

INSTITUTE AND FACULTY OF ACTUARIES

EXAMINERS' REPORT

April 2021

Subject SP8 – General Insurance Pricing Specialist Principles

Introduction

The Examiners' Report is written by the Chief 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

Paul Nicholas
Chair of the Board of Examiners
July 2021

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

1. The aim of this General Insurance: Pricing Principles 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 SP8 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 SP8 examination.
4. As well as pricing techniques, SP8 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. Comments on *candidate performance in this diet of the examination*

1. The general performance of candidates was lower than that seen in the last sitting. Most candidates demonstrated a good knowledge of the subject areas examined and scored well in basic knowledge based questions. Questions that required application of this knowledge and tested higher order skills proved more challenging, and candidate responses to these questions generally lacked breadth and detail. There was no evidence of time pressure in this paper, though there was some evidence that candidates spent a lot of time on shorter questions and may not have left enough time for the longer questions. There was also some evidence of candidates mis-reading the question and not tailoring their answers to specific information given in the question.

2. Knowledge based questions were generally well answered, and better prepared candidates successfully tailored their answers to the questions, and were able to generate a wide range of points. Candidates did not score so well on application and higher order skills questions, in particular questions 4, 6 and 10. Performance on the numerical questions was also lower in this sitting.
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 59.

325 candidates presented themselves and 107 passed.

Solutions for Subject SP8 – April 2021

Q1

(i)

To protect the CFO (or more likely their employer) against legal liability to compensate third parties [1/2]

owing to any wrongful act of the CFO in their company duties [1/2]

such as allowing the company to continue to operate when it should have been declared insolvent [1/2]

or allowing false financial statements to be published [1/2]

or any act resulting in the insured being declared unfit for his or her role [1/2]

to cover the legal expenses relating to any liability claim [1/2]

To protect against securities actions, where the CFO is one of the parties being litigated against [1/2]

It may be a regulatory requirement (depending on the nature of the business) [1/2]

It may be purchased because it strengthens the company’s credit rating [1/2]

The CFO may not take up the position without the insurance [1/2]

[Marks available 5, maximum 3]

(ii)

Typical exclusions:

Intentional, deliberate, fraudulent or criminal acts [1/2]

Breach of contract (e.g. falsifying qualifications) [1/2]

Claims normally covered under other or prior insurance [1/2]

Personal gain [1/2]

Where the director has acted under the influence of alcohol/drugs [1/2]

Insured vs insured – actions brought by the board of an association against the association or third parties would not be covered [1/2]

Fines, penalties and punitive damages [1/2]

Loss of or damage to property [1/2]

Bodily injury [1/2]

Discrimination / wrongful termination [1/2]

Defamation, libel and slander claims [1/2]

Acts committed before the retroactive date [1/2]

Prior and pending litigation	[1/2]
Claims relating to terrorism / nuclear or radioactive risks	[1/2]
Claims reported after the discovery period	[1/2]
	[Marks available 7½, maximum 4]
	[Total 7]

Part (i) was reasonably well attempted with many correctly describing D&O insurance. However, some answers described other forms of liability insurance which did not score.

Part (ii) was also well attempted with those giving a wide range of exclusions tending to do better.

Q2

(i)

Desirable qualities:

Accuracy as a predictor of next year's mean loss costs / low variance around next year's mean loss costs	[1/2]
Unbiasedness as a predictor of next year's mean-expected losses (i.e. the difference between the predictor and the subsequent loss costs should average out near zero)	[1/2]
Independence from the base statistic	[1/2]
Availability of data	[1/2]
Easy or quick to compute / low cost to obtain	[1/2]
Explainable relationship to the loss costs of the class or individual being rated / easy to explain to management	[1/2]

(ii)

Standard for full credibility is $n_S = n_N \times (1 + CV_X^2)$ [1/2]

$$p = 0.95 \Rightarrow \Phi(y) = \frac{1+0.95}{2} = 0.975 \Rightarrow y = 1.96 \quad [1/2]$$

$$\text{Credibility criterion } n_N = \left(\frac{1.96}{0.05}\right)^2 = 1536.64 \quad [1/2]$$

$$\text{Standard for full credibility} = 1536.64 \times (1+3^2) = 15366.40 \quad [1/2]$$

Since we only had 1000 claims in the first year, the full credibility standard is not met and we have to use partial credibility

$$\text{Credibility factor } Z = \sqrt{n/n_S} = \left(\frac{1000}{15366.4}\right)^{0.5} = 0.2551 \quad [1]$$

$$\begin{aligned} \text{Credibility premium} &= Z\bar{X} + (1 - Z)\beta \\ &= 0.2551 \times 6.75 + (1 - 0.2551) \times 5 \quad [1/2] \\ &= \$5.45 \text{ million} \quad [1/2] \end{aligned}$$

Assumes the observed number of claims is an appropriate estimate of the expected number, and [1/2]

the expected number of claims is sufficient for a normal approximation to be used for the distribution of aggregate claims [1/2]

[Marks available 5, maximum 4]

[Total 7]

Many scored well in part (i), but a number lost out on marks because their response lacked sufficient detail.

Performance in part (ii) was mixed with some scoring full marks, and some not attempting it at all. Common errors were failing to square CV_x , using the standard for full credibility rather than partial, and applying Z and $(1-Z)$ the wrong way round.

Q3

(i)

Direct expenses can be accurately allocated to individual policies / classes of business usually directly involved in new business acquisition or policy maintenance activities e.g. commission, claims handling [1/2]
 Indirect expenses cannot be directly allocated to individual policies / classes of business and relate to general management and service departments e.g. investment expenses, IT costs [1/2]
 Direct expenses are often directly proportional to change in business volume [1/2]
 However indirect expenses may remain fixed and move in steps due to significant changes in volume [1/2]
 Indirect expenses may be allocated according to measurable quantities, e.g. rent costs apportioned by class of business according to floor space [1/2]
 In practice, there is no clear dividing line between the two categories hence companies might categorise expenses differently [1/2]

[Marks available 5, maximum 4]

(ii)

The premium loading to account for this is usually negative (i.e. discount) since investment return is assumed to be positive [1/2]
 However, if not accounted for, the insurer’s premium is likely to be less competitive [1/2]
 It is applied by discounting the projected claims cash flows and cash flows for expenses at a suitable/appropriate rate of interest [1/2]
 to the date at which the premium is paid [1/2]
 The rate of discounting should be appropriate for the class [1/2]
 The impact of discounting will be more significant for long-tailed business [1/2]
 We need to decide whether a gross or net rate is applicable [1/2]
 In general, we will assume a conservative rate of return [1/2]
 The return achievable will depend on the duration for which the funds are invested and the form of the liabilities (e.g. fixed, increase in real terms, etc.) [1/2]
 If investment income is taken into account in pricing, it would be normal to use a risk-free rate [1/2]
 For short-tailed classes (and highly volatile long-tailed classes) it may be more suitable for the actuary to adjust the profit loading than to discount [1/2]

[Marks available 7, maximum 4]

[Total 8]

Part (i) was reasonably well attempted, however responses tended to lack breadth.

In part (ii) candidates who answered the specific question did quite well, however a number of responses talked more generally about investments and therefore scored less well.

Q4

A stop loss contract is priced using similar methods as other types of excess of loss reinsurance [1/2]
 but where the excess point and limit is expressed as a loss ratio rather than a monetary amount [1]
 The main difference with a stop loss is that it will respond to the aggregate of losses in the year [1/2]
 rather than just, say, individual large losses or large catastrophic losses [1/2]
 A view of the cedant's loss ratio can be derived from historical experience, suitably adjusted [1/2]
 e.g. for inflation, IBNR, changes in mix, rate changes, etc. [1/2]
 A stochastic approach is often taken [1/2]
 by fitting a distribution to historical loss ratios [1/2]
 Alternatively, the losses may be modelled separately [1/2]
 for example, by splitting out attritional, large and catastrophe losses (or attritional + large/catastrophe) [1/2]
 The catastrophe loss could come from a vendor model (where applicable) [1/2]
 The large losses from a frequency and severity approach [1/2]
 The attritional losses using past historical attritional experience suitably adjusted [1/2]
 This may produce a model of the overall volatility of cedant's losses [1/2]
 Then apply the stop loss conditions to get a risk premium and distribution for the reinsurer's losses [1]

Important considerations when pricing a stop loss include:

- meeting risk transfer criteria (regulatory minima) [1/2]
- any inuring reinsurance [1/2]
- amount of recoverable layer returned by cedant [1/2]
- quality of cedant's pricing/underwriting/claims handling etc. [1/2]
- the classes and territories the cedant is writing/planning to write [1/2]
- expenses/loads e.g. brokerage, retrocession, profit margin etc. [1/2]

[Marks available 11½, maximum 8]

[Total 8]

Responses to this question were mixed but generally scores were low. Candidates did not appear to have much awareness of how stop loss contracts are priced, or were unable to articulate this in a clear way

Q5

(i)

Catastrophe perils:

Hurricane/typhoon/cyclone	[½]
Tornado	[½]
Earthquake	[½]
Flood	[½]
Hail	[½]
Storm/Winter storm/Freeze	[½]
Tsunami	[½]
Volcanic eruption	[½]
Wildfire/conflagration	[½]
Drought	[½]
Terrorism	[½]
Industrial accident/explosion	[½]
Cyber	[½]
Disease/epidemic/pandemic	[½]

[Marks available 7, maximum 2]

(ii)

(Award 1 mark if all 5 modules named, ½ mark for 4 modules)

Event Module

It would contain a database of stochastic pandemic events	[½]
with each event assigned a probability/frequency of occurrence and characteristics such as:	[½]
• Geography	[½]
• Type: virus/bacteria	[½]

Hazard Module

This would determine the hazard of each pandemic in each location	[½]
These could be defined by: <i>(max 1 mark)</i>	
• Infection rate / R rate	[½]
• Hospitalisation rate	[½]
• Death rate	[½]
• Vaccination rate	[½]
• Proximity/exposure to other strains	[½]

Inventory (or exposure) Module

A detailed exposure database of the insured’s policies that are vulnerable to pandemic	[½]
and the amount of exposure usually defined in terms of sum insured or limit	[½]
E.g. <i>(max 1 mark)</i>	
• Business Interruption	[½]
• Employee Liability	[½]
• Health/Life Insurance	[½]
• Payment Protection Insurance	[½]

This would also include details about the exposure that could strongly affect pandemics:

- Medical care [½]
 - Population density [½]
 - Industry [½]
 - Dependency on travel [½]
 - Nation's per capita GDP [½]
 - Age of policyholders [½]
 - Ethnicity of policyholders (if permitted) [½]
 - Other relevant factors (eg existing medical conditions, BMI, demographic) [½]
- (max 2 marks for suitable examples)*

Vulnerability Module

This would calculate loss as a portion of sum insured/limit [½]
 resulting from exposure to a given hazard [½]
 This could be different for different types of business [½]
 e.g. business interruption claims are likely to be linked to the contagiousness of the disease
(or any suitable example) [½]

Financial Module

Uses a database of policy conditions e.g. deductible/limits [½]
 to translate the ground up loss to an insured loss [½]

[Marks available 15½, maximum 8]

[Total 10]

Most scored full marks in part (i)

In part (ii) it was good to see that most candidates structured their answers. Some made little or no reference to pandemics so scored less well. Those that included relevant examples, such as infection rates, tended to do best.

Q6

(i)

The catastrophe loading calculated purely from historical losses is €410,000 [½]
 about 17% higher than the model's expected losses of €350,000 [1]
 This should be considered reasonably close [½]
 The central European country seems to be prone to windstorms, since 3 of the last 10 years have experienced windstorm losses [½]
 We do not know the total size of exposure; hence, it is difficult to estimate how severe the windstorms are [½]
 According to the model, in a 10-year period, we should expect a maximum loss of €700,000 but the 2015 loss is much higher at €3.5m [1]
 and corresponds to a probability of between 1% to 2% [½]
 The 2010 loss falls within the 5-10yr return period, which looks reasonable [1]
 The 2011 loss is much smaller and falls outside the range of the catastrophe model results [½]

If the catastrophe model does not generate small events, we should model such losses as part of attritional claims [½]
 It is worth investigating the 2015 loss to understand whether the loss is normally expected every 10 years [½]
 If not, the loss should be adjusted with the higher return period attached to it. [½]
 We must also check how the loss was adjusted to latest terms [½]
 we may have stopped writing risks in a particular location, or changed our terms and conditions to avoid such a loss from re-occurring [½]
 Construction risks may be high when projects are closer to completion. It is possible that the current business mix includes a higher proportion of risks from the earlier phase when risk may be lower [1]
 The historical windstorm losses were concentrated in a 5-year period and haven’t occurred in the last 3-4 years. The clustered set of events might have been triggered by global events e.g. El Nino [½]
 Are these losses from the ground up and uncapped? [½]
 Is there any other cover in place e.g. reinsurance (internal or external) applying or any contributions from other parties/ recoveries? [½]
 Overall, there is not enough credible historical data to disregard the catastrophe model [½]
 [Marks available 11½, maximum 6]

(ii)

The catastrophe model is developed for the central European country and may not be applicable to another country. [½]
 The neighbouring country may have a lower or higher occurrence of such events [½]
 Hence the event module could be inappropriate.
 The windstorms occurring in the neighbouring country may result in lower or higher wind speeds [½]
 Hence the hazard module could be inappropriate.
 The output from the model is based on exposures from the central European country, including details about each risk, location, etc. [½]
 By just scaling the results, we are ignoring the information about the risks in the neighbouring country / risks might differ significantly between the two countries [½]
 e.g. construction projects in the neighbouring country may be much larger than the ones in the central European country, or [½]
 e.g. construction projects in the central European country might be closer to the coast and hence at a higher risk [½]

(other acceptable examples, up to 1 mark)

Inventory module may therefore not be appropriate.
 Financial analysis module may be inappropriate.
 Policy conditions, terms and conditions, excesses, limits, etc. might vary on business written in the two countries. [½]
 However, adapting results from other models can sometimes be useful (also quicker and cheaper than building a new model). [½]
 Also, as it’s a neighbouring country, there might be commonalities that make the suggested approach reasonable, e.g. if exposed to the same windstorms and share similar construction types [½]
 The loading may be increased or decreased on a subjective basis to account for the factors mentioned above. [½]
 Justification of the approach will require considerable judgement and will be subjective [½]

[Marks available 6, maximum 4]

[Total 10]

Part (i) - candidates struggled with this application question, with many failing to compare the actual results with those implied by the model.

Part (ii) – quite well attempted and many structured their answer in terms of the modules. The best answers gave both positive and negative points about the approach suggested by the underwriter

Q7

(i)

$$380 - 351 + 1 = 30 \quad [1]$$

(ii)

The deviance is a measure of how close the model predicted values are to the observed values [½]

and are weighted or adjusted to give more importance where the variance should be small [½]

Clearly a model with lower deviance is desirable, (though it is important to be mindful of overfitting) [½]

Observations which make large contributions to the deviance should be investigated for errors or outliers [½]

It may be used in the process of comparing two nested models [½]

To compare two nested models, we can use a chi-squared test on the difference in scaled deviances, if the scale parameter is known [½]

or perform an F test, where the change in deviance is the numerator of the test statistic, if the scale parameter is not known [½]

They can also be used to derive deviance residuals which may be used to test the distributional assumptions of the model [½]

[Marks available 4, maximum 2]

(iii)

The two models are nested [½]

and the scaled deviance can be calculated so [½]

under the null hypothesis H_0 : the two models are statistically the same

$$D_1^* - D_2^* \sim \chi^2_{df_1 - df_2} \quad [½]$$

$$D_1^* - D_2^* = \frac{307,431.3 - 307,394}{1.09395} = 34.1 \quad [½]$$

$$df_1 - df_2 = 29 \quad [½]$$

$$\chi^2_{29}(5\%) = 42.56 \quad \text{or} \quad p\text{-value} > 0.2 \quad [1]$$

There is therefore insufficient evidence to reject H_0

and therefore property value does not appear to be a significant factor [½]

The AIC is also lower for model B [½]

which supports the conclusion that property value can be excluded from the model [½]

(iv)

Property value is related to size	[½]
So would expect risk to increase with property value	[½]
Property value likely to be correlated with value of contents and fittings	[½]
However, owners of more expensive properties could have installed more expensive anti-theft technology	[½]
The factor is correlated with other factors	[½]
Such as number of bedrooms, property type	[½]
Two identical properties will have different property values depending on where the property is	[½]
Property value is subjective and may vary depending on use of valuation	[½]
Property value varies over time depending on the state of the economy and/or housing market	[½]
The property value is unlikely to be known by most unless their property has recently been on the market/had a valuation done recently	[½]
Not straightforward to obtain from an estate agent/valuer	[½]
Property value is verifiable	[½]
Open to some manipulation	[½]

[Marks available 6½, maximum 3]

[Total 11]

In part (i) the most common incorrect answer was 29, but a wide variety of other answers were seen.

Part (ii) was quite well answered, but only a few answers had enough different points to score the 2 marks available.

Part (iii) was generally well attempted. Nearly all performed a chi-squared test, but many did not state why this was appropriate. A surprising number gave an incorrect or ambiguous conclusion to the test. A number of candidates did not mention the AIC at all.

In part (iv) many answers focused purely on the desirable characteristics of a rating factor, however the question asked about the merits of property value as a proxy risk factor

Q8

(i)

The business is on-line and therefore susceptible to attacks such as viruses and ransoms [½]

The data it holds on its server is also valuable to criminals [½]

In the event of a cyber-attack, the travel agency will want protection against a variety of potential costs:

- Business interruption / Loss of income [½]
- Investigation, defence costs and civil damages associated with security and privacy breaches of customer data [½]
- Payments/compensation to customers and partners (e.g. hotels) for denial of access and failure of software/services or for financial losses, e.g. credit card details stolen and used [½]
- Putting in place measures to protect any affected customers [½]
- Cost of ransoms to release data [½]

- Reputational damage [1/2]
- Cost of restoring/repairing/replacing damaged IT systems [1/2]
- Payment of regulatory fines [1/2]
- Infringement of intellectual property [1/2]
- Libel or slander [1/2]

The insurance may also provide assistance with and management of incidents [1/2]

any liability for transmitting a virus to a third party [1/2]

Suppliers/partners/customers may choose not to do business with them unless they have this cover in place [1/2]

Cyber risks may be excluded by other policies the travel agent has [1/2]

It only has one "server" so an attack could result in all of its data being compromised [1/2]

[Marks available 8½, maximum 4]

(ii)

What the company does [1/2]

Number of employees [1/2]

Revenue/turnover/average profits [1/2]

Volume of data the company holds [1/2]

Complexity of data/systems architecture [1/2]

Sensitivity of data captured/held [1/2]

Dependence of the revenue on IT [1/2]

Location of servers e.g. cloud or particular host [1/2]

Data and IT security controls in place [1/2]

Maximum 1 mark for examples

- firewalls in place or anti-virus software in place [1/2]
- password policies, frequency of patches and other updates [1/2]
- staff training and/or vetting [1/2]
- data encryption policies [1/2]
- level of home working and related security measures [1/2]

History of incidents or near-misses [1/2]

Who the company shares data with or receives data from [1/2]

and the third parties' data/IT security standards [1/2]

Business continuity plan in case of IT event / backup of servers etc [1/2]

Level of regulatory fines for breaches [1/2]

Location of business may impact regulatory fines [1/2]

Level of cover chosen, e.g. Sum Insured / Reputational damage / Legal costs / Excess and limits / other example [1/2]

Trends in incidence and severity of cyber attacks [1/2]

[Marks available 11, maximum 5]

(iii)

Lack of historical events to estimate likelihood and severity of losses [1/2]

Many events go undetected [1/2]

Uncertainty about frequency/severity of catastrophe events, e.g. a worldwide ransomware attack affecting many insured [1/2]

Uncertainty related to possibility of past events being detected years later (depending on when the retroactive date is) [1/2]

Large variety of ways in which security could be breached, and	[½]
Large variety of ways in which the business may be impacted	[½]
Ways in which security can be breached is evolving / increasing skill, resource and number of those launching attacks	[½]
As are the methods by which businesses can protect themselves	[½]
It is difficult to quantify the benefit that certain protection measures give	[½]
Evolving regulatory requirements	[½]
and uncertainty around potential fines for breaches	[½]
Uncertainty around the level of moral hazard or anti-selection, and how to allow for this in pricing	[½]

[Marks available 6, maximum 3]

[Total 12]

Part (i) was well attempted but many answers did not clearly explain why the cyber insurance might be bought. Those that tailored their answer to the specific business in the question generally did better.

Part (ii) was well attempted but answers varied. Candidates appeared to struggle to generate a wide variety of different ideas. A few candidates described how to calculate the risk premium, which was not asked for.

Candidates found part (iii) challenging. Many wrote a general list of sources of uncertainty but did not score well as the points were not specific to cyber insurance.

Q9

(i)

Split out large, develop to ultimate and inflate:

	Turnover	Claims incurred	Remove large	Ultimate (A)	Inflate to 2021 (B)	Ultimate large loss (C)	Inflated large loss (D)	Attritional burning cost (E)
2016	3,966	2.86	2.86	2.86	3.32			0.00084
2017	4,150	8.04	3.04	3.04	3.42	5.00	5.63	0.00082
2018	4,467	3.31	3.31	3.45	3.77			0.00084
2019	5,701	7.43	3.43	4.51	4.79	5.26	5.58	0.00084
2020	6,343	3.50	3.50	5.22	5.38			0.00085

[1] for (A), [1] for (B), [½] for (C), [½] for (D), [1] for (E) [4]

Attritional burning cost is fairly steady so no apparent residual trend [½]

Burning cost = $(3.32+3.42+3.77+4.79+5.38)/(3966+4150+4467+5701+6343) = 0.00084$

[1]

(unweighted average gets ½ mark)

Attritional risk premium = $0.00084 \times 6343 \times 1.05 = 5.59$ [½]Large loss adjustment = $(5.63 + 5.58) / 5 = 2.24$ [½]

Large loss adjustment assumes the past five years' experience is indicative of the future
 Estimated risk premium = $5.59 + 2.24 = \$7.83\text{m}$ [½]

(The calculation above makes the following additional assumptions. Alternative answers were credited where appropriate assumptions were stated.)

- Claims inflation continues at 3% p.a.
- Turnover inflation is zero, or has already been adjusted for inflation if applicable.
- Large losses need to be developed in the same way as the attritional losses
- Large losses need to be inflated in the same way as the attritional losses
- No other material changes, e.g. to mix, claims handling etc.

(ii) *(assumptions made in part (i) were credited here and vice versa)*

The firm's growth forecast	[½]
There may be additional risks associated with opening two new offices. It would be useful to know how quality of work will be maintained or whether it might improve/deteriorate	[1]
Has the firm changed or is it changing the types of work it undertakes	[½]
Experience in the industry/level of experience of architects	[½]
Have there been any significant changes in staff that could impact the quality of output	[½]
Level of staff training and continuous professional development	[½]
Which countries they are operating in	[½]
Types of work undertaken e.g. large shopping centres or private homes	[½]
Are there any impending legal changes that could affect likelihood or size of claims	[½]
Is there any potential for latent claims for work done by the firm many years ago	[½]
Has the firm fully disclosed all investigations where there could potentially be a claim	[½]
The firm may have more granular data e.g. individual losses by location	[½]
More information on the large losses to help understand likely recurrence/cost	[½]
Any changes over time or in 2021 to the insurance policy terms and conditions	[½]
[Marks available 7½, maximum 3]	

(iii)

Expenses = $0.25 \times \text{RP} = 0.25 \times 7.83 = 1.9575$ [½]

Commission = $0.2 \times \text{GP}$

Capital = $0.125 \times 0.72 \times \text{NP} = 0.125 \times 0.72 \times 0.8 \times \text{GP} = 0.072 \times \text{GP}$ [½]

So:

$\text{GP} = 7.83 + 1.9575 + 0.2 \times \text{GP} + 0.072 \times \text{GP}$ [½]

$\text{GP} = \$13.44\text{m}$ [½]

Assumptions:

- Investment income is negligible [½]
- Expenses covers all known expenses except commission [½]
- Return on capital is a one-year calculation, i.e. no residual value at the end of the year. [½]
- Assume no reinsurance in place [½]
- Assume no loading needed for tax [½]

[Marks available 4½, maximum 3]

[Total 13]

Part (i) was generally well attempted but only a handful of candidates achieved full marks. A number of candidates treated the large losses differently to the solution above but failed to give adequate explanation or reasoning for what they did. Another common error was not checking for any trend in the annual burning cost.

Most answers to part (ii) did not give answers specific to the firm of architects.

Candidates struggled with part (iii), with the capital element seeming to cause most problems.

Q10

(i)

Reasons:

- The entrepreneur might believe that the market is coming out of the soft market stage [½]
- or has knowledge that some insurers are pulling out of the market, presenting an opportunity to take some of their customers [½]
- Believes they can use their experience to deal with a soft market better than competitors [½]
- e.g. through tight underwriting leading to better risk selection [½]
- Could have a low-cost business model (e.g. many non-core functions being outsourced) which would give a competitive advantage [½]
- Could undercut rivals and potentially use other successful businesses to cross-subsidise [½]
- Although soft, the market may still be profitable [½]
- The new business may be niche and doesn’t follow the general trend [½]
- and therefore could be profitable [½]
- The brand may be strong, allowing the new business to charge rates higher than the market [½]
- The brand may be strong enough to attract a large amount of capital [½]
- Could be a strategic business decision [½]
- e.g. writing business at market rates (or lower) to attract clients [½]
- Could make profits through cross-selling to the specialty insurance customers [½]
- Reinsurance may currently be cheap, allowing reasonable net profits to be made [½]
- Strong investment income may allow reasonable profits to be made (for long-tailed business) [½]

[Marks available 8, maximum 5]

(ii)

- Cover may not be available from the traditional reinsurance market [½]
- especially as the insurer is new so might be seen as more risky [½]
- The cost of traditional reinsurance may be too expensive [½]
- The entrepreneur does not wish to cede profits to 3rd parties [½]
- The entrepreneur has no need for expertise that may be available through reinsurance brokers [½]
- To ensure there is focus on risk management [½]
- To gain tax and other legislative or regulatory advantages [½]
- To earn additional income/profit by accepting external risks on a commercial basis [1]
- To avoid credit risk associated with external reinsurers [½]
- To enable the enterprise to buy cover directly from the retrocession market [½]

A captive may reward good experience (by reducing premiums) more quickly than an external reinsurer [½]

To make reinsurance premiums more predictable (as not exposed to the reinsurance cycle) [½]

[Marks available 6½, maximum 4]

(iii)

Combined loss ratio = incurred loss ratio + expense ratio

Incurred losses:

Big data and/or more sophisticated use of data could lead to better risk selection and management [½]

Loss prediction / prevention eg by using machine learning [½]

Fraud detection eg by using blockchain technologies [½]

Better preventative measures for customers or technology that reduces the size of losses e.g. pipe monitors for preventing escape of water claims [½]

Expenses:

New distribution platforms to improve the accessibility of products e.g. smartphone solutions for customers in emerging markets [½]

Reduction in commission due to change in platforms [½]

Intelligent automation (e.g. online claims handling platform) could reduce staff costs [½]

Customer engagement eg by using AI and machine learning techniques, or social media marketing tools, could facilitate more frequent and meaningful communications with customers and targeted marketing [½]

Blockchain – using distributed ledger technologies in the claims process can help with data sharing, accuracy, transparency and record keeping [½]

Improved means of communication may enable more staff to work from home therefore reducing office space required and hence rental costs / electricity spend / travel etc. [½]

Remote loss assessment could be used to reduce reliance on claims assessors, thereby cutting expenses [½]

Premiums:

Big data – leveraging off real-time and ubiquitous data originating from various high-tech sources (eg telematics) can help manage and price risks [½]

Identify more helpful rating factors (could be linked to technology use itself) [½]

Predictive modelling/ more sophisticated models increasing “accuracy” of premiums [½]

Increased computing power can be used to allow more complex modelling for more accurate pricing and speedier analysis [½]

Increased data storage capability can be used to improve accuracy of pricing models. [½]

New products – opportunity to increase demand by addressing needs largely unmet by standard covers [½]

[Marks available 8½, maximum 5]

[Total 14]

Part (i) was generally well answered, with those giving a wide range of different ideas scoring better.

Part (ii) was also generally well answered.

It was good to see that many candidates structured their answer to part (iii) around the component parts of the combined loss ratio. The main reason why scores were low for this part was due to candidates not giving sufficient detail on how the technologies and innovations could be used, which is what the question asked for.

[Paper Total 100]

END OF EXAMINERS’ REPORT