INSTITUTE AND FACULTY OF ACTUARIES

EXAMINER'S REPORT

September 2011 examinations

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

Purpose of Examiners' Reports

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 who are 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. Although Examiners have access to the Core Reading, which is designed to interpret the syllabus, the Examiners are not required to examine the content of Core Reading. Notwithstanding that, the questions set, and the following comments, will generally be based on Core Reading.

For numerical questions the Examiners' preferred approach to the solution is reproduced in this report. Other valid approaches are always given appropriate credit; where there is a commonly used alternative approach, this is also noted in the report. For essay-style questions, and particularly the open-ended questions in the later subjects, this report contains all the points for which the Examiners awarded marks. This is much more than a model solution – it would be impossible to write down all the points in the report in the time allowed for the question.

T J Birse
Chairman of the Board of Examiners

December 2011

General comments on Subject ST7

Candidates who are well prepared generally appear to perform reasonably on ST7, with the more challenging questions tending to occur on SA3. Candidates should consider the following advice however (if they are not already):

- Lists are hugely valuable for breadth of point generation but candidates should always exercise judgement when applying them
- Calculation questions will come up on a regular basis with 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 and time period issues).
- 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.
- Candidates should aim to be able to give near exact glossary definitions as incoherent or vague descriptions will be marked harshly. 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.
- It is important to always read the question properly.

Comments on the September 2011 paper

This was a fairly standard paper and none of the questions should have been unexpected for well prepared candidates. Overall performance was in line with historical experience, with the capital elements of the paper tending to score lower than the reserving orientated sections.

Implementation of standard actuarial techniques and calculations was reasonable and in line with previous papers, although these are areas where candidates should be able to score more highly. It is hoped that candidates would tend to carry out these calculations far more successfully in normal circumstances with access to computers and without the pressure of an exam situation.

1 (i) The main risk is in having insufficient premium if any of the assumptions used in pricing are incorrect e.g. on depreciation of the car value or on appreciation of cost of new vehicle.

There may be a lack of underwriting at point of sale if policy sold in conjunction with purchase of car

There is moral hazard
e.g. there is no reason for the policyholder to argue over the amount payable on the comprehensive policy as he gets the total amount anyway possibly increasing the potential amount payable under the gap policy.
Or could drive less carefully

Also more incentive for false claims as more than replacement value received by policyholder.

Consider limiting top of gap to the original purchase price or other upper limit.

Or have an excess.

If car is bought second-hand the moral hazard may be considered to be too high
So should restrict the cover to new cars only

Could be disputes over amount payable if car is not standard i.e. has extras installed/ may not be available standard equivalent new model e.g. model discontinued.

Need to tighten the policy to state exactly what is covered and to ensure any conceivable circumstances are covered

Disputes could be reduced by specifying a list of allowable comprehensive insurers or that same company as the gap insurer is used

Could arrange that the gap insurer negotiates with the comprehensive motor insurer over amounts payable by each.

Other generic reasons why claims may be higher than expected as in motor insurance in general e.g. catastrophic events

A disappointing number of candidates were unclear on the differences between moral hazard and fraud. Few candidates stated the main risk of having insufficient premium if pricing assumptions are flawed, and fewer still pointed out that the insurance would only tend to be available for new cars.

(ii) UPR = unearned premium reserve

The amount set aside from the premiums written before the accounting date to cover risks incurred after that date.

AURR = additional unexpired risk reserve

The reserve held in excess of the UPR which allows for any expectation that the UPR will be insufficient to cover the cost of claims and expenses incurred during the period of unexpired risk.

This should have been a straightforward question earning nearly full marks for most candidates. Many struggled with clear definitions however, for example only defining unearned premium reserve as the reserve for premiums that are unearned. Some candidates even seemed unfamiliar with the concept of an acronym for example defining UPR as Unexpired Risk Reserve or AURR as Additional Unearned Premium Reserve.

Candidates should make sure that they are familiar with robust, glossary definitions particularly for key terms such as these. Where the question is easy and direct bookwork, examiners are far less forgiving of sloppy wording than they would be with more challenging application or higher order questions.

(iii) Original premium assuming initial car price A and probability of write-off each year is p:

Assuming compound interest

1st year gap: $Ap((1.05)^{0.5} – 0.9 \times (0.85)^{0.5}) = 0.1949Ap$

2nd year gap: $Ap((1.05)^{1.5} – 0.9 \times (0.85)^{1.5}) = 0.3706Ap$

3rd year gap: $Ap((1.05)^{2.5} – 0.9 \times (0.85)^{2.5}) = 0.5302Ap$

Premium, P = total = $1.0958Ap$

UPR after 2 years = $0.5302Ap$

UPR/P = 0.5302/1.0958 = 48.4%

URR = $1.2Ap((1.1)^{2.5} – 0.85 \times (0.8)^{2.5}) = 0.9390Ap$

AURR = URR – UPR = $(0.9390 – 0.5302)Ap = 0.4088Ap$

AURR/P = 0.4088/1.0958 = 37.3%

Alternatively, assuming simple interest

1st year gap: $Ap(1.025 – 0.9 \times 0.925) = 0.1925Ap$

2nd year gap: $Ap(1.075 – 0.9 \times 0.775) = 0.3775Ap$

3rd year gap: $Ap((1.125 – 0.9 \times 0.625) = 0.5625Ap$

Premium, P = total = $1.1325Ap$

UPR after 2 years = $0.5625Ap$

UPR/P = 0.5625/1.1325 = 49.7%

URR = $1.2Ap(1.25 – 0.85 \times 0.5) = 0.99Ap$

AURR = URR – UPR = $(0.99 – 0.5625)Ap = 0.4275Ap$

AURR/P = 0.4725/1.1325 = 37.7%

Most candidates struggled with this question and some did not even attempt it. Of those that did, many ignored the information provided about timing of write-offs. Others assumed that the risk was even each year, in spite of this clearly not being an appropriate assumption.

2 (i) *Claim cohort*
A group of claims with a common period of origin.

The period is usually a month, a quarter or a calendar year.

The origin varies but is usually defined by the date of a claim event
…or the date of reporting of a claim
…or the date of payment of a claim
…or the date when the period of cover to which a claim attaches commenced.

(ii) Positions in annualised triangle

- Accident year basis: Smith: b_{32}; Matiza: b_{42}; Shah: b_{33}
- Underwriting year basis: Smith: b_{32}; Matiza: b_{42}; Shah: b_{24}
- Reporting year basis: Smith: b_{41}; Matiza: b_{42}; Shah: b_{42}

(iii) Collapsing quarterly triangle

- $b_{41} = a_{11} + a_{12} + a_{13} + a_{14} + a_{21} + a_{22} + a_{23} + a_{31} + a_{32} + a_{41}$
- $b_{42} = a_{15} + a_{16} + a_{17} + a_{18} + a_{24} + a_{25} + a_{26} + a_{27} + a_{33} + a_{34} + a_{35} + a_{36} + a_{42} + a_{43} + a_{44} + a_{45}$
- $b_{51} = a_{51} + a_{52} + a_{53} + a_{54} + a_{61} + a_{62} + a_{63} + a_{71} + a_{72} + a_{81}$

(iv) *Quarterly vs annual triangles*

- Claim volumes – annual claims are relatively unstable with low volumes but this is exacerbated for quarterly claims.
- The purpose for which reserving is being done
- Class of business
- ..which will impact stability of claims development patterns: if unstable then quarterly projections will be more difficult and may give a spurious level of accuracy.
- ..which will also impact seasonality of claims;

…projecting by accident quarters will enable analysis of trends in quarters from year to year and allow for heavier development or loss ratios in some quarters,
e.g. Q4 and Q1 might have worse experience than Q2 and Q3 due to accidents caused by cold weather for some classes.

- Frequency of reserve reviews or if how done in the past
  if quarterly, then it may be easier to work with quarterly triangles and development patterns rather than rebase the diagonals of the annual triangles each quarter or try to derive factors to gross up the leading diagonals.

- It will be easier to monitor emerging experience each quarter (actual versus expected) against budget if we project quarterly triangles.

- Whether there is a need to identify or eliminate distortions that may have occurred in a particular calendar quarter without discarding the whole calendar's year worth of data e.g. due to special case reserve review.

- Ability to spot or confirm trends over time: 3 years of increasing factors in the annual triangle could be coincidental, but 10 (say) out of 12 quarters of increasing factors probably indicates a trend.

- Availability of data: if reserve reviews used to be done annually, there may not be quarterly data available going back.

- Other practical constraints such as flexibility of software, time available.

- It is possible to use triangles prepared with quarterly developments but with annual cohorts (accident/underwriting years) or vice versa.

- Also may consider projecting quarterly accident/underwriting periods for more recent accident/underwriting years but keeping with annual projections for older more mature years.

- Year end data may be more accurate as more extensively audited so that quarterly development data may be misleading.

This question was generally well answered, although unfortunately candidates who attempted more elegant solutions in part (iii) tended to score worse than those who adopted the simple but time consuming approach.

3 (i) *Benefits provided by employers' liability insurance*

- This insurance indemnifies the insured
- against legal liability
- to compensate an employee or his or her estate
- for bodily injury, disease or death suffered

- owing to negligence of the employer
- in the course of employment.

- Loss of or damage to employees' property is usually also covered.
- Normally high levels of indemnity are provided.

- The benefit can be in the form of regular payments to compensate for disabilities that reduce the employee's ability to work
- lump sum payments to compensate for permanent injuries to the employee

- and benefits under the legal framework.
- Legal costs will also be covered.
- Other costs such as care costs can also be included.

A generic bookwork question generally well answered.

(ii) Average date of accident for policies incepting during 2010

- Assume policy terms of one year.
- Assume risk spread evenly/ claims occur regularly throughout policy year.
- Assume no bias in policy exposure levels for different inception dates.

Month	*No. policies incepting on 1st of month*	*Average accident date (months from start of year)*	*Product*
Jan	5,000/2 = 2500	0 + 6 = 6	15,000
Feb	2,500/11 = 227.27	7	
March	227.27	8	
April	227.27	9	
May	227.27	10	
June	227.27	11	
July	227.27	12	
August	227.27	13	
September	227.27	14	
October	227.27	15	
November	227.27	16	
December	227.27	17	
			= 12 × 2,500 = 30,000
Total	5,000		45,000
Weighted average		= 45,000/5,000 = 9	

So average date of accident is 1 October 2010

But simpler answer is:
Policies incepting 1 January:
Number of policies = 2,500
Rest of policies:

Number of policies = 2,500
Average date of inception = 1 July
Overall, average date of inception = 1 April
So average date of accident = 1 April + 6 months = 1 October 2010

A disappointing number of candidates made entirely avoidable errors with basic sums (for example, assuming that 1 September was 9 months from 1 January). Few candidates identified the simple approach provided above, although this should have been readily obvious to anyone used to solving problems. Most used the more cumbersome method correctly, although some candidates seemed to take an accident year perspective and assume that there was no exposure after 31 December.

(iii) Why the average date of notification is likely to be significantly later

- Employers' liability cover often gives rise to long tail claims caused by exposure to harmful substances or conditions.

- Impact of exposure to these harmful substances or conditions may take time to manifest.
- E.g. impact of asbestos may not manifest for 30 or 40 years.

- With long manifestation periods, it may take time to establish the period of exposure
- and hence who the insurer was at that time, particularly if records have been destroyed, therefore delaying notification to the insurer.

- Even accidents in the workplace may not be reported immediately to the insurer if the employee or employer did not realise the seriousness of the accident.
- E.g. employee may start having neck injuries a few weeks after a fall at work.

- Policies may be written through brokers or handled by third party administrators, who may delay notifying to the insurer or wait to submit block notifications.

- There may be (retroactive) changes in legislation or new court judgements.

- Claim farming/ advertisements seeking possible claimants can be responded to some time after the relevant incident

This was again badly answered. Postal delays and seasonal effects are unlikely to be material issues but seemed to receive more attention than some of the obvious issues. Many candidates simply offered "latent claims" as a cause of notification delays, this is a categorisation of claims that have significant notification delays, not a cause of delay.

4 (i) *Supervision of investment policy*

Restrictions on the amount of certain types of assets that can be taken into account when assessing solvency.
Encourages liquidity and reduces risk that liabilities won't be met as they fall due.

Requirement to hold mismatching reserves.
Or to use ALM/ physically match assets and liabilities/ hold sufficient cash to pay large claims
Provides incentives to insurers to match their assets with their liabilities and removes risk that liabilities won't be met as they fall due.

Restrictions on holding some foreign securities…
or requirement to hold government securities
Each for political reasons

Some restrictions are placed on insurers for particular product lines …
or at certain stages of development.
There may be more restrictions in the situation where an insurer is in difficulty, having breached or being in danger of breaching regulations.
…Custodianship of assets
…Prevention from holding certain assets
…Prescription to hold certain assets

Any other valid point

(ii) *Supervision of underwriting policy*

Restrictions on the type/ /classes of business it is authorised to write.
Amount of business a general insurance company can write
Ensuring companies have appropriate expertise/
…Sufficient capital to write the business classes.

Limits on premium rates that can be charged.
Ensures premium rates are sufficient to meet future claims/ ensure policyholders not overcharged.

Restrictions on information that may be used in underwriting and premium rating.
For ethical / anti-discrimination reasons.

Licensing agents to sell insurance and requirements on the method of sale.
To ensure agents have necessary expertise and that insured is well informed.

Cooling off period, e.g. fourteen day cancellation rules on policies issued.
To protect policyholders and promote confidence in the industry.

Regulations with respect to treating customers fairly.
To protect policyholders and promote confidence in the industry.

Restriction on countries a general insurance company can write business in.
Prevents exposure to volatile risks and unfamiliar legal systems and regulations.

Restrictions with respect to anti-competitive behaviour.
Prevents formation of cartels, concentration of risk, and protects policyholders.

Requirement to file / publish premium rates before they can be used.
Prevents anti-competitive practices and therefore protects policyholders.

Mandatory restrictions on cover e.g. no deductible on EL.
To protect policyholders and claimants and to ensure consistency of cover.

Requirements to offer cover e.g. even in high-risk flood areas / motor 3rd party liability.
For social responsibility and helps economy as a whole.

Statutory requirement to offer certain cover e.g. EL & Motor 3rd Party Liability.
For social responsibility and helps economy as a whole.

Prohibiting illegal products from being sold.
To discourage illegal practices.

Generally well answered (again a relatively standard bookwork question), although many candidates did not seem to notice that the question asked for "purposes" as well.

5 (i) *Assume:*
No cancellations/changes to cover after inception
Exposure is level within each year for all three risks

Bigtown Metro
9.5 then 8.5 years of exposure remaining, level risk profile
09 UPR = (9.5/10) × 50m = \$47.5m
10 UPR = (8.5/10) × 50m = \$42.5m

Mega Power Plant
Risk Pattern \$10m exposure from years 1–6 then \$40m in year 7
6 then 5 years of exposure remain
UPR 09 = 10m+10m + 10m + 10m + 10m + 40m *or 100 – 10* = \$90m
UPR 10 = 10m+10m + 10m + 10m + 40m *or 100 – 20* = \$80m

City Mall
Yr 1: 1/7 of risk; Yr 2: 2/7 of risk; Yr 3: 4/7 of risk
2.75 then 1.75 years of exposure remaining
09 UPR = ((0.75 × (1/7)) + (2/7) + (4/7)) × 30m = \$28.929m
10 UPR = ((0.75 × (2/7)) + (4/7)) × 30m = \$23.571m

Total 09 UPR = 47.5m + 90m + 28.929m = $166.429m
Total 10 UPR = 42.5m + 80m + 23.571m = $146.071m

Generally well answered, although some candidates did not do the final calculations of total UPR by year in spite of the question specifically requesting this.

(ii) *Assumptions:*

Investment Income is based on the average of the assets held at the beginning and end of the year.
The small contract engineering premium is written evenly throughout the year.

Small premium contracts are annual
No reinsurance is purchased.
The expected loss ratio for the large contracts is correct.
The outstanding claims reserve includes IBNR, IBNER etc.
No AURR.
Risks are uniform and claims are incurred exactly matching the earned premium patterns for large and small claims

Earned Premiums:
Small: 50,000/2 + 60,000/2 = 55,000
Large: 166,429 –146,071 = 20,357 (from part (i))
Total: 55,000 + 20,357 = 75,357

Incurred Claims:
Small: (40% × 55,000) + (75% × 60,000) – (75% × 50,000) = 29,500
Large: 65% × 20,357 = 13,232
Total: 29,500 + 13,232 = 42,732

Expenses & Acquisition Costs:
Small: (25% × 60,000) + (10% × 55,000) + (5% × 29,500) = 21,975
Large: (10% × 20,357) + (5% × 13,232) = 2,697
Total: 21,975 + 2,697 = 24,672

Increase in DAC:
Small: (25% × 60,000/2) – (25% × 50,000/2) = 1,250
Large: 25% × (146,071 – 166,429) = (5,089)
Total: 1,250 + (5,089) = (3,839)

Underwriting Profit:
75,357 – 42,732 – 24,672 + (3,839) = 4,113

Reserve Calculations for investment income
UPR (net of DAC)@ 31/12/09
Small: (1–25%) × 50,000/2 = 18,750 or 25,000 – 6,250
Large: (1–25%) × 166,429 = 124,821 or 166,429 – 41,607
Total: 143,573

UPR (net of DAC)@ 31/12/10
Small: (1–25%) × 60,000/2 = 22,500 or 30,000 – 7,500
Large: (1–25%) × 146,071 = 109,554 or 146,071 – 36,518
Total: 132,054

OCR @ 31/12/09
Small: 75% × 50,000 = 37,500
Large: 25% × (180,000-166,430) = 3,393
Total: 40,893

OCR @ 31/12/10
Small: 75% × 60,000 = 45,000
Large: 25% × (180,000 – 146,071) = 8,482
Total: 53,482

Investment Income on technical reserves:
5% × (184,464 + 185,536)/2 = 9,250
(Other formulae are allowable for investment income here and on shareholders' fund, if reasonable)

Insurance Profit:
4,113 + 9,250 = 13,363

Calculation of shareholders funds at 31/12/10
Total assets 31/12/09 = 40,893 + 143,571 + 30,000 = 214,464
Sh Funds 31/12/10 = 214,464 – 132,054 – 53,482 = 28,929

Investment Income on shareholders' funds:
5% × (30,000 + 28,930)/2 = 1,473

Pre-Tax Profit:
13,363 + 1,473 = 14,837

Tax:
30% × 14,837 = 4,451

Dividends:
2,000 (as 25% of post tax profit is greater)

Retained Profits:
14,837 – 4,451 – 2,000 = 8,386

Candidates should be well prepared for balance sheet preparation questions, although few managed to answer this question fully. Many candidates made calculation errors, omitted key items such as acquisition expenses, or simply made unreasonable assumptions such as assuming outstanding claims for large contracts to be zero.

(iii) Loss ratio = claims incurred/earned premium
= 42,732/75,3657= 56.7%

Expense ratio = expenses/written premium
= 24,672/60,000 = 41.1%
Operating ratio = loss ratio + expense ratio
= 56.7% + 41.1% = 97.8%

Alternatively:
Expense ratio = expenses/earned premium
= 24,672/75,357 = 32.7%
Operating ratio = loss ratio + expense ratio
= 56.7% + 32.7% = 89.4%

This was not even attempted by a number of candidates.

(iv) The companies may have a very difference mix of business…
...e.g. writing different small/large contract split or different territories.

The companies could have different reserving philosophies…
…one company may reserve on a best estimate basis while the other may be more prudent.

Asset valuation or measurement of investments returns could be different/ other capital considerations

One year of ratios is insufficient to draw meaningful comparisons…
…there may be unusually large losses or one-off operational issues distorting the comparisons.

The nature of the companies could be very different…
..the other could be larger writing a number of lines of business
..or the distribution channels could be different and hence expenses could be very different.

The two classes could have different reinsurance arrangements (company A's small contract premiums are stated to be gross of reinsurance; no information given for B)

There could have been an error in the calculation/extraction of the loss ratios for the comparison company.

Any sensible comment on the figures given for B compared with those derived for A
and the possible limitations involved.

This was generally badly answered, although candidates should be expecting questions of this type.

6 (i) (a) *Copulas/diversification*

Copulas are mathematical relationships between individual and joint distributions
..that can be used to allow for diversification in a capital model.

Advantages
Copulas allow for non linear dependency such as stronger correlation in the tail
..which is often the case in reality (e.g. reinsurer default and catastrophe losses).

Disadvantages
Mathematics is complex so they can be difficult to explain
..can be difficult to estimate parameters from data.
Therefore may be useful to test if copulas make significant difference to justify additional complexity.

(b) *Fixed percentage for operational risk*
Operational risk is the risk of loss resulting from inadequate or failed internal systems, people or processes.
It can be estimated using scenarios based upon the company's risk register.

Advantages
A full assessment of operational risk requires significant input from across the business (i.e. time and resource) so there could be short term savings.
Operational risk assessment can be very subjective so a proportional method may be justified.

Disadvantages
Using a percentage load will not consider the unique risk characteristics of the business.
A percentage load would presumably have to be prudent and hence may increase capital requirements
There would need to be a modelling exercise to determine the appropriate percentage in any case.
It will not demonstrate that the business has undertaken a full assessment of its operational risks.
This is a particular issue under Solvency II.
Therefore it is not appropriate to use such a method (and regulator is unlikely to approve).

This was one of the lower scoring questions, most likely reflecting the weighting of candidates towards reserving rather than capital work. A number of candidates seemed to simply not understand either copulas or operational risks; although they may not have

encountered these in their professional lives they are not obscure concepts and candidates should have a reasonable level of awareness.

(ii) (a) *New line of business/ profit commission*

All risk types would be expected to show some form of increase as additional exposures are being taken on.
Insurance risk could increase more significantly
..as a new product so more uncertainty as to adequacy of pricing etc.
Profit commissions tend to act in a non-linear fashion and significantly reduce diversification benefits as majority of excess profits are ceded so increase is likely.
Conversely, as a new line of business this could increase diversification
Increased operational risk
…Any reasonable example of operational risk

(b) *Removing lower working layers of reinsurance*

Reduced counterparty credit risk
..as will be assuming lower level of reinsurance recoveries.
Increased insurance risk
...as net of reinsurance claims severity and volatility will increase
...depending on the effectiveness of reinsurance programme.
Large insurer so removal of lower layers should have limited impact.
Partly offsetting will in theory be ceding less profit to reinsurer
...so secondary effect could be higher market risk as more assets to invest given that RI premium outgo is well in advance of recoveries.
Potential liquidity risk increase.

Again this was a lower scoring question. Some candidates did not seem to understand how profit commissions work. Candidates also often failed to give the names of the risk types impacted.

(iii) **Advantages**

Suggestion could possibly save costs as:
Company may be struggling to recruit and retain specialist staff.
Capital modelling packages can be very expensive.
Capital models usually require good IT infrastructure (e.g. plenty of server space) which the company may not have.
Using a consultant could give the company access to benchmark information that improves model verification.
Or greater external expertise and market awareness.
The company could also benefit from the provider's expertise
Frees up resources which could be used more profitably elsewhere

Disadvantages
Many regulatory regimes require that company's models satisfy "use test"...
...difficult to prove embedded in organisation if development is very heavily outsourced.

The capital model may be used for other purposes (e.g. RI optimisation) – difficult to do this easily if the model is outsourced.
Could be difficult to get a very fast turnaround at important times, such as when testing different business plans.
Management may not be comfortable with large amounts of sensitive information (e.g. future business plans) going outside the company.
Outsourcing fees may be high..
The company should have better knowledge of the business being written
The outsourcing company may get the model wrong and this may not be obvious to the company
The company will still need to use internal resources to provide the data and challenge the results.

This question was reasonably well answered.

7 (a) **Proportionality and practicability**

Some risks will be less material than others or other sensible comment on materiality..
We should use our professional judgement to decide how best to approach the modelling exercise.
For many reasons, including limited resource, time constraints or materiality, a complex stochastic model may not be the most appropriate solution.
Lack of data may limit the level of detail or accuracy with which we may model other risks.
The size of reserves for a particular portfolio would usually be a good starting point for deciding upon the level of detail for modelling the relevant capital requirements.
Very small or unusual classes may require a more pragmatic approach that does not require large volumes of data.
It is important to realise that some groups that might appear small (e.g. in terms of premium and/or past claims) may actually have large underlying exposures
and hence might need more analysis than might be suggested by merely looking at the level of premiums and/or claims.

(b) **Reinsurance**

We could model the capital requirement of a particular portfolio on a gross basis with explicit allowance for reinsurance...
….or on a net basis where we consider the liabilities net of reinsurance; that is, we make an implicit allowance.
When we consider the risks in the tail of the relevant distribution, we must consider the possibility of exhausting available reinsurance protection and the contingent cost of any reinstatement premiums.
In general, it is better to model gross claims and reinsurance recoveries separately so that we can accurately model reinsurance limits and so on, and the risk of reinsurer default.
If we only model net liabilities, it is very difficult to allow accurately for counterparty credit risk and the net impact of varying claim experience.

We should consider the credit risk associated with potential reinsurance recoveries
…. in particular the situation following a large catastrophe when reinsurers are likely to have significant claims on their resources.
If the reinsurance treaty protecting a particular portfolio is not on a risks-attaching basis, there will be an additional pricing risk associated with the cost of renewing the treaty. We should consider the potential inability to renew a treaty.

Both sections of this question were relatively low scoring,, seemingly largely due to a failure to read the question and adapt their answers to the specifics of the question.

END OF EXAMINERS' REPORT