

# **INSTITUTE AND FACULTY OF ACTUARIES**

## **EXAMINERS' REPORT**

September 2021

### **SP7 - General Insurance Reserving and Capital Modelling 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.

Sarah Hutchinson  
Chair of the Board of Examiners  
December 2021

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

The aim of this General Insurance Reserving and Capital Modelling Specialist Principles subject is to instil in successful candidates the ability to apply, in simple reserving and capital modelling situations, the mathematical techniques and the principles of actuarial planning and control needed for the sound financial operation of general insurers.

Candidates who pass the exam are expected to analyse hypothetical situations, within the context of general insurance, including using judgement to assess the implications of possible actions and to develop appropriate proposals or recommendations relating to reserving and capital modelling.

Candidates who are well prepared generally appear to perform reasonably well on SP7, although a number of candidates do not appear to be adequately prepared, are unable to generate sufficient distinct points in their answers or show poor exam technique. The points provided in this report are worth considering to improve performance.

Lists are hugely valuable for breadth of point generation, but candidates should always exercise judgement when applying them. In many instances questions will be specifically designed to render a number of the standard points inappropriate and marks will be available for identifying and articulating these nuances well.

Calculation questions will come up on a regular basis within SP7 papers. Candidates should always be prepared for such staples as balance sheet preparation, triangle manipulations & projections and reinsurance layer calculations (along with being able to carry out any necessary adjustments including inflation, exposure, earning distortion and time period issues). All workings and rationale should be clearly shown to allow credit to be given for workings even where the calculations are incorrect.

Candidates should expect the examiners to set questions 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 capital and reserving, including reinsurance.

Candidates who answer the questions with bigger marks first seem to not run out of time. Although this can vary from individual to individual, time keeping is of essence.

The depth and breadth of an answer needs to be in line with the command verb and marks allocated to the question.

While the marking schedule is discussed extensively to cover as many points as possible, 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.**

Candidates performed reasonably well in this exam diet.

Question 4 was the only calculation question in the exam paper and most candidates answered this question well. Calculation questions regularly come up in SP7 and candidates should practise these as part of exam preparation.

Candidates also answered the question on regulation, Question 6, quite well. However, there was a lack of good points in the application part of this question, i.e. part (ii).

Question 8, on the other hand, was answered poorly as many candidates did not tailor their answers to the context provided in the question.

The higher order questions score lower marks on an average.  
Question 3 part (iii) is an example.

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 61  
295 presented themselves and 112 passed.

## Solutions for Subject SP7 - September 2021

### Q1

(i)

Salvage refers to the amounts recovered by insurers from the sale of insured items that had become the property of the insurer by virtue of settling of a claim [1/2]

For example, the sale for scrap or parts of motor vehicles written off (salvage) [1/2]

whereas subrogation is the substitution of one party for another as creditor, with a transfer of rights and responsibilities [1/2]

For example recovery from other parties to whom some claim liabilities can be attributed [1/2]

it applies within insurance when an insurer accepts a claim by an insured, thus assuming the responsibility for any liabilities or recoveries relating to the claim [1/2]

For example, the insurer will be responsible for defending legal disputes and will be entitled to the proceeds from the sale of damaged or recovered property [1/2]

A salvage money can be received due to the subrogation clause, as the two are interlinked. [1/2]

The subrogation clause could entitle the insurer to the assets from a third party that may then be salvaged [1/2]

for example, if a marine insurer pays a claim for a damaged cargo in full, it has the right to sales proceeds (if any can be made) of the damaged cargo (salvage recovery) [1/2]

whereas if the damage to the cargo was caused by a third party, the insurer may pay the claim to the insured, but recover the amount from the third party using the subrogation clause [1/2]

[Marks available 5, maximum 3]

(ii)

It could be made through an explicit allowance to the IBNER on a claim-by-claim basis [1/2]

a -ve IBNER will have to be set up using an estimated recovery	[½]
If such recoveries are very frequent, and a common feature of the line of business under consideration, then the selected development patterns should automatically allow for such recoveries	[½]
and those patterns will project an ultimate loss value adjusted for such recoveries (both IBNR and IBNER component)	[½]
and traditional actuarial techniques such as the chain ladder on the incurred claim triangles should be able to estimate these recoveries	[½]
Equally, salvage and subrogation (S&S) recoveries could be projected separately from the gross of S&S amounts as the pattern of recoveries may not match the gross payment patterns.	[½]
and then a difference of the projected values could be used to arrive at the net of S&S figure	[½]
Although the accuracy of above techniques will depend upon how much past data the company has and the consistency of such recoveries	[½]
when using exposure based reserving techniques, it may have to be allowed for separately in the projected ultimate loss or the loss ratios should be chosen such that they allow for these recoveries	[½]
Alternatively, the actuary can choose to use claims information which is gross of any salvage and subrogation	[½]
and an adjustment is then made for the estimated salvage and subrogation amounts as provided for by the Claims function	[½]

[Marks available 5½, maximum 3]

**[Total 6]**

*Overall, the question was reasonably answered.*

*Several candidates found part (ii) challenging where they were required to think of the practicalities of allowing for recoveries in the IBNR calculations.*

## Q2

The claims are received as bordereaux, it is possible that several individual claims are bundled into one	[½]
increasing the severity	[½]
and reducing the frequency	[½]
this can cause issues with case reserving in the short/medium term	[½]
particularly for the liability portfolio where case estimation for long tailed claims can be quite an important element	[½]
The brokers could be doing claims handling on behalf of the insurer as a part of the deal	[½]
thus leading to a change in the adequacy of case reserves	[½]
both brokers are large so could have very different case reserving and reporting practices between them	[½]
The data will be received quarterly introducing reporting delays compared to the earlier situation when claims would have been received throughout the quarter	[½]
there will be further reporting delays due to data first being processed by the brokers instead of the in-house claims function	[½]

Some claims which would have previously been reported may no longer be reported (nil claims) if the Brokers are going to do a basic due diligence on whether the claim is a valid one or not [1/2]  
 equally the propensity to claim by SMEs may increase if the Brokers make them aware of the different clauses in the insurance contract better, encouraging them to claim [1/2]  
 The level of detail available for a claim may change [1/2]  
 as the brokers may not capture all the information when collecting the claims information [1/2]

[Marks available 7, maximum 2]

(ii)  
 there is likely to be a change in the business mix, since the client base is likely to change [1/2]  
 could suffer from adverse selection if the brokers get higher commissions from other insurers [1/2]  
 the profile of customers going to brokers may be different to those who purchase online, which may not be immediately captured in the IBNR estimation exercise [1/2]  
 It may take a while before the business mix change can be accurately reflected in the IBNR calculations [1/2]  
 More complex liability policies are more likely to be sold via brokers than through an online-only channel [1/2]  
 this is likely to increase the exposure, requiring different actuarial techniques to set the IBNR [1/2]  
 especially since the company was set up only a few years ago so it may not have enough data to do credible IBNR estimation [1/2]  
 may have to resort to using benchmarks [1/2]  
 If using exposure based IBNR techniques, then the Loss Ratio assumptions may be difficult to set up, leading to under or over-reserving [1/2]  
 also there could be late adjustment to premiums as brokers may declare the policies late [1/2]

Also due to the borderaux claims coming in only on a quarterly basis for 40% of the portfolio, the historical claims data and development triangles may become redundant [1/2]  
 reporting lags may increase (pure IBNR effect) [1/2]  
 and settlement lags may increase (IBNER effect) [1/2]  
 settlement lags can reduce too if the Brokers help in negotiating on the large claims [1/2]  
 Changes in the case adequacy can impact the IBNR estimation [1/2]  
 introducing more uncertainty [1/2]

Depending upon the timing of the valuation exercise vs the date of receipt of the borderaux, the IBNR is likely to be set up based on an outdated incurred amounts for part of the portfolio [1/2]  
 additional IBNR estimates may have to be booked to cover the gap [1/2]  
 this could be a bigger issue on the Property line where the claims may occur before the premiums are received for instance [1/2]  
 as described in part (i), there could be unexplained changes to frequency and severity, leading to incorrect IBNR estimation [1/2]  
 chances of fraud could go up since there is less direct interaction with the client [1/2]  
 The impact might be less if the triangles are split by channel of distribution, so that the new information can be reserved for separately. [1/2]

But it will take time for enough data to be collected to book an accurate IBNR reserve ALAE may change due to the new distribution channel, which can also affect the IBNR estimates if the two are not separated during the reserving process [1/2]

Additionally there could be data issues in transferring data from the Brokers' systems to Company's systems, leading to inaccuracies in the data received [1/2]

[Marks available 12½, maximum 5]

**[Total 7]**

*Question tested the understanding of a change in distribution channels on the data and reserve calculations. While most candidates demonstrated a good understanding of how a change in distribution channel could impact incurred data, several candidates could not articulate well how distribution channels can impact the IBNR, despite plenty of points available to be awarded marks for.*

### Q3

(i)

IBNER allows for any additional increase (or decrease) to the case reserves against the reported claims. [1/2]

It can be booked for individual claims on a case-by-case basis, either using the actuary's judgement/analysis or estimates received from professional indemnity loss adjusters [1]

For example, if at the time of closing the accounts, a legal confirmation has been received from the claimant of an architect that they are happy to accept a lower claim settlement amount than was reserved, this might be booked in as a claim specific negative IBNER [1]

Professional Indemnity line is often reserved on a claims made basis, so any of the traditional actuarial technique will estimate IBNER only (as there will be no pure IBNR) [1]

Often, the IBNER is set together with the pure IBNR using triangulation methods, and not an individual claim level, so the usual traditional IBNR estimation techniques could be used to do a joint pure IBNR and IBNER estimation [1]

For the claims already reported, the average claim cost could be projected separately using standard techniques, and multiplied with the reported claim count to estimate the IBNER [1]

[Marks available 5½, maximum 2]

(ii)

Advantages:

May provide a more accurate view of the overall IBNER [1/2]

Could provide an insight to the Claims Team who may be able to perform a more accurate case reserving in future, thus minimising the need for IBNER calculations in future [1/2]

Changes to claims environment can be more readily reflected [1/2]

Holding too much case reserves incurs a capital charge, so if IBNER can be more accurate, the company's capital position may improve [1/2]

Might help the company to identify fraudulent claims better [1/2]

May also provide insight into a particular category of claimants which the insurer may want to write more of or less of [1/2]

Can also help while negotiating the final loss settlement amount	[½]
more accurate reserving will lead to better pricing	[½]
reinsurers may prefer it as it will give them a better estimate of their reserves	[½]
company can estimate the potential RI recoveries better	[½]
Method may be simple and easy to explain to management	[½]
Can be used when statistical methods are not suitable	[½]
Makes use of qualitative information more easily than projecting as a triangle	[½]
Might be the only approach for large/catastrophe losses	[½]
Might be the more suitable approach for inwards reinsurance, e.g. ones with high attachment points	[½]

[Marks available 7½, maximum 2]

(iii)

Agree with Chief Actuary:

The previous organization was smaller in size, writing what would be considered a low-frequency, high-severity business	[½]
which is more suited to a case-by-case IBNER estimation	[½]
Medical malpractice PI coverage is better suited to individual case IBNER estimation as individual circumstances can be studied in more detail claims	[½]
Likely the reported claim count was much smaller in the previous organization so possible to use case by case reserving approach within timelines	[½]
Doing so for the Travel business which is a high-volume business may actually be impractical	[½]
Long-tailed lines like PI may not require frequent valuation due to long settlement delays, rendering individual case reserving feasible, when compared to Travel Insurance	[½]
Most perils in Travel Insurance will be low-peril fixed indemnity coverages, whereas PI may have higher limits and subject to court rulings	[½]
so the IBNER element might not be material for Travel claims	[½]
For a high claims frequency business like travel traditional reserving techniques will provide a good estimate	[½]
Travel business is more homogeneous than Med Mal, hence traditional reserving techniques may provide a good estimate	[½]
More scope for negotiation on individual cases under PI	[½]
Company T's IT Systems may not be as advanced to allow tracking of IBNER for a large volume of claims	[½]
All other stakeholders such as Auditors and Regulators may not have raised any concerns to the current practice, so Company T's Management may see it as unnecessary	[½]
Claim level IBNER may only result in spurious accuracy with no material differences in the level of reserves held under the current approach	[½]
May not impact uncertainty around reserves much	[½]
Time and cost involved to do such a detailed reserving may not justify doing so	[½]

Do not agree with the Chief Actuary

There is potential benefit in doing a more detailed level IBNER setting, and may lead to less reserves to be held	[½]
Holding less reserves may mean better capital position	[½]
And potentially better investment outcomes	[½]

- The new Reserving Actuary may have identified some claim leakages which is why they have proposed such an approach [1/2]
- Perhaps such an approach can be used on the larger claims first, and not on the attritional claims. Company T's Management should consider the pros and cons in detail [1/2]
- Better claims reserving may result in savings, allowing Company T to price their products at a more competitive rate [1/2]
- May lead to less claims uncertainty, hence freeing up capital held in this regard [1/2]
- [Marks available 1 1/2, maximum 8]  
[Total 12]

*Application question around the pros and cons of reserving at an individual claim level.*

*Parts (i) and (ii) were answered well.*

*Candidates scored below average on part (iii) mainly because they couldn't come up with sufficient distinct points.*

#### Q4

(i)

		1	2	3	4	5	6	7			Simple Average BCL	
Step1 - Average Incurred cost per claim		12	24	36	48	60	72	84	Current		Dev F	Ultimate
	2014	9.546	13.454	17.220	24.192	28.673	31.380	30.997	30.997		1.000	30.997
	2015	7.029	10.517	18.622	24.966	27.152	27.239		27.239		0.988	26.907
	2016	8.797	18.533	26.350	31.884	31.128			31.128		1.036	32.250
	2017	13.872	20.686	29.717	29.563				29.563		1.122	33.171
	2018	18.375	28.440	29.453					29.453		1.389	40.900
	2019	16.340	25.104						25.104		1.929	48.419
	2020	17.985							17.985		3.082	55.428
	Age to Age	1.409	1.280	1.405	1.185	1.094	0.988					
		1.496	1.771	1.341	1.088	1.003						
		2.107	1.422	1.210	0.976							
		1.491	1.437	0.995								
		1.548	1.036									
		1.536										
Simple	Age to Age	1.598	1.389	1.238	1.083	1.049	0.988					
Simple	Cumulative	3.08	1.93	1.39	1.12	1.04	0.99	1				

- Correct calculation of average claim cost [1]
- Correct calculation of grossing-up factors [1]
- Correct calculation of the Ultimates [1]

		12	24	36	48	60	72	84			Simple Average BCL	
Step2 - Ultimate claim count		12	24	36	48	60	72	84	Current		Dev F	Ultimate
	2014	1,342	1,514	1,548	1,557	1,549	1,552	1,554	1554		1.000	1554.00
	2015	1,373	1,616	1,630	1,626	1,629	1,629		1629		1.001	1631.10
	2016	1,932	2,168	2,234	2,249	2,258			2258		1.002	2263.10
	2017	2,067	2,293	2,367	2,390				2390		1.002	2395.96
	2018	1,473	1,645	1,657					1657		1.007	1669.35
	2019	1,192	1,264						1264		1.028	1299.18
	2020	1,036							1036		1.150	1191.52
	Age to Age	1.128	1.022	1.006	0.995	1.002	1.001					
		1.177	1.009	0.998	1.002	1.000						
		1.122	1.030	1.007	1.004							
		1.109	1.032	1.010								
		1.117	1.007									
		1.060										
Simple	Age to Age	1.119	1.020	1.005	1.000	1.001	1.001					
Simple	Cumulative	1.15	1.03	1.01	1.00	1.00	1.00	1				

Correct calculation of grossing-up factors [1]  
 Correct calculation of the Ultimates [1]

Step3 - Calculating Reserves - Simple Average BCL				
Year	Average Cost per claim	Claim Number	Ultimate for the year	IBNR for the year
2014	31.00	1,554	48,169.00	-
2015	26.91	1,631	43,885.61	-487.39
2016	32.25	2,263	72,980.68	2,692.68
2017	33.17	2,396	79,476.79	8,821.79
2018	40.90	1,669	68,261.56	19,457.56
2019	48.42	1,299	62,895.97	31,163.97
2020	55.43	1,192	66,069.86	47,437.86
		<b>Total</b>	<b>441,739.47</b>	<b>109,086.47</b>

Correct calculation for Ultimate values (with or without tail factor) [1]  
 Correct calculation for IBNR [1]  
 Showing calculations [1]

Assumptions:

Past trends of claim count development will continue in the future [½]  
 No material change in the inflation already captured in the triangle [½]  
 Assume no tail factor (or state the tail factor applied, if any) [½]  
 Any other valid assumption (s) [½]

[Marks available 2, maximum 1]

The final calculations for using weighted average for both average cost and claim count are as follows:

Step3 - Calculating Reserves - Weighted Average BCL				
Year	Average Cost per claim	Claim Number	Ultimate for the year	IBNR for the year
2014	31.00	1,554	48,169.00	-
2015	26.91	1,631	43,885.61	-487.39
2016	32.29	2,263	73,067.10	2,779.10
2017	32.90	2,397	78,862.73	8,207.73
2018	39.45	1,671	65,914.88	17,110.88
2019	44.53	1,302	57,980.64	26,248.64
2020	50.35	1,195	60,172.33	41,540.33
		<b>Total</b>	<b>428,052.29</b>	<b>95,399.29</b>

The final calculations for using weighted average for claim count and simple average for average claim are as follows:

Year	Average Cost per claim	Claim Number	Ultimate for the year	IBNR for the year
2014	30.997	1,554.0	48,169.00	-
2015	26.907	1,631.0	43,885.61	-487.39
2016	32.250	2,263.0	72,980.68	2,692.68
2017	33.171	2,397.0	79,509.96	8,854.96
2018	40.900	1,671.0	68,343.36	19,539.36
2019	48.419	1,302.0	63,041.22	31,309.22
2020	55.428	1,195.0	66,236.14	47,604.14
		<b>Total</b>	<b>442,165.98</b>	<b>109,512.98</b>

(ii)

Advantages

Easy to understand and communicate [½]  
 useful when there are features in the data that aggregate modelling methods will not detect [½]

or model properly [½]

for example, claims inflation may arise from an escalation of settlement amounts or increase in claims frequency [½]

aggregate models cannot distinguish between these two sources of inflation [½]

Provides information about how both claim numbers and claim amounts are expected to develop in the future [½]

If used in the correct way, it can be useful as a basis for estimating latent claims (which are claims that are reported a significant time after occurrence) because we can make explicit assumptions about the average claim size, the long-term effect of inflation and the expected number of claims [½]

Helps to explain volatile data and results, when the data contains only a small number of claims, for example, for very small lines of business or reinsurance losses [½]

[Marks available 4, maximum 1]

Disadvantages

need more data for the ACPC method than for some other methods [½]

therefore we can only apply the method when we have the required information on claim numbers and claim amounts [½]

method may not be suitable where the claim count or an average claim size is not meaningful [½]

subscription market where insurers write different shares on each of the policies that they underwrite [½]

unless suitable adjustments have been made to the data [½]

More time consuming than projecting the reported claims triangles alone [½]

Can be distorted by reopened claims, nil claims or partial payments [½]

Assumes that the distribution of claims is the same for each origin year or settlement year [½]

[Marks available 4, maximum 1]

**[Total 11]**

*This was the only numerical question in the paper, and most candidates performed very well on this question. Follow on marks were awarded to candidates who made an error in the calculation of averages.*

*A wide range of techniques were used to arrive at the Ultimate values using the ACPC technique, and all relevant ones were awarded full marks.*

**Q5**

(i)

Motor accidents can sometimes result in third-party claims which may not be proportionate to the sum insured of the car involved in the incident [½]  
 This could be made worse by depreciation on the value of the cars, which is reflected in the sum insured value [½]  
 For example, there could be a death and personal injury where the cost of treatment could be much higher [½]  
 leaving the claimant not fully indemnified by the amount equalling twice the value of the insured vehicle [½]  
 there could also be damage to third party property which is considerably greater than twice the sum insured value, leaving the claimant not fully indemnified by the amount equalling twice the value of the insured vehicle [½]  
 there might have been an increase in such cases recently (or over time) [½]  
 The legal costs to settle the disputes in such cases might be getting very high prompting the Regulator to introduce this regulation [½]  
 Inflation - both medical... [½]  
 and legal could be disproportionate to the increase in SI for cars [½]  
 [Marks available 4½, maximum 2]

(ii)

Candidates must tailor their answer to the situation given in the question  
 the nature of third-party liability claims is changing from being capped to a certain value to one of that being unlimited in nature [½]  
 this will introduce volatility in the reported loss amounts [½]  
 ...reserving techniques work on homogenous claim triangles, Own Damage and third-party liability claims can behave quite differently [½]  
 The case reserving philosophy will also be different on the two types of claims [½]  
 with the third-party liability more prone to court decisions [½]  
 and inflation [½]  
 further the tail of the third-party liability BI claims may change considerably compared to earlier, [½]  
 making it much longer-tailed now compared to the past [½]  
 not splitting the triangles will also make the triangle less tail-homogenous [½]  
 The premiums charged are also likely to change, hence the loss ratios for the two perils is going to be divergent [½]  
 so exposure based techniques will not work on the combined triangle [½]  
 the regulator may have made it mandatory to report the IBNR figures separately for own damage to third-party liability. following the new regulation [½]

there might be a different capital treatment for the claims coming from third-part liability, and separate reserve estimates will be required to apply the risk charges correctly	[1/2]
following the new regulation, there might be a requirement to price the third-party component separately to the own damage component	[1/2]
the pricing team may need an accurate and separate IBNR calculation to suitably price the product	[1/2]
Actuary would want to remove the historical information for liability portion which is not relevant anymore for projecting into the future, hence splitting the triangles	[1/2]
	[Marks available 8, maximum 6]

(iii)	
historical split of the data might not be available	[1/2]
since these were always reserved for together	[1/2]
System may not be set up to capture this information	[1/2]
particularly because it is a small insurance company	[1/2]
May not have sufficient data to apply traditional reserving techniques once the split is done	[1/2]
Even if the split can be done, and history is available, it will likely not be suitable to project for the future due to data being truncated	[1/2]
	[Marks available 3, maximum 2]
	<b>[Total 10]</b>

*Candidates scored above average for parts (i) and (iii) but below average for part (ii).*

*Candidates who only attempted to list the generic points around distinction between own damage and third party liability without referring to the situation in the question obtained lower marks.*

## Q6

(i)	
correct market inefficiencies and promote efficient and orderly markets	[1/2]
protect consumers of financial products	[1/2]
maintain confidence in the financial system	[1/2]
help reduce financial crime	[1/2]
(ii)	
Information Asymmetry	
There is generally a larger information asymmetry existing between consumers purchasing personal lines products and those purchasing corporate ones, hence better regulation is required for individuals	[1]
In particular large companies may hire people specifically to deal with insurance purchasing or pay for advice if this is a large expense	[1/2]
and have more say in deciding the terms and conditions for such a contract	[1/2]
Individuals have less negotiating power compared to big companies	[1/2]
Individuals could be financially less sophisticated, requiring more support in terms of strictly regulated insurance market	[1/2]

Insurance plays an important societal role, so having good regulation will improve the faith of individuals in the insurance industry	[1/2]
The chances of an individual's ruin are higher than those of a big corporate in case of insurer default/ going rogue	[1/2]
Individual customers may not be able to afford legal advice in case of a mishap whereas corporates will be having much better access to such advice both at the time of purchase and at the time of claiming	[1/2]
Individuals can be easy victims to mis-selling compared to corporates, good regulation will minimise this risk	[1/2]

[Marks available 5½, maximum 5]

(iii)

Licensing agents to sell insurance and requirements on the method of sale	[1/2]
Cooling off period	[1/2]
Requirements on policy wording being simple to understand	[1/2]
Requirements on information and education that must be given to potential customers	[1/2]
Requirements to offer certain cover	[1/2]
Requirements to purchase certain cover / Minimum cover levels required	[1/2]
Requirements to pay levies to consumer bodies	[1/2]
Legislation to protect policyholders should a company fail	[1/2]
Rate tariff set by regulator	[1/2]
Minimum / maximum / tariff premium restrictions	[1/2]
Ombudsman / committee to look into any consumer complaints	[1/2]
Restrictions on information that may be used in setting pricing	[1/2]
Rules on treating customers fairly	[1/2]
Rate changes requiring regulatory approval	[1/2]
Requirements for management to be fit and proper	[1/2]
requirements to offer cover even in high risk areas	[1/2]
Legislation on capital requirements to reduce the likelihood of a company failing	[1/2]
Restrictions on maximum commission that can be charged by policies	[1/2]
Reinsurance cover required to be purchased by insurers	[1/2]
restriction on the type of reinsurance covers	[1/2]
restrict the sale of illegal products	[1/2]

[Marks available 10½, maximum 5]

**[Total 10]**

*Parts (i) and (iii) were very well answered, with several candidates scoring full marks.*

*Part (ii) was poorly answered as many candidates did not generate sufficient distinct points around the differences between individuals and corporates as a consumer of insurance.*

**Q7**

(i)

Currency of the premium	[1/2]
together with currency of any endorsements and adjustment premiums, since it is a large company so likely to have such requirements	[1/2]
for a client with coverage across multiple currency geographies, must allow for capturing premiums in multiple currencies	[1/2]

the exchange rate as at the date of entering the contract, since the reserves will be held in the home currency	[1/2]
or if the premium is received late, the system might have to capture the exchange rate based on the date of receiving the premium,	[1/2]
Currency of the claim	[1/2]
currency in which the case reserves will be set	[1/2]
exchange rate at the time of claim settlement	[1/2]
and if the payment is made in instalments, this information will be required to be captured at each payment date	[1/2]
possible adjustments to any deductibles due to exchange rate fluctuations	[1/2]
capturing any differences in premium taxation in different jurisdictions	[1/2]
currency details of reinsurance premium	[1/2]
and claim recoveries	[1/2]

[Marks available 6½, maximum 3]

(ii)	
whether claims reserving has to be done in a single currency or multiple currencies which is likely to depend upon the quantum of business written in each of the different currencies	[1/2]
as well as the actual and potential volatility in the exchange rates	[1/2]
since the reserves will ultimately be kept in the home currency	[1/2]
development patterns can get distorted if exchange rate fluctuation is not factored in correctly	[1/2]
can be avoided by converting all transactional level data using the most recent exchange rate	[1/2]
if all projections done in the original currency then should not be an issue	[1/2]
likewise, the loss ratios will move only due to currency fluctuations in premiums and losses	[1/2]
different inflationary and rate change factors may apply to each currency	[1/2]
any Actual vs Expected calculations should take such movements into consideration	[1/2]
since it is large established company, it might have a rigid existing reserving processes and those features will have to be factored in the designing the reserving process, following the change	[1/2]

[Marks available 5½, maximum 4]

(iii)	
Advantages	
administratively easier	[1/2]
will cost less to manage fewer currencies	[1/2]
easier for regulatory reporting	[1/2]
depends upon how many currencies the company is going to expand writing business into if too many, then it will make sense to manage centrally	[1/2]
insurer may have better understanding investment opportunities in the local currency, so insurer may be able to optimise investment returns	[1/2]
regulation may necessitate for claims to be reserved in the home currency	[1/2]
Disadvantages	
will have to deal with currency fluctuations in the reserving process	[1/2]
may have to deal with foreign exchange regulations if holding reserves in multiple currencies	[1/2]

would have been easier to settle claims in the currency of the premiums if holding reserves in the same currency. Will avoid exchange rate fluctuations [½]  
 additional time and cost involved [½]  
 asset liability mismatching might be a bigger issue [½]

[Marks available 5½, maximum 3]

**[Total 10]**

*Question around the implications of writing business in several currencies. There was quite some variation in the marks obtained for this question, but almost half the candidates scored below average.*

*Part (ii) was the most challenging, with many candidates writing considerations around writing business in multiple countries as opposed to multiple currencies. While different countries will usually have different currencies, the changes required to the reserving process will not necessarily be the same.*

## Q8

(i)

type of contract, non-standard RI contracts might have to be looked at on an individual basis [½]  
 in this case it will have to be split between Facultative and Treaty covers [½]  
 Different facultative covers could potentially be clubbed together across different clients [½]  
 Basis of cover - losses occurring, risks attaching, claims made [½]  
 Line of business - will have to be divided between Commercial Property, Personal Accident and General Liability [½]  
 The three lines of business can have very different claim profiles [½]  
 Attachment point - since the company seems to write business with different attachment points, it will make sense to split the business for each LoB by different attachment points. [½]  
 The extent of data in each sub-category which is available to allow application of reserving techniques [½]  
 Nature of retrocession covers may make it more convenient to group the triangles in a certain way [½]  
 Type of Cedants - small insurers may have a different profile to mid-large insurers [½]  
 Catastrophe claims - these could potentially be merged across all lines of business and then IBNR allocated among individual lines. [½]  
 whether the reinsurance comprises specific claim types such as latent claims [½]  
 Any regulatory requirements around how data can be grouped [½]  
 Internal company reserving guidelines [½]

[Marks available 7, maximum 4]

(ii)

Candidates must tailor their answer to the situation given in the question  
 Having sufficient and homogeneous data in each reserving triangle [½]  
 Whether to use annual or quarterly origin and development periods [½]  
 Reserving for short-tailed business i.e. Personal Accident and Commercial Property  
 can perhaps make use of chain ladder techniques [½]

although short tailed lines for the cedant may not necessarily mean they will be short tailed for the Reinsurer, depending upon the attachment points [1/2]  
 Whereas the General Liability claims may have to rely on a combination of Chain Ladder, BF and Cape Cod techniques [1/2]  
 reporting lag could be considerable for the high-attachment point policies [1/2]  
 For exposure-based reserving using premiums as the exposure method, the premiums are only an estimate based on the expected direct written premiums [1/2]  
 this could lead to an incorrect loss ratio [1/2]  
 might be better to consider using other exposure measures [1/2]

It would be best to consider the Catastrophe claims separately [1/2]  
 Clash events may have to be reserved for separately [1/2]  
 Adjusting for inflation can be a major consideration, especially for the claims with high attachment points. [1/2]  
 and for the General Liability portfolio which could be long tailed [1/2]  
 Whether the attachment points are inflation-indexed or not could also have an impact [1/2]  
 Also it may have to keep reserves for the near-miss events as they can grow over time to hit the attachment points [1/2]  
 Paid claims patterns can sometimes be more stable over a period of time than incurred claims since the latter can be influenced by the case reserving techniques of the cedant [1/2]  
 Reinstatement Premiums will have to be considered in the ultimate premium estimation [1/2]  
 Reins premiums are correctly assigned to the LoB whereas the regular premiums are based on allocation, leading to incorrect estimation of premiums [1/2]  
 likewise profit commissions/swing premiums will have to be considered [1/2]  
 there could be a change in the mix of business, and this could lead to incorrect IBNR setting [1/2]  
 The reinsurer maybe missing information around the actual exposure in the business, causing a further misallocation between potential losses and reserves set for each line [1/2]

[Marks available 10½, maximum 7]

(iii)

Different lines of business can have different premium earnings patterns [1/2]  
 e.g. Commercial property claims could have seasonality [1/2]  
 e.g. XoL General Liability earning pattern could be influenced by a few underlying policies earning differently [1/2]  
 Earning patterns for the underlying business may not be the same as those for the RI business for company A [1/2]  
 the actual premium charged for the reinsurance cover may not necessarily reflect the underlying risk in the same proportion [1/2]  
 the allocation of premium in the way described may not be the correct methodology [1/2]  
 Even within the same line of business, the facultative covers may earn differently to treaty business for example [1/2]  
 and may further be complicated by the differences in a risk-attaching and a losses occurring policy [1/2]  
 it can be a bit complex to allow for these differences when calculating the UPR on a combined basis [1/2]  
 the ultimate premium may not be known since the cedants are only providing an estimate of the direct written premiums [1/2]  
 there could be material differences between deposit premiums and actual premiums calculated afterwards [1/2]

[Marks available 5½, maximum 3]

**[Total 14]**

*This question wasn't answered well by the candidates, with parts (ii) and (iii) pulling the marks down.*

*Very few candidates were able to generate points around reinstatement premiums, risk-attaching vs losses occurring for part (iii). Some candidates were not sure about the difference between UPR and unwritten premium for the year.*

## **Q9**

(i)

### Stress Testing

Quantifies the effect of varying a single parameter [½]

Can be used to identify/quantify impact of different stress scenarios on an insurer's expected financial position [½]

Tests can be deterministic or based on probability distributions [½]

Can focus on understanding specific risks in isolation [½]

### Scenario Testing

Quantifies the effect of a change in a combination of parameters [½]

Useful for testing combined effect of a number of risks (and mitigating actions) [½]

Could be used to validate the reinsurance recoveries with the reinsurance provider in extreme loss scenarios [½]

### Sensitivity Analysis

Process of testing how results change following a small change in one of the assumptions [½]

The purpose is to identify the more sensitive assumptions in the model [½]

Not possible to test all assumptions in complex model so can change block of assumptions by fixed amount or look at largest classes [½]

### Back Testing

Process of comparing actual experience with model output [½]

The purpose is to test how well the model predicted the outcomes that actually occurred [½]

Assessment will need to be made as to whether any deviations are random or are a consequence of limitations in the model [½]

### Model Documentation

Essential for providing a verifiable audit trail in the development and operation of the model [½]

Documentation should cover rationale for selecting assumptions and the particular risk issues considered [½]

### Peer Review

Undertaken by someone not involved in the day-to-day capital modelling [½]

This can be done internally or using an external specialist [½]

### Market Benchmarking

Comparison of key assumptions and results with those of similar companies [½]  
 May be available from regulators, market bodies or actuarial consultants [½]

#### Analysis of Change

Compares key inputs and outputs of the latest model to the previous version of the model [½]

Provides a mapping of the key drivers of any changes [½]

#### Reverse Stress Testing

Process of considering the scenarios that could lead to failure of the overall business model [½]

Purpose is to test that the overall model captures major exposures and key business risks [½]

#### P&L Attribution

Process of reviewing outcomes from the prior accident year and testing them against the modelled parameters [½]

The purpose is to create a cycle of feedback that drives a process of continuous refinement and to ensure that there are no material sources of volatility not represented within the model [½]

[Marks available 12½, maximum 7]

(ii)

Reasons why validation exercise useful for the Company:

Give Senior Management and the Board comfort that when model updates are made, they have been implemented appropriately within the model [1]

Gives Board greater understanding of how the internal model works [½]

Provides senior management with better understanding of the business [½]

Enhances model governance within the organisation [½]

May be a regulatory requirement [½]

May identify errors within the model [½]

May identify areas for improvement within the model, e.g. to implement a more efficient model structure [½]

Expands number of people within the Company with comfort using the internal model, i.e. reduces key man risk, as people outside core capital modelling team may carry out validation and get comfortable with the model [½]

Give comfort to shareholders/ [½]

rating agencies/ [½]

policyholders [½]

Use of an external consultant for model validation may result in consultant recommending improvements to the model [½]

which mean the Company uses cutting edge modelling techniques in line with its competition [½]

Also, if the model has been purchased from an external vendor, validation will help establish its suitability for the company [½]

Might be in line with the best practice/peer practice [½]

Provide everyone with a better understanding of the critical assumptions and limitations [½]

[Marks available 8½, maximum 5]

(iii)

Possible reasons include:

Move to a more matched position, to reduce Market Risk, if the Company is now writing more long-tail exposures	[1]
May have a greater willingness to invest in more return-seeking assets	[½]
For example due to an increased level of risk appetite	[½]
May have an increased level of excess capital, and hence greater investment freedom to invest in more return seeking assets	[½]
May be regulatory changes around companies' investment policies	[½]
Company may have purchased more reinsurance and feel it now has more investment freedom	[½]
Competitors might be doing so	[½]
Changes in the economic environment may make the current investment mix less desirable	[½]
or might have made equity and property cheaper to invest in	[½]
Historically the company might not have been big enough to make riskier investments	[½]
	[Marks available 5½, maximum 3]

(iv)

Market Risk arises on both the asset and liability side of the balance sheet	[½]
the Company may now be writing more long-tail exposures, such as Casualty lines of business	[½]
these exposures are more appropriately matched by assets such as Equities and Property, than Bank Deposits and short duration Bonds, resulting in reduced market risk	[½]
Therefore, investing more in these assets may reduce the Company's Market Risk	[½]
For example, the inflation associated with such exposures (e.g. medical inflation) would be more appropriately matched with Equities and Property	[½]
If the Company is unmatched (e.g. with Bank Deposits and short duration Bonds) then this will need to be covered by a capital charge that would have been unnecessary had the liabilities and assets been matched	[½]
May also be greater matching by currency	[½]
Higher investment returns	[½]
Regulatory stipulations	[½]
Change in reinsurance	[½]
Market price of investments may have plummeted	[½]
Better diversification between asset types	[½]
Possibly an error in the risk calculation, which could also be driven by investing in a new asset type not previously modelled (e.g. fund of funds)	[½]
Definition/Calculation of Market Risk might have changed	[½]
The company may have shrunk overall, so the Market Risk might have reduced only in absolute terms but not relative terms	[½]
	[Marks available 7½, maximum 5]

**[Total 20]**

*Overall, candidates scored just under the paper average for this question. Despite generating sufficient points in part (ii), several candidates didn't score too well as the points were repeatedly linked to the calculation of capital itself.*

*Those who took a broader view of the benefits of model validation scored better. Also, many candidates assumed that the company is starting to write more long-tailed business, which wasn't stated in the question, but was one of the possibilities.*

**[Paper Total 100]**

**END OF EXAMINERS' REPORT**