_n by Z/n so that:

$$Z = \sum_{j=1}^n a_j$$

and the estimator can be written as:

Equation 3:

$$a_0 + \sum_{j=1}^n a_j X_j = a_0 + Z\bar{X}$$

where:

$$\bar{X} = \sum_{j=1}^n X_j / n.$$

Equations 1 and 2 are now two linear equations in two unknowns, a_0 and Z . The solution to these two equations is:

Equations 4 & 5:

$$a_0 = (1 - Z)E[m(\theta)]$$

$$Z = \frac{n}{n + E[s^2(\theta)]/V[m(\theta)]}.$$

So, the solution to the problem of estimating $m(\theta)$ given is given by the right hand side of equation 3 with a_0 and Z given by Equations 4 & 5, respectively.

In summary, the estimate of $m(\theta)$ given \bar{X} given by EBCT Model 1 is:

$$(1 - Z) E[m(\theta)] + Z\bar{X}$$

where:

$$\bar{X} = \sum_{j=1}^n X_j / n$$

and:

$$Z = \frac{n}{n + E[s^2(\theta)] / V[m(\theta)]}$$

Comments on Q6(ii): This also was bookwork. This part was not even attempted by the vast majority of candidates. Of those who did attempt it, many gave up mid-way through.

(iii) Company A:

Volume mean

$$= (100 \times 30 + 90 \times 23.1 + \dots 78 \times 3.1) / (100 + \dots + 78) \\ = 1,400 / 433 = 3.233$$

$$\sum P_{ij}(X_{ij} - X_i)^2 \\ = [100 \times (3 - 3.233)^2 + 90 \times (3.1 - 3.233)^2 + 70 \times (4.4 - 3.233)^2 \\ + 95 \times (2.8 - 3.233)^2 + 78 \times (3.1 - 3.233)^2] / (5 - 1) = 123.2$$

Company B:

Volume mean

$$= (110 \times 2.7 + 110 \times 33 + 90 \times 2.9 + 105 \times 31 + 105 \times 2.9) / (110 \\ + \dots + 105) = 1,500 / 52.0 = 2.885$$

$$\sum P_{ij}(X_{ij} - X_i)^2 \\ = [110 \times (2.7 - 2.885)^2 + 110 \times (3 - 2.885)^2 + 90 \times (2.9 - 2.885)^2 \\ + 105 \times (3 - 2.885)^2 + 105 \times (2.9 - 2.885)^2] / (5 - 1) = 4.8$$

$$Px = (2 \times 5 - 1)^{-1} \times [433 \times (1 - 433/953) + 520 \times (1 - 520/953)] \\ = 52.5032$$

$$E[m(\theta)] = (1,400 + 1,500) / (433 + 520) = 3.043.$$

$$E[s^2(\theta)] = (123.2/4 + 4.8/4) / 2 = 15.999$$

$$V[m(\theta)] = [100 \times (3 - 3.043)^2 + 90 \times (3.1 - 3.043)^2 + \dots 105 \times (3 - 3.043)^2 \\ + 105 \times (2.9 - 3.043)^2] / (9 \times 52.50) - E[s^2(\theta)]$$

$$\begin{aligned} &= [(0.2 + 0.4 + 134.4 + 3.8 + 0.1 + 11 + 0.2 \\ &+ 2.1 + 0.9 + 3.6) / 9 - 15.999] / 52.50 \\ &= [(138.9 + 17.8) / 9 - 15.999] / 52.50 \\ &= (17.412 - 15.999) / 52.50 = 0.0269 \end{aligned}$$

$$\begin{aligned} Z &= 433 / (433 + E[s^2(\theta)] / V[m(\theta)]) \\ &= 433 / (433 + 15.999 / 0.0269) \\ &= 0.4215 \end{aligned}$$

Hence expected claims = $0.4215 \times 3.233 + (1 - 0.4215) \times 3.043 \times$ number of policies in 2007
= $3.123 \times 78.0 = \text{£}243.6\text{K}$

Assuming the same number of policies as the latest year or any other reasonable assumption e.g. average of last 5 years, trend in average movements, downward linear trend

Comments on Q6(iii): Many candidates scored highly on this part but some failed to realise that the formulae required are in the formulae book. Not giving the number of policies for 2007 in the question may have presented difficulties for some candidates.

- (iv) The expected claim amount for company A is lower as Model 2 allows for the volume of business which has recently declined for company A .
or any other reasonable observation

Comments on Q6(iv): For candidates that attempted this part of the question most stated that this was due to Model 2 taking into account the volume of business.

7 (i) **Projecting incurred claims data only**

Projecting incurred claims data only is preferable to only projecting paid data.

Incurred projections are useful as paid claims development will be less mature than incurred claims.

Paid projections, however, can help identify changes or inconsistencies in the strength of case reserves or possible redundancies.

Projecting both bases can therefore reveal features of claim reserves that would otherwise be missed.

Need paid claims development if discounted reserves required

Would recommend that the client projects both paid and incurred data.

Projecting net of reinsurance only

Projections at a net level will be robust as long as the proportion of reinsurance recoveries remains stable.

It would be preferable to project at a gross level and apply the actual reinsurance program to the projected future claims

This may not be feasible in practice.

Alternatively project at gross level and analyse the trend in reinsurance to gross ratios for premiums, paid, incurred, outstanding claims in order to select reinsurance IBNR ratios.

In addition, understand change to the reinsurance programme and how this will impact the IBNR ratios selected.

ELR using 3 -year rolling average

3-year rolling average is good where the historical selected ultimate loss ratios are volatile over time.

Using a weighted average by ultimate premium though would smooth out any volatility over the accident/underwriting year (as the years with the largest ultimate premiums will be more stable)

Gives credit to the account's own unique experience.

Easy to apply

but a fairly mechanical approach, which doesn't take into account any possible trends showing in the data/unusual years etc.

Claims and premiums are calculated on the same basis.

No account has been made to allow for premium rate changes and claims inflation.

Would recommend a weighted average where the number of prior year historical selected ultimate loss ratios is based on the data.

Would recommend loss ratios are adjusted to allow for premium rate changes and claims inflation.

Recommend use of market stats benchmarks, where available for a sense check – although need to ensure that the data is on a consistent basis.

Exchange rate conversion

This exchange rate conversion method would work on paid data but not on incurred.

The outstanding need to be treated in a different way depending on whether they are

New claims in the quarter/year

Prior claims with no movement in the quarter/year

Re-stated claims with movement in the quarter (e.g. due to additional information or hyper-inflation)

For the first two type of outstanding claims the method is fine, for the last type of claim the entire outstanding amount would need to be converted into US \$'s.

The method assumes that the movement in exchange rates move in exactly offsetting ways to movements in inflation – this is not always the case in practice.

Dealing with exchange rates is always complicated. This approach does have its disadvantages but it is not unreasonable therefore no recommendation to change the current method.

Comments on Q7(i): *Candidates failed to generate many points for the 12 marks available and so tended to score badly. The better answers contained a sensible structure, e.g. they took each of the 4 notes in turn and considered the advantages, disadvantages and recommendations, although there were still an insufficient number of points made. The poorer answers tended to be very muddled. Some candidates were unable to comment fully on why both paid and incurred projections are important and the disadvantages of projecting at a net level only. Hardly any candidates scored marks for the discussion of hyper-inflation and exchange rates, but*

it was recognised by the examiners that this was a difficult concept under the time pressure of an exam. Many candidates mistakenly considered the BF ELR to be lacking in independence, some even stating that this made the BF method to be the same as the chain ladder method. However, because the ELR related to the previous three years, it was in fact suitably independent. Incorrect assumptions about the independence of the ELR for the BF method have been commented on in previous examiners' reports.

- (ii) + Useful in exceptional circumstances e.g. a very new book of business with no prior data or extremely volatile own history – as is the case for this company.
 + Underwriter has a good knowledge of the business
 + May reflect market rate changes and inflation effects as well as trends in claims frequency and average cost
 + Provides independent estimates
 – Underwriter's estimates may be too optimistic and hence not representative of the actual loss ratios.
 – Need to check consistency of the basis used.
 This approach is reasonable, would recommend the use of market stats data as well, where available, as a sense check
 Need to ensure consistency with the basis e.g. gross/net commission/reinsurance.

Comments on Q7(ii): *This part of the question was answered reasonably well.*

- (iii) The mix of business is the same for each year.
or other reasonable key assumption

Comments on Q7(iii): *The question asks for one key assumption and so students should only state one assumption. The examiners are not impressed by a scattergun approach in which candidates hedge their bets by stating a number of possible assumptions.*

- (iv)

Year	Earned Premium \$000's	Earned Policy Years	Incurred Claims \$000's	Incurred Cumulative Development Factor	Selected Ultimate Loss Ratio	Premium Rate Increase for 2007 Level	Claims Cost Increase for 2007 Level	2007 On-Level Loss Ratio	Selected Ultimate Losses \$000's
2002	11,750	1,150	8,765	1.000	75%	1.366	1.28	70.1%	8,236
2003	13,000	1,275	10,350	0.960	76%	1.368	1.22	67.5%	8,776
2004	12,500	1,125	9,235	0.940	69%	1.256	1.16	63.6%	7,951
2005	13,250	1,050	9,500	0.920	66%	1.106	1.10	65.8%	8,720
2006	15,250	1,125	11,250	0.975	72%	1.029	1.05	73.4%	11,201
2007	17,650	1,265	9,575	1.520	78%			68.3%	13,697

Where premium rate factor for 2002 is $(17,650/1265)/(11750/1150) = 1.366$, etc.

Claims cost increase for 2002 is $1.05^5 = 1.276$, etc.

2007 on level loss ratio is $75\% \times (1.276/1.366) = 70.1\%$, etc.

$$\begin{aligned} 2007 \text{ IER} &= (11750 \times 70.1\% + 13000 \times 67.5\% + \dots + 15250 \times 73.4\%) / \\ & (11750 + 13000 + \dots + 15250) \\ &= 68.3\% \end{aligned}$$

$$2007 \text{ Selected IBF Ultimate} = 9575 + (1 - (1/1.520)) \times (68.3\% \times 17650) = 13,697.$$

Comments on Q7(iv): *Slightly different answers could be achieved depending on whether candidates used the selected ultimate losses or the selected ultimate loss ratio on which to base the calculation, because of rounding differences. Marks were awarded for either basis and also if premiums and claims were adjusted to same-year values as the question did not specify what weighted premiums to use. Many candidates failed to even attempt to adjust either the premiums or the claims for premium increases or inflation, even though information on these was given in the question. Some candidates also calculated a straight average rather than a weighted average, as required in the question, when calculating the ELR.*

$$\begin{aligned} \text{(v)} \quad 142 \times 1 / (1.05)^{\text{DMT}} &= 86 \\ (1.05)^{\text{DMT}} &= 142/86 \\ \text{DMT} \times \ln(1.05) &= \ln(142/86) \\ \text{DMT} &= \ln(142/86) / \ln(1.05) \\ \text{DMT} &= 10 \text{ years.} \end{aligned}$$

The DMT is very high. This is likely to be a liability class of business with latent claims e.g. asbestos.

Comments on Q7(v): *This part of the question was well answered by the majority of candidates. Whilst most candidates recognised that this would be data from a liability class not all candidates realised that a tail length in excess of 10 years would suggest latent claims like asbestos. Some candidates mistakenly tried to calculate the discounted mean term using paid development patterns even though there are no data to do this.*

- (vi) Exposure-based methods but amount and quality of data are often insufficient. Paid and incurred survival ratios and IBNR to outstanding ratios. These ratios all use figures that are estimated by the company, e.g. incurred, reserves, IBNR, OS and will differ depending on reserving strength. This also makes benchmark comparisons difficult, as each company will have different reserving basis. Paid survival ratios do at least have paid figures in the numerator (which are not open to interpretation).

Comments on Q7(vi): *Even though most candidates realised that this was a long-tail book of business, with a small number of claims which would be potentially very large and variable, they were still suggesting the application of chain ladder methods. Only a few candidates scored marks on this part.*

END OF EXAMINERS' REPORT