

INSTITUTE AND FACULTY OF ACTUARIES

EXAMINERS' REPORT

April 2018

Subject ST7 – General Insurance: Reserving and Capital Modelling Specialist Technical

Introduction

The Examiners' Report is written by the Principal Examiner with the aim of helping candidates, both those who are sitting the examination for the first time and using past papers as a revision aid and also those who have previously failed the subject.

The Examiners are charged by Council with examining the published syllabus. The Examiners have access to the Core Reading, which is designed to interpret the syllabus, and will generally base questions around it but are not required to examine the content of Core Reading specifically or exclusively.

For numerical questions the Examiners' preferred approach to the solution is reproduced in this report; other valid approaches are given appropriate credit. For essay-style questions, particularly the open-ended questions in the later subjects, the report may contain more points than the Examiners will expect from a solution that scores full marks.

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.

Luke Hatter
Chair of the Board of Examiners
July 2018

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

1. The aim of this General Insurance Reserving and Capital Modelling Specialist Technical subject is to instil in successful candidates the ability to apply, in simple reserving and capital modelling 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. Candidates who are well prepared generally appear to perform reasonably on ST7, although a number of candidates do not appear to be adequately prepared, or show poor exam technique. The following points are always worth considering to improve performance:
 - 2.1. 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 (often generous multiple marks) will be available for identifying and articulating these nuances well.
 - 2.2. Calculation questions will come up on a regular basis within ST7, as candidates can clearly observe from examination of historical papers. Candidates should always be prepared for such staples as balance sheet preparation, triangle manipulations & projections and reinsurance layer calculations (along with being able to carry out any necessary adjustments including inflation, exposure, earning distortion and time period issues). Further, if the examiners cannot follow candidates logic they cannot give partial credit for incorrect calculations. Therefore a clear audit trail should be left to help secure appropriate method marks where the calculations are incorrect.
 - 2.3. Capital questions should be expected on every paper and represent a sufficient proportion of the course content that candidates should not expect to be able to pass on their reserving knowledge alone. Those who do not encounter capital work in their professional lives should be particularly careful to ensure that they take time to familiarise themselves with this element of the course.
 - 2.4. Candidates should aim to be able to give near exact glossary definitions as incoherent or vague descriptions will not score marks. If candidates struggle to remember definitions verbatim they should take the time to properly analyse the glossary definition to ensure they have fully absorbed all the nuances of the definition.
 - 2.5. It is important to always read the question properly and to answer only what you are asked.

- 2.6. Always assume that question content is there for a reason. If something is pure bookwork, it should be obvious as such as it will generally go straight to a question with little or no specific context. These are the only sorts of questions where you should expect to provide generic answers. Otherwise you will need to make reference to the situation posed in the question to score well. For example if lines of business, types of insurance entity, a specific set of regulatory requirements or anything else is mentioned they have been chosen as they have an impact on the answer. If numbers are mentioned, they are there because we expect you to look at them, think about them and offer some comment or display some ability to notice unusual features of a table of numbers (a key skill for an actuary). Every exam there will be a significant number of candidates who are clearly extremely well prepared, who write very long answers that clearly display all the base knowledge one might require to be able to think intelligently about a question, but because the answer is purely generic with no obvious attempt to actually think they score poorly.
3. 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. Overall the performance was reasonable with a handful of excellent, very high scoring papers. Responses showed that time pressure was an issue for a few candidates who either struggled with completing the papers or rushed the answers.
2. Responses to question 9 were generally poor. A number of candidates were unable to define the term “Insurance” well. Some candidates were unable to generate a breadth of valid points and failed to link the points being made to the specifics in the question. The balance of the paper was generally answered well, particularly the bookwork questions.
3. As usual strong candidates distinguished themselves by linking examples to specifics in the question whereas weaker candidates seemed to repeat learned material often out of context.

C. Pass Mark

The Pass Mark for this exam was 62.

Solutions

Q1 *Strengths*

Method can be applied to wide variety of datasets (paid / incurred or other suitable example) [½]

. . . and bases (accident year / UW year / reporting year or other suitable example) [½]

The chain ladder method can be used to project it to ultimate, provided the data can be arranged into a development triangle... [½]

...with credible volumes of data... [½]

... homogeneous risk groups... [½]

... and stable claims development. [½]

The basic method can easily be modified to allow for data distortions [½]

. . . or for inflation [½]

the method is conceptually straightforward [½]

the method is simple to use [½]

the method is flexible (e.g. the data does not need to be fully run-off) [½]

it is easy to relate results back to the pattern of development (to compare against expectations) [½]

the method can be developed to serve as a starting point for a number of other methods, for example the Bornhuetter-Ferguson method [½]

Widely understood by actuarial profession and by other insurance stakeholders [½]

Accepted method which is easy to explain to regulators & others [½]

Weaknesses (where not already considered within strengths)

Relies on past being appropriate guide to future which may not always be the case [½]

Can be distorted by unusual experience which wouldn't follow the same development pattern as more typical years [½]

Can be distorted by changes in practices which distort historical patterns [½]

. . . such as changes in reserving / payment / claim classification etc [½]

Subject ST7 (General Insurance: Reserving and Capital Modelling Specialist Technical)
– April 2018– Examiners' Report

Basic method is of limited value for recent cohorts particularly where long tailed	[½]
May often have no fully developed cohorts requiring some augmentation to the method	[½]
Requires considerable care and judgement to use effectively	[½]
Need to manage outliers & distortions introduces subjectivity	[½]
Sufficient credible data required so may not be suitable for all (small companies, new companies etc.)	[½]
<i>Other valid suggestions (½ mark for each suggestion)</i>	[2]
	[14, max 4]
	[Total 4]

<i>Bookwork, generally well answered.</i>

Q2 *Aviation liability*

Appropriate exposure measure might be turnover or alternative such as passenger / kilometres, passenger voyages, in-service seats, in-service vessels etc. [½]

Appropriate rating factor might be loss history, type of craft, use, region etc. [½]

Goods in transit

Consignment value preferred exposure measure, but give credit for other credible [½]

Appropriate rating factor mode of transport, nature of goods, type of storage, time period of transit etc. [½]

Extended Warranty

Appliance-years [½]

Make & model, term, type of cover, type of product or good, nature of sale etc. [½]

Legal Expenses

Number of policyholders or policyholder-years or sum insured [½]

Sum insured also viable as rating factor, but could have type of litigation / claim, before or after event etc. [½]

[4, max 4]
 [Total 4]

Generally well answered. A number of candidates showed a lack of understanding of the risk for Extended Warranty and Legal Expenses. Less well prepared candidates used 'Sum Insured' for all of the examples and marks were limited.

- Q3** (i) The substitution of one party for another as creditor, with a transfer of rights and responsibilities [1]

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, max 1]

- (ii) *Engineering plant & machinery*

Example – some variation on scrap from heavily damaged material, equipment that isn't too damaged to be used for other purposes, equipment that has been replaced as repair would take too long (or other credible) [½]

Likely to be material [½]

... as there would almost always be at least scrap value and often may be salvageable equipment [½]

Credit for other sensible examples / explanation (0.5 mark per point) [1]
 [2.5, max 1.5]

Trade Credit

Example – Debt obligation of defaulting counterparty or underlying collateral if any (or other credible) [½]

Likely to be material [½]

... as purpose of policy is to maintain cashflow for insured and many debts may still be recoverable given sufficient time to pursue [½]

Credit for other sensible examples / explanation (0.5 mark per point) [1]
 [2.5, max 1.5]

Employers' Liability

Example – could argue no valid example, or could give example of liability claims against third parties also involved in a level of contributing negligence [½]

Unlikely to be material [½]

... as claim requires negligence from employer so may not be obvious
subrogation against third parties [1½]

Credit for other sensible examples / explanation (0.5 mark per point) [1]
[2.5, max 1.5]

Aviation Hull

Example – scrap from downed aircraft, salvageable parts from more minor
events such as runway incidents [½]

Will be some, but not likely to be material [½]

... as residual scrap value unlikely to be significant relative to insured values
at stake given extent of damage from any major event [½]

Could be a material component where not a total loss [½]

Credit for other sensible examples / explanation (0.5 mark per point) [1]
[3, max 1.5]

[10½, max 6]

Candidates seemed to struggle with this question, particularly part ii. A number of candidates showed a lack of understanding of subrogation and/or lack of understanding of the cover provided by each product. Those who could define subrogation often could not relate it well to the different class of businesses. Many candidates failed to realise the overlap with salvage and focused on claims between the insurer and a third party (post claim).

Q4 (i) The risk of loss resulting from inadequate or failed internal processes, people and systems or from external events. [1]

(ii) *Credit available for other appropriate examples – stating an overlapping risk category should be credited as part of an example / explanation but not as a mark in isolation.*

Systemic pricing failures, e.g. not including inflation [1]

Bad management of delegated authorities leading to underwriting losses [1]

Variations in premium income due to operational issues, e.g. system downtime [1]

Poor aggregation management causing excessive catastrophe losses from an event [1]

Mis-purchase of reinsurance [1]

Reinsurance dispute due to disclosure or communication failures or writing outside of authorities etc. [1]

Systemic claims leakage impacting reserve development / validity of reserving assumptions [1]

Failure to communicate between claims and actuarial departments impacting accuracy of reserving process (double counts etc.)	[1]
Inappropriate valuation of assets	[1]
Failure to execute asset sales leading to additional liquidity costs	[1]
Fraud event left in the data (volatility goes up in the insurance risk)	[1]

<i>Other valid example</i>	[1]
<i>Other valid example</i>	[1]
<i>Other valid example</i>	[1]
<i>Other valid example</i>	[1]

[15, max 4]

- (iii) Unlikely to be any significant volume of operational events to use as basis for any heavily statistical modelling [½]
- Would expect companies in any case to respond to past operational issues by improving processes, making historical datasets invalid [1]
- Benchmark data may be of some use but will likely be difficult to apply credibly to a company as nature of operations is very personal [1]
- As per (ii) above, many of the operational events may be difficult to separate from observed outcomes in other risk categories [1]
- A broadbrush approach is unlikely to be appropriate [½]

Typical parameterisation approach is subjective	[1]
... ideally involving input from other stakeholders	[½]
... and building on other processes, e.g. risk register & controls	[½]
... considering risk mitigation impacts of various controls	[½]
... making use of external expertise if appropriate	[½]

Would generally use a scenario based approach	[1]
... or buckets of similar scenarios	[½]
... with estimates of frequency and severity	[½]
... or severity at various return periods	[½]
... considering correlation between events	[½]

Scenario based approach can then be converted into a distribution of outcomes to feed a stochastic model	[1]
... considering correlation with other risk categories	[½]

Limited in determining parameters stochastically but can model using simulations of operational risk losses	[1]
... usually modelled as frequency / severity	[½]
... can be modelled using probability distributions for combined risks or individual risks	[½]

[13½, max 5]

[Total 10]

Overall this question was answered relatively well.

Part i was bookwork which was generally answered well.

Part ii was generally well answered although some candidates failed to articulate the overlap between operational risk and other risk categories (and just described the typical failures in the other risk types). The better prepared candidates clearly explained the link between the type of operational risk and the other risk category.

Part iii was generally poorly answered - candidates did not consider the evolving nature of this risk and the lack of data and hence suggested inappropriate methods. Those who suggested appropriate methods, did not write in enough detail to score higher marks. A number talked about generic modelling approach rather than operational risk modelling specifically.

- Q5**
- | | | |
|-------|--|-------------|
| (i) | Costs to an employer of compensating an employee or their estate for | [½] |
| | bodily injury | [½] |
| | disease | [½] |
| | or death | [½] |
| | in the course of employment | [½] |
| | owing to the negligence of the employer | [½] |
| | loss or damage to employees’ property is normally covered too | [½] |
| | legal costs will be covered | [½] |
| | possibly care costs | [½] |
| | benefits under the legal framework | [½] |
| | May be regular payments as well as lump sums | [½] |
| | | [5½, max 3] |
| (ii) | Average inception date from $1/3 \times (0 + 0.25 + 0.75) = 1 \text{ May}$ | [1] |
| | So average accident date 1 November | [1] |
| | Assume claims are even over policy period / Uniform risk | [½] |
| | Assume policy terms of one year | [½] |
| | Assume similar profile & experience on each of the three blocks of exposure | [½] |
| | | [3½, max 3] |
| (iii) | Some exposures may take a long time to manifest to a point where the employee is aware there is an issue | [½] |
| | ... such as diseases with a long incubation period | [½] |
| | ... or industrial injuries that are cumulative in nature (e.g. deafness) | [½] |
| | Employees may wait before notifying employer even once aware | [½] |
| | for example as waiting to see extent of issue | [½] |
| | . unable to claim | [½] |
| | . or simple error | [½] |

Subject ST7 (General Insurance: Reserving and Capital Modelling Specialist Technical)
– April 2018 – Examiners' Report

Employers may be delay notification to the insurer [½]
 for example if they are investigating the merits of a claim prior to notification
 to insurer [½]
 or if they have a periodic notification arrangement for minor claims [½]
 or if they have a warranty arrangement to settle smaller claims themselves
 and do not believe a claim to be above that threshold [½]

Intermediaries may add additional delay [½]

May be practical issues impacting notification (system downtime or postal strikes etc.) [½]

Legislative changes or case precedents may create a new source of claims on a retrospective basis [½]

Claims farmers may encourage employees to revisit potential incidents at a later date [½]

There may be difficulties tracing employers or insurers [½]

Credit for other sensible examples but no double counting of the same example given from perspective of different stakeholders (e.g. employer and employee) (0.5 mark per point) [1]
 [9, max 4]
 [Total 10]

Overall this question was answered relatively well.

Part i was bookwork which was generally answered well.

Part ii was the only calculation type question on the paper and a small number of candidates made the calculation too complicated, and did not read the facts provided correctly. A number skipped the question entirely despite there being marks available for stating assumptions.

Part iii was answered less well and a number of candidates failed to generate a sufficient number of obvious reasons. The better candidates identified the key issues with reporting such claims and broke it down by delays due to employee and delays due to employer, as well as generic delays.

- Q6** (i) Assessing solvency capital requirements [½]
 Allocating the capital held between classes, products or policies for [½]
 ...performance measurement [½]
 ...pricing [½]

Subject ST7 (General Insurance: Reserving and Capital Modelling Specialist Technical)
– April 2018– Examiners’ Report

...business planning and strategy setting	[1/2]
Reinsurance purchasing	[1/2]
Strategic decisions (M&A, new products etc)	[1/2]
Asset allocation studies	[1/2]
Studies of enterprise level risks	[1/2]
...such as credit risk and operational risk	[1/2]
	[5, max 3]

(ii) *Methods*

Allocate using the same or different risk measure used in assessing the capital requirement.	[1]
Solvency capital requirement may be based on a target percentile in the tail of the underlying aggregate loss distribution...	[1/2]
but may allocate the diversified capital down to individual classes of business or products with reference to a lower percentile...	[1/2]
or with reference to various percentile-defined layers...	[1/2]
to prevent over-allocation to catastrophe-type business.	[1/2]
Marginal capital method (a “last in” method)...	[1]
...allocate the capital with reference to the marginal capital requirements of each segment.	[1/2]
 The Shapley method...	 [1]
...an extension to the marginal capital method based on game theory.	[1/2]
...Capital is allocated with reference to an average of the marginal capital requirements, assuming that the class under consideration is added to the overall portfolio first, second, third and so on.	[1/2]
...Shapley method can be unworkable in practice as the number of scenarios that needs to be run is the factorial of the number of classes...	[1/2]
...however, it can be used for a small number of classes.	[1/2]

Marks available for other methods (e.g. proportional method) with appropriate explanation / examples (1 per method / example) [3]

General Issues

Consider the use to which the results will be put...	[1/2]
...and desirable properties of the results, such as stability over time.	[1/2]
Not necessarily one method that is best suited in all cases.	[1]
Typically, compare the results from several methods of allocation and use judgement when recommending or setting the final allocation.	[1]
As the capital allocated includes a diversification credit, the diversification assumption for each class of business in this case would be implicit.	[1/2]

Important to distinguish between Total capital, Economic capital and Excess capital.	[1]
...We will normally allocate economic capital to each class of business in proportion to its contribution to the risk metric on a standalone basis.	[1/2]

..We may allocate the excess capital between classes of business pro rata to its risk-based capital or certain components of it, depending upon the purpose of the exercise.

[½]

[16, max 8]

[Total 11]

This was one of the worst answered questions on the paper.

Part i was bookwork which was generally answered well. It was surprising however that a number of candidates failed to identify 'assessing solvency capital requirements' as an example.

Part ii was generally poorly answered. Better prepared candidates described the different methods of allocation rather than the methods to set capital at a total level. Generally candidates did not consider a wider range of methodologies or did not explain them in an appropriate level of detail. A number of candidates could only come up with variations of a proportionate approach. Candidates often did not consider the general issues which might be encountered and there were a number of marks available for that.

- Q7** (i) To correct market inefficiencies and to promote efficient and orderly markets [½]
 To protect consumers of financial products [½]
 To maintain confidence in the financial system [½]
 To help reduce financial crime [½]
 [2, max 2]
- (ii) Achieves the principle objectives set out in (i) [½]
 Achieves appropriate balance between objectives [½]
 Achieves appropriate balance between interests of different market participants (e.g. not automatically in favour of consumer) [½]
 Cheap to administer [½]
 Easy to administer [½]
 Low as possible burden of regulation on market participants [½]
 Including on transactional costs [½]
 Encourages appropriate behaviours from consumers & insurers [½]
 Allows the insurance sector to grow sustainably and effectively [½]
 Does not introduce unreasonable barriers to entry [½]
 Does not cause viable businesses to fail unnecessarily [½]
 Is considered attractive to overseas policyholders [½]
 ... both on cost and protection grounds [½]
 Is recognised internationally [½]
 Easy for policyholders to get access to insurance [½]
 Achieves equivalence rights where available [½]

Does not deter talent from the insurance sector [1/2]

Other valid suggestion [1/2]

Other valid suggestion [1/2]

Other valid suggestion [1/2]

Other valid suggestion [1/2]

[10½, max 4]

(iii) The **purposes** of these approaches are listed in the sub-bullets.

- Restrictions on the type / amount of business a general insurance company can write / classes of business it is authorised to write. [1/2]

- Ensures companies have appropriate expertise/ sufficient capital to write the business classes. [1/2]

- Initial authorisation of new insurance companies. [1/2]

- Ensures companies have appropriate expertise / sufficient capital to write the business classes. [1/2]

- Limits on premium rates that can be charged. [1/2]

- Ensures premium rates are sufficient to meet future claims / ensure policyholders not overcharged. [1/2]

- Restrictions on information that may be used in underwriting and premium rating. [1/2]

- For ethical / anti-discrimination reasons. [1/2]

- The requirement to deposit assets to back claims reserves. [1/2]

- To ensure the company has sufficient funds to pay claims. [1/2]

- The requirement to maintain a minimum level of solvency. [1/2]

- To ensure if claims are significantly worse than expected the company will still remain solvent. [1/2]

- Restriction on the type or amount of certain assets allowed to demonstrate solvency. [1/2]

- To prevent high-risk assets from backing liabilities. [1/2]

- Restrictions on the currency, domicile and duration of assets allowed to demonstrate solvency (*or mismatching reserves*). [1/2]

Subject ST7 (General Insurance: Reserving and Capital Modelling Specialist Technical)
– April 2018 – Examiners' Report

- To ensure that assets match liabilities by term and currency so that short term changes in exchange rates will not have an impact on solvency margins. [½]
- The use of prescribed bases to calculate premiums, asset values and liabilities to demonstrate solvency. [½]
 - To ensure accurate / consistent estimates of liabilities and uncertainty. [½]
- Licensing agents to sell insurance and requirements on the method of sale. [½]
 - To ensure company has necessary expertise and that insured is well informed. [½]
- The requirement for risk-based capital calculations & ICA analyses. [½]
 - To ensure accurate estimates of liabilities and uncertainty. [½]
- Requirement to pay levies to consumer protection bodies. [½]
 - To protect policyholders and maintain faith in insurance market. [½]
- Legislation to protect policyholders should general insurance companies fail, e.g. Financial Services Compensation Scheme. [½]
 - To protect policyholders and maintain faith in insurance market. [½]
- Cooling off period, e.g. fourteen day cancellation rules on policies issued. [½]
 - To protect policyholders and promote confidence in the industry. [½]
- Regulations with respect to treating customers fairly. [½]
 - To protect policyholders and promote confidence in the industry. [½]
- Restriction on countries a general insurance company can write business in. [½]
 - Prevents exposure to volatile risks and unfamiliar legal systems and regulations. [½]
- Restrictions with respect to anti-competitive behaviour. [½]
 - Prevents formation of cartels, concentration of risk, and protects policyholders. [½]
- Requirement to file / publish premium rates before they can be used. [½]

- Prevents anti-competitive practices and therefore protects policyholders. [½]
- Mandatory restrictions on cover e.g. no deductible on EL. [½]
 - To protect policyholders and claimants and to ensure consistency of cover. [½]
- Requirements to offer cover e.g. even in high-risk flood areas / motor 3rd party liability. [½]
 - For social responsibility and helps economy as a whole. [½]
- Statutory requirement to purchase certain cover e.g. EL & Motor 3rd Party Liability. [½]
 - For social responsibility and helps economy as a whole. [½]
- Disclosure / transparency of reporting requirements. [½]
 - To help regulators, investors, capital providers and policyholders assess the soundness of the company. [½]
- Requirement for a Statement of Actuarial Opinion to be produced by an approved actuary. [½]
 - Promotes confidence in the level of reserves and helps to prevent the failure of a general insurance company [½]
- Requirements for management to be fit and proper. [½]
 - Promotes confidence in the industry and helps prevent fraud. [½]
- Restriction on the type of reinsurance that may be used. [½]
 - To prevent exposure to risky reinsurers or reinsurance products. [½]
- Restriction on discounting of liabilities and discounting rates that can be used [½]
 - To ensure consistency and that reserves are sufficient. [½]
- Prohibiting illegal products from being sold. [½]
 - To discourage illegal practices. [½]
- Requirement for general insurance companies to be audited. [½]

Subject ST7 (General Insurance: Reserving and Capital Modelling Specialist Technical)
– April 2018 – Examiners' Report

- To give regulators and investors confidence in the company and to prevent fraud. [½]
 - Requirement for data to be appropriately secured / protected. [½]
 - To protect stakeholders (policyholders, investors etc.) and to prevent fraud / discourage illegal practices. [½]
- [29, max 8]
[Total 14]

Overall this question was answered relatively well.

Part i was bookwork which was generally answered well.

Part ii caused candidates more problems than expected with the poorly prepared candidates repeating the same answers as for part i. A number of candidates listed restrictions rather than outcomes

Part iii was answered better with most candidates able to generate a number of points. There was a wide range of marks available and a few candidates wasted time by listing too many examples.

- Q8** (i) *Travel insurance*
- Chain ladder or other statistical method should be appropriate as main approach [½]
- ... as high volume & short tail [½]
- ...and likely to be stable claims development [½]
- Possibly supplement with claims view on any large medical claims [½]
- May need to adapt chain ladder for large claims distortions [½]
- Quarterly or monthly may be worth considering to manage seasonal distortions [½]
- [3, max 1.5]
- Commercial Property*
- Chain ladder for attritional claims [½]
- ... as short tail and may be of reasonable volume [½]
- ... large claims likely to be a major feature however so would either address with claims view or some kind of separate large claim projection [½]
- ... similar consideration of catastrophes / business interruption claims which are also likely to be a feature [½]
- [2, max 1.5]
- Commercial Motor*
- Chain ladder for attritional claims [½]
- Would need to project damage and injury separately (split into claim type or other perils) [½]

Again large injury claims likely to be a feature so would need separate treatment [½]
 May need to handle any PPOs separately with bespoke claims view [½]
 Could make adjustment for seasonality [½]
 Depending on maturity of account may need credibility for injury elements [½]
 [3, max 1.5]

Marine liability and property damage

Likely to need BF methods for both due to length of tail / size & complexity of claims [½]
 Should separate liability and property damage at the least [½]
 May well also subdivide into smaller marine classes, e.g. specie / cargo / hull / marine liability / energy liability [½]
 May be cover differences (claims made vs losses occurring) also worth separating for [½]
 Would again need to make separate allowance for large claims [½]
 [2.5, max 1.5]

Additional valid comments (e.g reinsurance, size or experience of company, data etc.) relevant across the portfolios or stated to be specific to an individual portfolio (½ mark per point) [2]

[12½, max 6]

(ii) *Overall company*

Best strategy for individual lines may not be optimal strategy for overall company, which will depend on a number of factors [½]

Marks available for listing appropriate factors (0.5 marks per factor) - examples include

- *risk appetite*
- *availability of capital*
- *relative size of portfolios*
- *experience and size of company*
- *relative risk or line profiles for different accounts*
- *market conditions for reinsurance etc.* [2]

Risk XoL

Travel Insurance - yes, e.g. for liability claims [½]
 Commercial Property - yes, e.g. for individual large claims, particularly if there is a relatively standard line deployment [½]
 Commercial Motor - yes, e.g. for large injury claims [½]
 Marine Liability & Property damage - yes, e.g. for individual large claims, may have varying limits for different elements (e.g. specie vs hull) [½]

Aggregate XoL

Travel Insurance - yes, e.g. for political / epidemic claims [½]

Subject ST7 (General Insurance: Reserving and Capital Modelling Specialist Technical)
– April 2018 – Examiners' Report

Commercial Property - yes, e.g. for events affecting properties in close proximity [½]
 Commercial Motor - yes, e.g. for pile-ups and/or weather related events [½]
 Marine Liability & Property damage - yes, e.g. for weather related events [½]

Catastrophe XoL

Travel Insurance - no, e.g. unlikely to be required [½]
 Commercial Property - yes, e.g. for earthquake depending on territories covered [½]
 Commercial Motor - yes, e.g. for weather related events [½]
 Marine Liability & Property damage - yes, e.g. for property elements of book depending on territories for weather related events [½]
 Higher level of cover than for Aggregate XoL so could purchase both where appropriate [½]

Surplus / FAC

Travel Insurance / Commercial Motor - no, large limits tend to be made available across all policies even if rarely triggered, so surplus or fac not appropriate [1]
 Commercial Property / Marine Property Damage - yes given heterogeneous risks, surplus is useful if there is significant variation in limits offered although Fac could be used to target more occasional large lines or to manage any overly aggregating exposures. [1]

Quota Share

Possible for each line of business [½]
 but better for homogeneous risks so for Travel Insurance and Commercial Motor [½]
 although may not have any real benefits as lines of business may not be capital intensive [½]

Other reinsurance

Financial Reinsurance - could be considered for solvency but unlikely [½]
 Stop Loss - unlikely to be useful for this portfolio [½]
 CAT products such as ILWs may be less useful due to basis risk [½]

Additional valid comments / detail (e.g reinstatements, PPOs, stability clauses, hours clauses etc.) provided appropriately related to a line of business and linked to a reinsurance type [2]

[16, max 10]

[Total 16]

Overall this question was not answered as well as expected given it is a relatively simple application of bookwork. Better prepared candidates were able to understand both the products and how they relate to reserves and reinsurance.

Part i caused problems for a few candidates who showed a lack of understanding of the risks for the products (particularly Marine Liability and Property Damage).

In part ii candidates failed to generate sufficient examples and simply repeated the standard set of reinsurance products in the notes. Few candidates mentioned overall company considerations. Not all candidates gave examples of claims / events that could be covered (even after mentioning the correct reinsurance and class). Better prepared candidates considered each type of reinsurance for each product and commented on what would and wouldn't be suitable.

- Q9** (i) Insurance is an arrangement whereby one party (the insurer), in consideration for a premium, agrees to indemnify another party (the policyholder who can be an individual or a company) against part or all of the liability assumed by the policyholder for a specified loss, damage or illness within a specified period. [1]
 Reinsurance is an arrangement whereby one party (the reinsurer), in consideration for a premium, agrees to indemnify another party (the cedant) against part or all of the liability assumed by the cedant under one or more insurance policies, or under one or more reinsurance contracts [1]
 [2, max 2]
- (ii) *Reporting delays*
- Claims reporting delays are longer for the reinsurer [½]
 ... Claim reporting delays for reinsurers are longer even for proportional reinsurances compared to the delays experienced by insurers. [½]
 ... reinsurance contracts typically require the insurer to report premiums and losses to reinsurers on a quarterly basis... [½]
 ...as a result the reinsurer may be notified of its claims under proportional covers up to a quarter of a year later than the insurer is notified. [½]
 ... In some cases the cedant may be required to provide details only of individual claims above a certain amount. [½]
 For excess of loss covers, the claims reporting delays are longer still, as it can take time for the insurer to recognise that a loss is large enough to be reported to the reinsurer... [½]
 ... particularly if the retention on the excess layer is high. [½]
 ... As a result of this, casualty reinsurers typically require the insurer to report claims when the incurred claim size exceeds half the excess retention. [½]
 For both proportional and non-proportional reinsurance, the reporting process can increase the delays. [½]
 ... The reporting process can involve the outwards reinsurance team at the insurer, the reinsurance broker, and the claims team at the reinsurer. [½]
 ... At each stage of this process, additional delays (e.g. adjusting and agreeing the claim) are likely to occur before the information finally reaches the reinsurer's claims systems. [½]

Data and system constraints

The information that a reinsurer receives about losses can have less detail than in the information that an insurer receives. [½]

... This is a bigger problem for proportional covers, where the insurer may report losses on an aggregate basis (or provide information only on claims in excess of an agreed amount to the cedant), on the same basis as the contract. [½]

... For example, for a quota share written on a risks attaching basis, the insurer may report aggregate paid and incurred losses to date, associated with risks written in the reinsurance policy period. [½]

If the reinsurer uses an accident year reporting basis for its accounts and regulatory returns, it must somehow split the risks attaching data supplied between accident years. [½]

Usually the insurer provides more information about losses to a non-proportional contract but even then, a reinsurer may need to spend a material amount of time and resource in requesting additional information which it feels that it needs to allocate and treat the losses appropriately. [½]

Where a reinsurance contract covers several lines of business, the loss data may show which losses are associated with which lines. But often the premium is allocated to the line according to a pre-agreed percentage split, perhaps based on the expected split of business when the contract was underwritten. [½]

... To the extent that this split differs from the actual mix of business or does not appropriately allow for different levels of risk between lines of business, the premium split may be inaccurate. [½]

... As premium (adjusted for rate changes) may be the only measure of exposure a reinsurer has, this can lead to a mismatch between exposure and losses in the reserving process. [½]

Because of the complexity and individuality of reinsurance risks, it is difficult for a reinsurer to have IT systems that capture perfectly all the contracts written and their key features. [½]

... It is more difficult than for an insurer, whose contracts tend to be more homogenous. [½]

... This makes storing and accessing accurate information harder for reinsurers. [½]

The actuary working for a reinsurer should be aware of the potential shortcomings of the data that (s)he is using. [½]

[1 ½, max 8]

- (iii) Greater tendency for claims to increase [½]
 - ... greater for non-proportional reinsurance particularly on liability classes due to liability amount disputes [½]
 - ... large claims have longer delays so more time for social and economic inflation to impact final amount [½]
 - ... tendency to underestimate legal costs and other direct claims handling costs for long drawn-out claims [½]

... although reverse can be true for property claims as initial estimates tend to be overcautious. [½]

Greater heterogeneity of exposure [½]

... Reinsurers may write a wide range of lines of business and a wide range of contract types with very different terms and conditions. [½]

... But most reserving methods are based on the assumption that risks are homogeneous; [½]

... and there are large data volumes, so that aggregate results are more stable. [½]

Sparse data [½]

... Particularly for high excess non-proportional business, there may be very few actual claims [½]

so the usual reserving data triangles may be very sparsely populated. [½]

This makes it difficult to determine reliable development patterns resulting in more volatile projections. [½]

Reduced applicability of industry benchmarks [½]

... Because of the heterogeneity of their exposures, different reinsurers can experience very different claims development behaviour. [½]

... This makes industry-wide benchmarks potentially less appropriate, particularly for smaller reinsurers writing business in very specific areas. [½]

... In any event, there are relatively few industry benchmarks for reinsurance claims development, particularly for non-proportional reinsurance. [½]

Data grouping for reserving [½]

... For a reserving exercise, we ideally subdivide loss and premium data into groupings that are as homogenous as possible, and still have enough data in any one group to be able to identify development patterns and so on [½]

... There are a large number of potential groupings: more than for a direct insurer and far more than the volume of data is likely to allow. [½]

... We need to make a compromise between homogeneity and data volumes. [½]

... We may do this by discussing it with underwriters and claims handlers and examining development patterns to find a grouping of categories that are expected to behave in similar fashion. [½]

Credit for other sensible comments (0.5 mark per point) [1]

[12, max 6]

(iv) *Property Treaty*

Typically all types of property treaty business (facultative or excess, catastrophe or per risk) considered to be shorter tailed... [½]

other than high excess property treaty (which might be treated more like casualty treaty) [½]

Use relatively straightforward reserving approaches, such as chain ladder [½]

... or expected loss ratio, using rate and inflation-adjusted historic loss ratios as a guide. [1/2]
The effort required for more complicated methods is unlikely to be rewarded with a materially different or more accurate end result. [1/2]
We may spend time and resources more productively in improving the analysis for other parts of the reinsurer's inwards business. [1/2]
The chain ladder approach may have the added benefit of being easier to extend to a stochastic approach to produce a distribution [1/2]
We should be careful with major catastrophe losses, particularly recent catastrophes. [1/2]
It may be best to exclude all major catastrophes from the main methodology, reserve for them separately and then add them back at the end of the process. [1/2]
We could use historical experience from other similar types of catastrophe as a guide to the likely future development of more recent events... [1/2]
... for example, US windstorms, US earthquakes, European windstorms, European floods etc. [1/2]
May review the development in finer detail for catastrophes, for example, looking at monthly or weekly development, rather than annual, to allow better for the time of year that the event occurred. [1/2]

Casualty Treaty

Typically all types of casualty treaty business treated as long-tailed reinsurance business (proportional casualty treaty, casualty excess treaty, casualty aggregate excess, casualty facultative) [1/2]
Commonly use chain ladder based methods... [1/2]
... usually in conjunction with the Bornhuetter-Ferguson, or Cape Cod approaches, [1/2]
... with separate treatment of major catastrophes. [1/2]
There could be reserving problems for new or recently established reinsurers, where the oldest development year is not yet mature... [1/2]
... a tail may need to be estimated based on analysis of case estimates and projected number of future claims [1/2]
... or a suitable benchmark if available [1/2]
Legislative / legal changes should be considered [1/2]

Incurred vs Paid Data

Incurred losses are the result of an aggregation of loss data from a number of different insurers [1/2]
... with slightly different reserving practices [1/2]
... which may have changed in the past. [1/2]
... and a reinsurer's pool of cedant insurers may change from year to year [1/2]
... so the incurred data for a reinsurer will be much less consistent than for a direct insurer. [1/2]

... the reinsurer's claims team would have to review all the losses submitted and adjust the data submitted to make the year-by-year and cedant-by-cedant data more consistent. [½]

... as a result, it is appropriate for a reinsurer to rely more on paid development-based reserves than incurred [½]

... because the payments depend less on individual insurers and more on legal process. [½]

Expected Loss Ratios

We may be able to use the target loss ratios from the pricing of the contracts. [½]

If we do not use these directly, we may combine the pricing loss ratios (perhaps using a credibility weighting) with inflated and rate-adjusted historic loss ratios, say, as an input into the process. [½]

Credit for other sensible comments (0.5 mark per point) [2]

Generally the most difficult question on the paper for candidates, as it required application of bookwork across different units.

Part (i) was bookwork which was generally well answered although a number of candidates unable to define the term "Insurance" well.

Part (ii) was generally poorly answered with a number of candidates unable to generate a breadth of valid points. The better prepared candidates clearly outlined the key differences without being repetitive.

Part (iii) was challenging as many candidates seemed to misread the question as "additional data and assumptions" and not "additional issues" so just listed multiple specific data points required for such an exercise.

Part (iv) was also not answered well as candidates did not explain the techniques for each product individually and papers suggested a struggle for time. Only better prepared candidates understood that property and casualty reserves need to be separately modelled and talked about Incurred vs Paid considerations and Expected Loss Ratio assumptions.

[17, max 8]

[Total 24]

END OF EXAMINERS' REPORT