

# **INSTITUTE AND FACULTY OF ACTUARIES**

## **EXAMINERS' REPORT**

September 2018

### **Subject ST8 – General Insurance: Pricing 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.

Mike Hammer  
Chair of the Board of Examiners  
December 2018

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

1. The aim of this General Insurance: Pricing Specialist Technical subject is to instil in successful candidates the ability to apply, in simple pricing analysis 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. Subject ST8 deals with applications of general insurance pricing techniques across many different types of product. Candidates should expect the examiners to draw these applications from all parts of the syllabus in order to test as wide as possible a range of skills and, in particular, to achieve a fair balance between personal and commercial lines.
3. Examiners will sometimes require the use of standard general insurance actuarial and statistical techniques that are covered in earlier subjects. Candidates should ensure that they are familiar with these when preparing for the ST8 examination.
4. As well as pricing techniques, ST8 also covers the workings and use of reinsurance products, so candidates should also expect the examiners to set questions on these aspects.
5. In questions with an element of calculation, different numerical answers may be obtained from those shown in these solutions depending on whether figures obtained from tables or from calculators are used in the calculations. Candidates are not penalised for this. However, candidates may lose marks where excessive rounding has been used or where insufficient working is shown. Where questions require looking up values in tables, candidates are expected to interpolate between two values if reasonable to do so, even when this is not stated in the question.
6. Where examples are given in the solution to illustrate the points made, marks were awarded to candidates who gave these particular examples or an equally valid alternative.
7. Candidates who give well-reasoned points, not in the marking schedule, are awarded marks for doing so.

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

1. With the exception of Question 11, the paper was of a fairly standard level however the general performance of candidates was slightly down on previous sittings. Most candidates demonstrated a good knowledge of the subject areas examined and scored well in basic knowledge based and numerical questions. Questions that required application of this knowledge and tested higher order skills proved more challenging, in particular Question 11. There was no evidence of time pressure in this paper.

2. Knowledge based questions were generally well answered, and better prepared candidates successfully tailored the answers to the questions, instead of making more general comments. Candidates did not score so well on application and higher order skills questions, in particular parts of 7, 8 and 9. A common fault was candidates not reading the question properly and making lots of points that were either not relevant or lacked detail.
3. The comments that follow the questions concentrate on areas where candidates could have improved their performance. Candidates approaching the subject for the first time are advised to concentrate their revision in these areas.

**C. Pass Mark**

The Pass Mark for this exam was 57.

## Solutions

### Q1

Advantages:

- much easier to administer [½]
- makes it easier for bank to market and sell [½]
- which could increase overall volumes / provide competitive advantage [½]
- easy for insurer to monitor overall rate adequacy [½]
- reduced need to collect or store policyholder data [½]
- reduces calculation time /effort (no need to calculate a quote) [½]
- reduced expenses [½]
- Innovative, so may raise the insurer's profile, i.e. increase market recognition. [½]

Disadvantages:

- will be difficult to compare experience to pricing assumptions [½]
- will be difficult to implement rate increases without anti-selection/change in mix of business [½]
- increased risk of anti-selection [½]
- as rates likely to be inappropriate for a lot of policyholders [½]
- so could potentially reduce the insurer's profits [½]
- will have to offer same coverage to all policyholders regardless of risk [½]
- in particular, won't be able to distinguish between policyholder with high monthly repayments and low monthly repayments [½]
- or customers with a poor credit score vs those with a good credit score [½]
- difficult to introduce new expanded or slimmed down policies [½]
- will be hard to identify drivers of losses as policyholder data is unlikely to be collected [½]
- e.g. gender, age, loan size, loan type [½]

-If this results in losses for the insurer, it may choose not to continue its relationship with the bank [½]

-The insurer may set a very prudent flat fee, to allow for the extra risks involved in this arrangement (e.g. of anti-selection), giving a poor deal for customers and/or leading to poor sales [½]

-may attract bad risks to take out loans, who then default [½]

-policyholders who are better risks (or with smaller loans) may be deterred by the relatively high price [½]

-The insurer may end up with a much higher % of large loans on the book than is usual/anticipated. [½]

-insurer will be blind to the mix of business on the book, assuming policyholder data is not collected [½]

-If insurer misprices badly, it could fail and default on claim payments [½]

-regulator may object [½]

-reinsurers may be wary of providing cover or charge very high premiums due to the risks associated with this arrangement [½]

[Max 5]

[Total 5]

*Most candidates generated a good range of answers and scored well. A number of candidates gave advantages and disadvantages of the product and general relationship between the bank and insurance company which did not score as the question specifically asked about the flat fee.*

## Q2

- claims department will need to record claim payments and/or case reserves to keep a record of the amounts paid and/or to monitor progress of claims settlement [½]
- pricing actuaries will need claims, premium and exposure history to set rates / check rate adequacy [½]
- and to analyse price elasticity and/or customer lifetime value [½]
- policy admin will need to record policyholder information, and any changes/extensions/amendments to the policy [½]
- reserving actuaries will need case reserves and payments to set reserves [½]
- capital actuaries will use the information for capital modelling [½]
- cat modelling department will need policy information to input into a cat model [½]
- reinsurance department will need to use the claims data to know what recoveries it can claim from its reinsurers... [½]
- ...and to record the recoveries [½]
- ...and to test the adequacy/level of its reinsurance coverage and/or reinsurance planning. [½]
- reinsurers would also want to know what has been written and the mix of business so that they can set the right reinsurance premium [½]
- Reinsurers may use e.g. premium data to check that the correct amount is being passed on under a quota share. [½]
- finance/accounting department will need the data to prepare regular accounts [½]
- policyholders/claimants may be entitled to see what data is being stored about them [½]
- marketing department may need policy data to help with marketing campaigns [½]
- marketing may use the data for cross-sell opportunities given large/multi-product insurer [½]
- regulator will want to check that data protection laws (and other regulatory rules) are being complied with [½]
- tax authorities will want to check that appropriate tax is being collected [½]
- regulator may want certain metrics e.g. to demonstrate value for money, QRTs, etc. [½]

- board/senior management would use the data to monitor how the business is performing [½]
  - and for planning purposes / set strategy / targets [½]
  - and to compare performance with competitors / assess position in the insurance cycle [½]
  - underwriters may want to use data for portfolio analysis or to set appropriate underwriting terms, etc. [½]
  - risk/compliance may want to use data to monitor what's being written is within risk appetite/guidelines [½]
  - Industry bodies – for collection or addition to industry databases [½]
  - fraud team will use claims/policy details to help identify fraud [½]
  - investment team for matching assets and liabilities [½]
  - operational resourcing will use data to plan appropriately for surge/catastrophe events [½]
  - ... and to check for backlogs, or other operational inefficiencies [½]
  - Brokers may use, e.g. premium data to calculate commission owed. [½]
- [Max 6]  
[Total 6]

<p><i>Most candidates were able to generate a wide variety of users and their uses of the data.</i></p>
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### Q3

- how the database complies with data protection laws [½]
- e.g. will insurers be able to access personal information about members of the public [½]
- what customers were told at the point of sale about the use of their data and/or consent given by customers [½]
- how will data be verified, and/or can it be corrected [½]
- need to clarify what information exactly can be recorded / level of detail [½]
- should only policyholders/claimants who have been convicted of fraud be on the database [½]
- how to prevent the database being used to undermine competition amongst insurers [1]
- how long the history will be stored for [½]
- who will administer the database... [½]
- the cost of setting up (and maintaining) the database [½]
- how will the cost of setting up the database be split between insurers [½]
- how frequently will the database be updated/the need to be kept up to date [½]
- will all insurers be required to contribute to it [½]
- and how insurers may need to be incentivised to contribute [½]
- which members of staff will be allowed to access the database [½]
- how to communicate / justify the database to the public / media [½]
- what will consumer reaction be to the proposal / potential reputational damage to industry [½]
- will database cover all products and all policyholders [½]
- e.g. will it include commercial motor [½]
- what format/standard definitions will be used for insurers to contribute data [½]
- data security issues/back up facility/protection against cyber-crime [½]
- how the data will be collected/transmitted between insurers and database [½]



-capacity of the system and/or easy of expansion

[½]

[Max 7]

**[Total 7]**

*Low scores in this question were generally caused by candidates focusing on the data itself and failing to think about the practicalities of creating such a database, such as costs, maintenance and security. The question was however generally answered quite well.*

## Q4

(i)  $C_L = C \times \left( G\left(\frac{L+D}{M}\right) - G\left(\frac{D}{M}\right) \right)$  [½]

$C = E[N]E[X] = 5 \times 25 = 125 = E[Y]$  [½]

$M = 400$  [½]

$L = 100$  [½]

$D = 50$  [½]

$G\left(\frac{100+50}{400}\right) = G(0.375) = 0.92$  [½]

$G\left(\frac{50}{400}\right) = G(0.125) = 0.62$  [½]

$C_L = 125 \times (0.92 - 0.62) = \$37.5m$  [½]

[Max 4]

(ii) The new exposure curve will be steeper (between 0.125 and 0.375). [½]

A bigger burning cost implies a greater gap between the two values on the exposure curve, and hence a steeper curve. [1]

[Max 1]

(iii) It depends on whether inflation is the same for all loss sizes. [½]

If it is and the sums insured are being adjusted for trend ... [½]

... then the exposure curves do not need to be adjusted. [½]

If it is not the case, then the curves need to be adjusted for the relative effect of trend ... [½]

... on losses of different sizes. [½]

It may be necessary to rework the whole analysis. [½]

[Max 2]

[Total 7]

*Part (i) was generally well answered.*

*Responses to part (ii) were mixed.*

*Better prepared candidates scored well in part (iii) as they understood that the solution depends on whether inflation is the same for all loss sizes.*

## Q5

Burning cost:

- The burning cost method is an experience-based method [1/2]
- ... that takes the actual cost of claims during a past period of years, expressed as an annual rate per unit of exposure [1]
- This could apply to a single risk or to a portfolio of similar risks [1/2]
- The loss data should be from the ground up before application of the reinsurance contract excess [1/2]
- ... and uncapped (i.e. before application of the cedant's policy limit or reinsurance contract limit) if possible [1/2]
- The technique may be purely based on past claims without adjustment [1/2]
- ... although an improvement would be to adjust past claims for trends [1/2]
- If trending is applied to claims, exposure should also be adjusted [1/2]
- The reinsurance contract terms are applied to each trended loss, to give the trended losses to the layer [1/2]
- The claims are then developed to ultimate [1/2]
- ... and divided by the corresponding exposure adjusted premiums [1/2]
- This gives a set of loss cost rates which can be applied to the future premium estimate [1/2]
- This needs a single rate to apply, e.g. by averaging this set or, if there is a trend, allowing for it [1/2]
- Alternatively, by scaling the (trended and developed) losses to the layer for each historical year to year-to-be-priced exposure levels, a set of exposure-adjusted losses to the layer can be obtained which in turn can be averaged (say) to arrive at an estimate of loss cost for the year to be priced. [1/2]

Original loss curves:

- Original loss curves are an exposure-based rating method [1/2]
- The main principle of exposure rating is to not use historical claims experience at all [1/2]
- ... but instead to base premium rates on the amount of risk (i.e. exposure) that policies bring to the portfolio [1/2]

- In exposure rating, a benchmark is used to represent the market severity distribution for the line of business and territory being covered [1]
- The benchmark may even be directly derived from the market severity distribution [½]
- Ideally the cedant data will include all risks written in a recent complete 12-month period .... [½]
- ... and whether the limits in the risk data are the insurer's share or the total of all insurers involved [½]
- The benchmark is used to calculate what proportion of the expected losses from the ceded risk would fall into the reinsured layer [½]
- The expected losses for the ceded risk can be calculated as the premium charged for each risk multiplied by the loss ratio for the risk ... [½]
- ... the expected loss ratio can be provided by the cedant, or market/other cedants' information can be used [½]
- Sometimes the cedant provides the reinsurer with historical development triangles and rate changes for the line of business to allow an estimated loss ratio to be derived. [½]
- The sum of these expected reinsurance losses gives the undiscounted expected loss cost for the reinsurance contract [½]
- The reinsurer can discount this to reflect the expected payment pattern of the reinsurance losses [½]
- This payment pattern could be based on the reinsurer's own experience or from the historical large loss experience of the cedant, or on a blend of the two, reflecting the credibility of the cedant's historical loss experience. [½]

[Max 8]

**[Total 8]**

*Most candidates were able to describe how the burning cost approach can be used to price an XOL treaty.*

*Many demonstrated knowledge of original loss curves and their construction, but were unable to describe how they might be used to price an XOL treaty and so did not score well.*

## Q6

- existing reinsurance in place [½]
- ... and whether it has delivered good value for money [½]
- availability of reinsurance cover [½]
- price of reinsurance cover [½]
- the classes of business written [½]
- motor classes are exposed to large bodily injury claims ... [½]
- ... and cover may be unlimited for these, ... [½]
- ... risks are fairly homogeneous in terms of size [½]
- the company's risk appetite [½]
- and their desire to have smooth results [½]
- the company's future growth plans / business strategy [½]
- e.g. if they intend to launch a new product or expand into new areas or write larger risks... [½]
- ...if a new product or area they may need some technical assistance... [½]
- ...or very basic coverage (e.g. excess of loss with very low limits) [½]
- or they may feel that expanding into new products will diversify their overall portfolio, leading to more stable results and less need for reinsurance [½]
- how much capital it has / solvency position / level of free assets [½]
- any regulatory guidance on reinsurance [½]
- e.g. how efficient it is at reducing their capital requirements [½]
- how confident they are in projecting their results/how much uncertainty there is in the numbers [½]
- how exposed they are to "shocks"/cats or large losses or accumulations [½]
- ...and how this exposure is changing over time [½]
- ... e.g. due to change in regulations/customer behaviour [½]
- relationships with reinsurers and brokers [½]

- need/desire for financial assistance [½]
- rating of reinsurers / possibility of reinsurer default [½]
- the availability and desire to consider ART opportunities e.g. captives could be used or the money markets [½]
- are there any emerging risks which the company needs RI to cover [½]
- Being a large insurer will tend to mean it needs less reinsurance as it can absorb a relatively large amount of loss itself and cope with fluctuations e.g. XL reinsurance will tend to attach at a higher level than for a smaller company and it may not require proportional reinsurance. [½]

[Max 8]

**[Total 8]**

*This question was generally well answered. Some candidates took the approach of discussing whether or not different forms of reinsurance would be suitable (e.g. XOL, Surplus Treaty, Stop Loss, etc.) but these solutions tended to lack breadth.*

## Q7

### (i) Individual risk model:

- The total claim amount  $S$  payable during a specified period in respect of a block of policies is:  

$$S = X_1 + X_2 + \dots + X_n$$
 [1]
- Where  $X_i$  is the claim amount payable during the period in respect of risk  $i$  and  $n$  is the number of risks [1]

#### Assumptions:

- The number of claims from the  $i^{\text{th}}$  risk, is either 0 or 1 [½]
- The probability of a claim from the  $i^{\text{th}}$  risk is  $q$  [½]
- For all risks  $j$  that do not have a claim,  $X_j = 0$  [½]
- Risks are independent [½]
- Claim amounts for risks do not need to be identically distributed [½]
- Number of risks does not change over time [½]

#### Collective risk model:

- The total claim amount  $S$  payable during a specified period in respect of a block of policies is:  

$$S = X_1 + X_2 + \dots + X_N$$
 [1]
- Where  $X_i$  is the claim amount payable during the period in respect of the  $i^{\text{th}}$  claim and  $N$  is the (random) number of claims during the period [1]

#### Assumptions:

- Claim amounts  $X_i$  are independent and identically distributed [½]
  - The  $X_i$  and  $N$  are independent [½]
- [Max 6]

### (ii) Reducing simulation error:

- Can be achieved by increasing the number of simulations [½]
- The number required will depend on the variance of the underlying distributions [½]

- ... and the purpose for which the simulation is to be carried out [½]
- The number of simulations that can be run may be limited by the available computer power and time constraints (increase computing powers to allow more simulations) [½]
- Alternatively, we can adjust the method used for generating the realisations of random variables [½]
- We can use low discrepancy points, or the Latin Hypercube, to do this [½]
- Low discrepancy points attempt to generate the random numbers in a systematic fashion [½]
- ... such that the multi-dimensional space (hypercube) of uniform numbers is filled out with as little discrepancy as possible given the number of iterations [1]
- This method is useful in practical applications as fewer iterations are needed in order to bring about convergence [½]
- The general principle is to generate more targeted samples from across the range of the distribution [½]

[Max 3]

[Total 9]

*Part (i) was well attempted by most candidates.*

*Most candidates were able to give high-level responses to part (ii), but only the better prepared students demonstrated good knowledge and understanding.*



## Q8

- (i) This ensures greater accuracy [½]
- Each peril will have different drivers of the claim frequency [1]
- e.g. subsidence depends on soil types, whereas that is unlikely to be a driver of theft claims [½]
- The same factor may be a driver but in different ways [½]
- e.g. a particular roof type may increase storm claim numbers but reduce number of fire claims [½]
- It is easier to fit trends to individual perils as the trends are simpler to explain [½]
- Avoids the risk of not spotting trends due to trends in different perils offsetting each other (eg increasing theft vs decreasing accidental damage) [½]
- Different perils may need different periods of data on which to build the model [½]
- e.g. theft claims are more frequent than storm claims so a shorter history of data is needed [½]
- Adjustments to data may be easier to apply if peril specific [½]
- e.g. weather peril specific excesses, due to changes in legislation or policy T&Cs that just affects that peril [½]
- reduces heterogeneity so might reduce volatility [½]
- claims distributions might have different shapes for different perils [½]
- not building separate models for each peril may require many interactions in the GLM which could lead to convergence problems [½]
- Different development patterns may apply to claim numbers for different perils [½]
- [Max 2]
- (ii) The plot of rescaled predicted values shows a strong upwards trend over the range where there is most exposure [1]
- Over this range the error bars are quite narrow which gives more certainty over the trend [½]
- Over this range, we see fairly distinct predicted values for distinct levels. [½]

The trend is not as clear at the extreme of the household income scale, but the exposure is low and reflected in the wide error bars [½]

The models are nested so a chi-squared test is appropriate [½]

$$D_1^* - D_2^* \sim \chi^2_{df_1 - df_2}$$

$$D_1^* - D_2^* = 275,112.04 - 275,066.06 = 45.98 \quad [½]$$

$$df_1 - df_2 = 2,004,673 - 2,004,664 = 9 \quad [½]$$

$$\chi^2_9(0.1\%) = 27.88 \text{ or } \chi^2_9(0.05\%) = 29.67 \text{ or } \chi^2_9(5\%) = 16.92 \quad [½]$$

Alternatively the p-value is < 0.05% or close to 0. [½]

We reject the null hypothesis that the two models are the same

Thus according to the chi-squared test, the factor is believed to be significant, i.e. the factor should be included. [½]

$$AIC = -2 \times \log\text{-likelihood} + 2 \times \text{number of parameters} \quad [½]$$

$$AIC_1 = 331,715.8 \quad [½]$$

$$AIC_2 = 331,906.9 \quad [½]$$

As  $AIC_1 < AIC_2$ , the model that includes the annual household income factor is a better model [½]

[Max 5]

(iii) Test consistency over time. [½]

Test consistency by distribution channel. [½]

A random factor could be created in the data, as a means to check consistency for a factor. [½]

Use the Hessian matrix to calculate the standard error for the parameter estimators for the factor, to see how well defined the parameters are. [½]

Seek views (eg of a consultancy) on how practical it is to obtain and verify. [½]

Do some market research [½]

Are competitors using the factor [½]

Depending on the peril this trend may make sense [½]

Or it could be contradictory	[½]
And may not be acceptable to customers / brokers / sales staff ...	[½]
... Or industry body / regulators	[½]
Speak to underwriters	[½]
Speak to claims staff	[½]
	[Max 3]
	<b>[Total 10]</b>

*Answers to part (i) were mixed, with some candidates unable to generate a good range of distinct points.*

*Part (ii) was generally well done, although a number could not calculate the AIC. It was common for candidates to state that the null hypothesis should be rejected, though never stated in their answer what the null hypothesis was.*

*Answers to part (iii) were again mixed, with many candidates talking about goodness-of-fit tests, and not considering more pragmatic approaches such as acceptability to customers.*

## Q9

- (i) There is no easily definable upper limit on the possible severity of loss ... [1]  
 ... which will often depend on court awards. [½]  
 The limit actually purchased may not be connected to the expected loss severity ... [1]  
 e.g. (the limit actually purchased may depend on...)  
 ... insured's insurance budget [½]  
 ... costs of cover [½]  
 ... insured's risk aversion [½]  
 ... market practice [½]  
 ... cover purchased historically [½]  
 [Max 3]
- (ii) Provides cover to a professional firm or a professional person [½]  
 Indemnifies the insured against legal liability ... [½]  
 ... for losses arising from negligence ... [½]  
 ... in the provision of a service, [½]  
 Usually covers legal expenses [½]  
 The perils depend on the profession [½]  
 e.g. unsatisfactory medical treatment, incorrect actuarial advice [½]  
 Usually written on a claims-made basis. [½]  
 [Max 3]
- (iii)  $\$17,000 \times (2.905 - 1.987) = \$15,606$  [1]  
 [Max 1]
- (iv) Professional indemnity claims will depend on the legal environment /regulations... [1]  
 ... size of court awards, and ... [½]  
 ... legal precedents, ... [½]  
 ... and these are likely to be different outside the developed country.

PI claims also depend on the social environment e.g. the developed country may be more or less litigious than the country she is now pricing [½]

It will be necessary to understand whether legal fees and/or other costs are included in the ILFs ... [½]

Differences in :

economic environment [½]

levels of cover, policy T&Cs, e.g. exclusions, limits [½]

mix of business e.g. professions covered [½]

professional standards/ monitoring of professional standards [½]

underwriting and claims handling standards [½]

Basis of cover e.g. claims made vs losses occurring. [½]

[Max 4]

**[Total 11]**

*Part (i) was not answered well*

*Most candidates scored full marks in parts (ii) and (iii).*

*Part (iv) was generally well answered with most candidates generating a wide range of reasons.*

## Q10

- (i) -premium income has risen substantially (almost trebling in 3 years) [1]  
 -should investigate any potential anti-selection [½]
- = however claims ratio has been fairly stable [½]
- could break down exposure into homogeneous groups and compare to pricing assumptions [½]
- e.g. by geography, or company size [½]
- would need to break down premium and claims into each cover type (EL, PL, Property)... [1]
- ...to spot trends in each cover separately [½]
- what is the definition of written premium? [½]
- e.g. net/gross RI/commission, allowance for mid-term adjustments, cancellations? [½]
- some claims will be particularly uncertain, e.g. EL is very long-tailed [½]
- short history of claims - will analysis be credible? [½]
- Property claims may include some catastrophe claims, which would need to be stripped out and analysed separately [½]
- period is short so there may not be any cat losses in the data or latent claims for EL, or large claims [½]
- should also strip out any large claims [½]
- What is included in the incurred claims figures? [½]
- need to develop incurred claims to ultimate if they don't include IBNR and IBNER [½]
- Ultimate claims figures depend on prudence of reserving. Need to take this into account when assessing profitability. [½]
- will need to use benchmark development curves given lack of data [½]
- this will introduce uncertainty, as it will be difficult to know how appropriate the curves are [½]
- incurred claims in the most recent year seem very high relative to premium, given the long-tailed exposure [1]

- have there been any changes in cover/policy Ts & Cs [½]
- Similarly for strictness of underwriting and claims handling. [½]
- need to allow for any regulatory changes ... [½]
- ... and any other changes to the external environment [½]
- And any other changes to external environment [½]
- if reinsurance is in place, it needs to be appropriately allowed for [½]
- though this could distort the analysis if coverage has been inconsistent [½]
- also need to take into account drivers of profitability other than claims:
- e.g. allowance for commissions, expenses, taxation, cost of capital, investment income [1]
- If assessing likely future profitability, claims data should be trended for inflation, .... [½]
- ... and likewise premiums should be adjusted for premium rate changes, [½]
- ... and any changes planned. [½]
- [Max 9]
- (ii) -The suggestion is very straightforward so will be easy to implement. [½]
- Avoids time/cost of more detailed analysis for setting rates. [½]
- all else being equal, charging more premium should reduce the probability of making a loss [1]
- but only if current rates are below those of competitors [½]
- otherwise, increasing the premium could make the product uncompetitive [½]
- which would reduce volumes and ... [½]
- ... increase expense strain [½]
- need to take into account the stage of the underwriting cycle to ascertain what kind of price rise could be supported [1]
- 10% is an arbitrary amount [½]
- pricing analysis may show more or less of an increase is required [½]

- may want to have more targeted price changes, targeting unprofitable policyholders for price rises [½]
  - which would reduce the potential for anti-selection [½]
  - this may upset long standing customers who might take their business elsewhere [½]
  - and potentially damage the reputation of the company [½]
  - if business is sold via brokers, they will not welcome higher premiums if it means they sell less [½]
  - potential regulatory restrictions on premium rates, or could be difficult to justify increase to regulator (depending on where the company is operating) [½]
- [Max 3]  
**[Total 12]**

*Part (i) was reasonably well attempted with stronger candidates generating a wide range of points.*

*Part (ii) was generally answered well, but many candidates suggested that increasing premiums would increase anti-selection.*



## Q11

- (i) To fill gaps in insurance cover that may not be available from the traditional insurance market [1]
- To manage the total insurance spend of large companies or groups of companies [1]
- To enable the enterprise to buy cover directly from the reinsurance market rather than direct insurers [½]
- To focus effort on risk management [½]
- To gain tax and other legislative or regulatory advantages [½]
- To accept external risks on a commercial basis so that the insurance premiums paid by the parent are tax-deductible [½]
- To avoid credit risk associated with external insurers. [½]
- Direct access to expertise of reinsurers. [½]
- A captive may recognise good experience (by reducing premiums) more quickly than an external insurer. [½]
- [Max 3]
- (ii) Introduction of a discount rate means that the ultimate cost of outstanding claims will be different to expected [1]
- Exposed companies have to revise their provisions [½]
- ... make a one-off provision/or reduce the provisions for unsettled claims relating to business already underwritten, affecting their financial results for the year [1]
- ... assume different claims costs when reserving for future business, and therefore adjust their pricing models accordingly [1]
- Premiums may increase for some policyholders if insurers pass any increases onto them [½]
- Premiums may not reduce for policyholders if insurers choose not to pass on any savings [½]
- Reinsurance recoveries are likely to change [½]
- Reinsurance costs are likely to change ... [½]
- ... an increase is likely to result in an increase in insurance premiums [½]

- Reinsurance availability is likely to change as reinsurer profits change [½]
- Change in the risk of reinsurance default [½]
- Increased uncertainty in reserving [½]
- Increased uncertainty in capital requirements / solvency / liquidity [½]
- Uncertainty may deter new entrants to the market [½]
- May reduce legal costs as no dispute over discount rate used [½]
- How often will the discount rate be reviewed / revised [½]
- Is the single discount rate appropriate for all policyholders [½]
- Will such discount rates be applied to other products in the future [½]
- Will the take up of this product change [½]
- What is the proposed calculation / how will the discount rate be set (e.g. Industry body will want to know what we assume the lump sum is invested in when determining the discount rate e.g. government bonds only, or a mix of bonds and equity, etc.) [½]
- How it is applied – to all claims or just prospective after a set date [½]
- Depending on how claim settlements are currently determined, this may increase or decrease work for the insurers which may be passed on to customers through increased/reduced premiums [½]
- Whether there will be any caps and floors to the rate [½]  
[Max 9]
- (iii) *This solution assumes the discount rate will increase claims/reserves – equivalent credit was awarded if a reduction in claims/reserves is assumed*
- The exposure of many captives is limited through policy limits [½]
- ... or reinsurance protection to both “any one claim” and “aggregate” limits [½]
- The effect on captive reserves may be to push certain individual claims up to their claim limit [½]
- ... and, in doing so, push the aggregate claims up to (or towards) the relevant aggregate limit [½]
- The impact on existing captive reserves and the provisioning for future claims may be limited [½]

... captives may find that the claims most likely to be affected are relatively few [1/2]

... and these may already have breached their per-claim limit [1/2]

If a captive continues to write the same limits, the number of claims approaching the limit, or the probability that aggregate limits will be breached, may change [1]

... but to a lesser extent suffered by the commercial market (which has larger and more open-ended exposures) [1/2]

For captive owners, the dynamics around retained and externally insured risk may change [1/2]

... as changes to projections of future claims performance lead to changes in ground-up premiums [1/2]

... and a change in the levels and terms at which commercial insurers and reinsurers are willing to offer cover in excess of captive retentions [1/2]

They may be required to change their investment strategy [1/2]

The proposal may not affect them if based offshore and not subject to same regulation [1/2]

If market rates increase as a result and are seen as unacceptably high, companies may retain more risk within their captives (or set up a captive if they don't already have one). [1/2]

Reinsurance premiums paid by captives writing the affected classes may increase, ... [1/2]

... eg if the discount rate is set very low, or just due to the increase in uncertainty. [1/2]

[Max 5]

[Total 17]

*Most candidates scored full, or nearly full marks in part (i).  
Those that scored well in part (ii) had breadth in their answer, but it was common for candidates to restrict their response to one or two issues and scores for this question were low.  
Part (iii) was very poorly answered.*

## END OF EXAMINERS' REPORT