

EXAMINERS' REPORT

April 2010 Examinations

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

Introduction

The attached subject report has been written by the Principal Examiner with the aim of helping candidates. The questions and comments are based around Core Reading as the interpretation of the syllabus to which the examiners are working. They have however given credit for any alternative approach or interpretation which they consider to be reasonable.

R Muckart
Chairman of the Board of Examiners

July 2010

Comments

Individual comments are shown after the solutions to each part question that follows

1 Underwriting

Pricing and Selection of risks
Monitoring accumulations
Monitoring growth/profitability

Possible purchasing of outwards R/I
Identifying improvements e.g. new rating factors
Identifying evidence of selection
Monitoring underwriting controls
Setting terms and conditions (including limits, deductible and excesses)
Setting underwriting strategy/producing underwriting manual
Any other reasonable suggestion

Claims Manager

Processing and settling claims
Estimating the cost of individual claims
Control overall cost of claims
Satisfying needs of customers
Apply appropriate claims management practices
Identify and reduce fraudulent claims
Ensuring timely review of case estimates
Any other reasonable suggestion

Reserving Manager

Recommend “best” estimates of reserves
Produce/sign off statutory actuarial opinions
Recommend published reserves (if different)
Quantifying reserve uncertainty
Any other reasonable suggestion

Comments on Q1: *Attempts were generally satisfactory. Many candidates did not get the right balance between providing a general description of what the departments did and focussing on the managerial role. A number of candidates were unable to state the aspects of the 3 roles.*

2 (i)

The reinsurance to close (RITC) principally of a Lloyd's syndicate...
...is the premium paid or the process to transfer liabilities in order to close an open underwriting year.
Usually at the end of a three year period,
the managing agency estimates outstanding liabilities
...and reinsures them into the subsequent open year of that syndicate.
Alternatively the RITC may be paid into another syndicate or a special Lloyd's subsidiary.

Comments on Q2(i): *Generally well answered.*

(ii)

The types of business often written by Lloyd's syndicates include specialist liability and other classes that can take some time until a clear estimate of claims cost is known.

It reflects the possible different membership of the underwriting years

...and enables participants to enter and leave the market or liability

...by distributing profits and losses at the end of three years

Premium can take longer than a year to be received and accounted for, particularly if it is being written through binding authorities.

Comments on Q2(ii): *Many candidates made the point about the difference in ownership although fewer commented on the significant amount of long tailed business in the Lloyd's market for which it would be difficult to estimate a result after one year.*

(iii)

Premium Trust Funds (PTF's) are the premiums and other monies that members receive in respect of their underwriting at Lloyd's.

These are held by managing agents to meet liabilities as they arise.

Funds at Lloyd's (FAL) are the capital fund of a member, specified by Lloyd's.

It is held in trust by Lloyd's who have the authority to use it to meet liabilities should the PTF be inadequate.

The central assets, including the New Central fund (NCF), are held by Lloyd's in aggregate to demonstrate overall solvency.

If a member's FAL proves inadequate, these assets can be used to pay claims.

Comments on Q2(iii): *A number of candidates were unable to identify correctly the three different funds*

3 Data Limitations/Errors

Company has only been writing business for three years so limited own experience from own business.

There may be distortions or omissions in the data, particularly as small company writing long tailed business.

Simulation Error

1,000 simulations are too low – ideally at least 10,000 simulations should be run.

Parameter Error

There will always be a certain degree of uncertainty that the parameters reflect real life.

Therefore there will be significant subjectivity in parameter selection, eg future court award inflation.

Uncertainty at Extreme Values

Liability business can give rise to very large losses that occur rarely so will be limited data to fit the tails of the distribution.

Model Error

The model may have been structured incorrectly so doesn't represent the underlying risks.

Choice of model for a particular risk can be very subjective, particularly due to the change in legislation.

Programming Error

Mistakes may be made when constructing the model particularly as the process is new to the company.

Incorrect Dependencies

The correlations between the different components of the model may not be estimated correctly.

Process Error

Given the model is stochastic, the future outcome will be uncertain even if the model chosen is perfect.

Other reasonable error (e.g. systemic)

Reasonable description

Comments on Q3: *Candidates who based their answers on the core reading scored well. The best candidates also brought in relevant factors from the information provided in the questions and scored close to full marks. However, many candidates lost marks for not explicitly stating the particular error. Marks were not awarded for describing broader risks such as operational and insurance risks or by dwelling on assumptions in parameter estimation.*

4 (i)

Tax treatment of different investments.

Relative net rates of return and riskiness of different investments

Economic outlook

Ethical considerations as certain investments may generate bad publicity or campaigns from consumers/pressure groups

Statutory valuation requirements

Solvency requirements beyond statutory minimum (to avoid regulatory intervention)

Rating agency requirements/ pressure to maintain a particular rating

Competition – strategy followed by other insurers

Regulatory constraints e.g., eligibility of assets for regulatory solvency

Market (shareholder) expectations of a particular return on capital

Stage of underwriting cycle may require a more cautious strategy

Asset availability in the market

Legislative developments

Accounting standards

Comments on Q4(i): *Standard bookwork that was generally answered well.*

(ii)

Company in run-off so has no ongoing premium income to fund current liabilities
...therefore will need to ensure appropriate liquid assets are available to meet these liabilities.

Expenses and overheads will become more significant as the business runs off

Company will maximise investment return subject to meeting its risk appetite

The level of mismatching possible will be subject to free reserves

Many claim payments are likely to be in US Dollars so need to ensure appropriate matching by currency.

Liabilities are likely to be long tail as disease claims are subject to many delays in both manifestation and litigation.

..so longer term assets may be an appropriate match for these liabilities.

The claims are likely to be subject to material levels of inflation.

Can be some large settlements agreed to major assureds so need to ensure that appropriate liquid assets are available to take advantage of these.

Company is small so wouldn't expect significant investments in equity and property

Consider relatively straight-forward (or outsourced) portfolio as less expertise may be available in-house to manage investments as the company is likely to be winding down staff numbers as has been in run-off for some time.

Small company will need to adhere to any investment policies that are set by the group

Extent of any additional funds that are available to the small company from the group

Knock on effects on the group position (e.g. tax efficiencies, diversification)

Extent of reinsurance in place

APH reserves are usually discounted so need to ensure that return from investment portfolio continues to supports discount rate chosen (or amend discount rate to reflect investment return achievable).

Comments on Q4(ii): *Those candidates who tailored their responses to the company described in the question scored well. A number of candidates seemed to misunderstand the meaning of "run-off" and talked about the future premium income stream of the small company.*

5 (i)

$$\text{RoC} = \frac{\text{Return on Equity} + \text{Return on Debt}}{\text{Total Equity} + \text{Total Debt}}$$

$$= \frac{\text{Projected Earnings in 2009} + \text{Return on Debt in 2009}}{\text{Average (Shareholders Equity at start and end of 09)} + \text{Total Debt in 09}}$$

$$= \frac{\text{Number of shares} \times \text{EPS 09} + \text{Debt interest 09}}{\text{Average (Shareholders Equity at start and end of 09)} + \text{Total Debt in 09}}$$

$$\begin{aligned}
 &= \frac{(20.4 / (61.78 / 1000,000)) \times 7.68 / 1,000,000 + 0.175}{(16.2 + 16.7) / 2 + 2.5} \\
 &= \frac{2.536 + 0.175}{16.45 + 2.5} \\
 &= 14.3\%
 \end{aligned}$$

(ii)

$$\begin{aligned}
 \text{Projected earnings for 2010} &= \text{Number of shares} \times \text{EPS}_{10} \\
 &= 330,204 \times 7.55 = \text{£}2,493,040 = \text{£}2.493\text{m}
 \end{aligned}$$

$$\begin{aligned}
 \text{Projected shareholder's equity for the end of 2010} &= \text{shareholder's equity at end of 2009} + \text{projected earnings for 2010} - \text{dividends paid out in 2010.} \\
 &= 16.7 + 2.493 - (330,204 \times 1.06 / 1,000,000) \\
 &= \text{£}18.843\text{m}
 \end{aligned}$$

$$\begin{aligned}
 \text{RoC for 2010} &= \frac{2.493 + 0.175}{(16.7 + 18.843) / 2 + 2.5} \\
 &= 13.2\%
 \end{aligned}$$

(iii)

$$\text{RoC for 2009 U/W year is average } (14.3 + 13.2) = 13.75\%$$

This assumes that the earnings pattern is uniform over the calendar year
and that the business is written uniformly over the calendar year
and that policies are annual

(iv)

Whether the 20 reinsurers are writing similar business to that which is being ceded

Whether the 20 reinsurers are based in the same territory as the off-shore subsidiary

Whether the RoC formula used by the actuary for the inter-quartile range is the same as the one that XYZ have used e.g. including debt in the calculations

Whether the accounting figures are based on company holding figures or more appropriately entity specific returns

Whether XYZ has also assumed that the business written and earnings pattern is even throughout the calendar year

Whether the returns for the inter-quartile range and XYZ's RoC are both net/gross of tax

Similarly, whether the returns are gross/net of overheads and investment return

What the EPS includes/excludes e.g. one-off exceptions and whether this is consistent with the returns used by XYZ

Similar reserving basis (eg levels of prudence)

The basis assumptions in the financials may vary

E.g. currency (*or another appropriate example*)

6

(i)

risk definition and details of cover

case reserve estimates

status of present record

dates of claims

start/end date of policies (*or another date example*)

relevant amounts and currencies (*exposure, sums insured, premiums, claims payments, etc.*)

currencies of claims

administrative details

history of past policy and claims records

link to relevant policy record

reinsurance recoveries triggered

type of claim

any other relevant details

(ii)

Information could be entered onto the wrong claim record

The claim and policy numbers should both be in series such that mistakes are difficult to make

It should not be possible for a policy number also to be a claim number

Information could be entered against the wrong policy record

The system should refer to the corresponding policy record and verify the existence of cover

Other details, such as policyholder surname, deductible, should be checked against the information on the policy record

A claim may be entered for an incorrect claim date

The system should automatically check that the policy was on-risk on the day when the claim occurred

The system should automatically check that the date of loss is before the date reported

A payment may be entered for an incorrect date

The system should automatically check that the payment date is after the date reported

The system should automatically check that the payment date is after historical payment dates shown

Incorrect amounts may be entered, or correct amounts in the wrong currency

There should be some check on amounts. Very large or small claims should be queried if entered. This is especially important if working in a variety of currencies

A query should be raised if an amount is entered in a different currency from previous entries

A query should be raised if the claim is not in the currency of the country of the address of the policyholder (this will not apply for marine insurance, travel insurance and some other classes)

A claim may be entered for an incorrect claim type

A query should be raised for open/closed claims if there is a zero/non-zero case estimate amount respectively

A query should be raised for re-opened claims if there is no claims history of the claim ever being in “closed” status

A claim may be entered for an incorrect case estimate

The fact that paid + estimated outstanding < sum insured, should be checked against the information on the policy record

Information may be missed out

A claim should not be accepted until all fields have been filled in, possibly with null entries

Any other reasonable suggestion

With appropriate procedure

Comments on Q6(ii): *The candidates that scored best on this question clearly stated the possible errors and then considered possible solutions for each of them rather than adopting a disjointed approach. More examples of checks could often have been given.*

7 (i)

Insurance companies do not normally fail because of one issue but more commonly as a result of a combination of issues

It is normally poor management plus one or more of the following

Insufficient reserves

Rapid growth

Selling insufficient business

Poor underwriting

Liquidity

Under-pricing

Economic Environment

Fraud

Asset risks

Catastrophe losses

Inadequate allowance for significant change in mix of business

Impaired affiliate / parent

Reinsurance failure

Event causing damage to reputation

Inadequate internal controls and data

Latent claims

Investment failure

Any other reasonable suggestions

Comments on Q7(i): *Candidates generally answered this question well. Strong candidates managed to pull together ideas from across the core reading to come up with a wide range of possibilities.*

(ii)

Restrictions on the type of business that a general insurer can write or classes for which the insurer is authorised.

Restriction on countries a general insurance company can write business in.

Initial authorisation of new insurance companies.

Limits or controls on the premium rates that can be charged.

A requirement to deposit assets to back claims reserves.

A requirement that the general insurer maintains a minimum level of solvency, measured in some prescribed manner.

The requirement for risk-based capital calculations & ICA analyses.

Requirement to hold capital at a given percentile level.

Restrictions on the types of assets or the amount of a particular asset that a general insurer can take into account for the purposes of demonstrating solvency.

Restrictions on the currency, domicile and duration of assets allowed to demonstrate solvency (*or mismatching reserves*).

A requirement to use prescribed bases for calculating premiums and for valuing the general insurer's assets and/or liabilities when demonstrating solvency.

Restriction on discounting of liabilities and discounting rates that can be used

Restrictions on individuals/qualification requirements on those holding key roles in companies.

Close the company to new business.

Restriction on the type of reinsurance that may be used.

Purchase more reinsurance to reduce risk

Requirements to spread the risk over more than one reinsurance company and to use reinsurance companies with a high credit rating

Requirement to increase reserves held

Requirement to hold catastrophe reserves

Minimum policy requirements

Restrictions on how products are sold

Requirement for automated information systems and distinct roles

Disclosure / transparency of reporting requirements

Requirement for a Statement of Actuarial Opinion to be produced by an approved actuary.

Requirement for reserve figures and internal controls to be audited

Requirement to embed capital modelling into the risk management process (use test)

Requirement to demonstrate understanding of the impact of company decisions on risk

Any other reasonable suggestion

Comments on Q7(ii): *Candidates who used the ideas generated in part (i), and systematically considered regulatory actions that could mitigate them, scored best. Some candidates concentrated the vast majority of their answers on investment issues rather than providing a broader solution. Given current legislative feeling, regulation should have been top of most bookwork lists to learn.*

8 (i) (a) *Tests include:*

Motor/property insurance issues

Higher than expected frequency for household losses...

...along with simultaneous higher motor losses as also exposed to weather events

Average loss sizes may increase as more total loss damage claims due to flood rather than bump claims in motor or theft losses.

Geographical exposure being wider than predicted by cat modelling packages.

More fraudulent claims (taking advantage of weather event).

Size of event exhausting reinsurance protection.

Business interruption issues arising from any commercial property covers

Counterparty issues

Large catastrophe event is likely to adversely impact reinsurers...

...so should test the failure of one or more reinsurers.

Liquidity problems caused by having to pay claims quickly.

Operational Risk issues

Operational risk stresses e.g. arising from flood damage to company processing centres or IT systems.

Staff unavailable – can't get into work, claim adjusters can't get on site etc

Difficulty in sourcing skilled labour to carry out the repairs at a reasonable cost (demand surge).

Risk of claims getting larger if they are not settled in a timely manner.

Claims handling systems being stretched by increased volume...

...leading to possible reputational risk if policyholders are kept waiting.

Creditor issues

An extreme storm could cause a drop in market confidence and fall in asset values..

...which may lead to higher unemployment and creditor claims.

Loss on commercial creditor business (more becoming insolvent)

Business Environment issues

Adverse legislative change/government intervention could follow the event e.g. limiting insurers' ability to exclude flood plains.

A particularly large catastrophe could change the insurance cycle allowing the company to increase rates by more than assumed in the business plan.

Model issues

Correlations in model stressed (e.g. between lines of business) as they may be different in adverse scenarios.

(b) *Tests include:*

Market Risk issues

A fall in value of any equity and property investments.

A change in the spread/yields of corporate bonds.

Creditor issues

Large increase in claims frequency on creditor policies as higher unemployment.
Claims costs may also rise as claimants are out of work for longer.

Motor/property Insurance issues

Increase in claims on motor and household business arising from burglary and other crimes

Increase in fraudulent claims because of recession.

Increase in litigation and customers' propensity to claim

A reduction in the volumes of new business written as customers don't buy discretionary covers...

...which may require the business to reduce staff numbers and therefore incur redundancy costs.

Counterparty issues

Impact of a ratings downgrade of reinsurers.

Failure of other counterparties e.g. loss of largest broker balance.

Business Environment issues

Significantly higher inflation rates on different types of claims costs

Tax rates may rise as the government seeks to recoup revenue

Other issues

The company pension scheme may require further investment following reductions in asset returns.

The impact of the company's own credit rating being reduced causing reputational damage and lost business.

Could be some beneficial effects such as a reduction in the cost of labour to carry out repairs etc.

Comments on Q8(i): *This was a challenging question and required application of knowledge from across the core reading. Strong candidates considered a variety of risks that would arise from the scenarios (e.g. counterparty default, operational issues) while weaker candidates talked only about the claims issues that could occur. Not many candidates scored highly despite lengthy answers. The recession part was generally less well answered possibly because many spent too much time on the weather part, going into too much detail on the damage that weather can cause. There was some uncertainty around how to answer the question, with some focussing excessively on specific quantitative stress/scenario tests rather than the issues.*

(ii)

Purchase additional reinsurance protection...

... that has a sufficiently high limit to cover a large storm event

... and includes provision for reinstatements

... to ensure adequate reinsurance protection

Diversify exposure by geographical area...

...to prevent accumulations of risk as an individual storm event will usually have the greatest impact in a certain region.

Arrange credit lines that could be drawn on at short notice...
...as a large amount of claims is likely to need to be paid quickly.

Catastrophe bonds or financial reinsurance
...that will provide payment to purchaser should weather event occur

Amend the terms and conditions of policies
Such as to introduce exclusions for certain flood events (subject to treating customers fairly)

Set up claims handling plan for natural catastrophe scenarios...
...e.g. operating mobile units that can travel to areas of greatest need.
... to reduce claims costs, claims expenses, fraudulent claims, gain good publicity

Employ in-house tradesman
... so labour available in the event of demand surge.

Any other reasonable mitigating action (with supporting reason).

Comments on Q8(ii): *This part was generally attempted more successfully with most candidates being able to suggest some reasonable management actions, but few expanded sufficiently to get the full marks.*

9 (i) Claims Cohorts

Accident year

Using this cohort, we group claims according to the year in which the claim event or “accident” occurred.

The main advantage of this approach is that all claims stem from the same exposure cohort.

The claims will therefore have usually been subject to the same risk environment although they may have arisen from policies written under different rating and policy terms.

We can relate variations between accident cohorts to the influences operating at that time; e.g., uplift in business volume or a change in legislation

For accounting purposes, we can compare the losses emerging with the actual charges made to the operations of that period (that is, the accident year).

Projection of the future development of claims (reported or paid) in this form should allow automatically for all IBNR claims, recoveries and re-openings belonging to the cohort.

There will be a requirement to hold an explicit UPR/AURR for the unearned portion

The main disadvantage is that the full number of claims in the cohort is not known until that last claim is reported.

Hence there is greater uncertainty in using average claim values.

Also for some classes of business (for example, certain classes in the London Market) the date of loss is not always known and hence the accident cohort approach is not practical.

Underwriting year

With this approach, we group claims according to the year in which the policy covering that claim inception, irrespective of when the claim occurred.

An advantage of this approach is that we can follow the total outcome of all policies written in each year.

Similarly, we can follow claims that arise from a particular group of policies that are subject to the same set of premium rates and use the results to test the adequacy of the premiums.

Method is consistent with some underwriting year reporting regimes (e.g. Lloyd's)

The disadvantage is that it will take more than one year before all the claims under that cohort have occurred (for example, if all policies are of a maximum period of 12 months, then it may be up to two years from the beginning of the underwriting year before all claims have occurred).

Claims in a particular cohort will also have occurred over a wider risk period than a single accident year cohort, with a consequent lengthening of the characteristic run-off pattern.

The claims will generally relate to at least two accident years. Hence, in the early stages of development after the end of the underwriting year itself, the observed pattern of claims emergence relates to previously notified claims, notification of previously IBNR claims and finally the emergence of new claims for new periods of exposure.

Analysis of premium development on an underwriting year basis can help us to understand the possible exposure patterns, which will impact upon claims development.

Projection on an underwriting year basis will ensure that IBNR, recoveries and reopened claims are automatically included, provided that the emergence of newly reported claims and reopened claims are all allocated to the correct underwriting year period.

Reporting year

Using this cohort, we group claims according to the year in which they are reported to the insurer or reinsurer, irrespective of the original period of the claim event.

An apparent advantage of this is that, by definition, no further claims will be added to the cohort after the end of the origin reporting period.

After the end of the cohort period, there is a fixed group of claims to be tracked during the run-off.

This is unlike the accident cohort where the development (at least in the early stages) is a combination of movement in previously reported claims and notification of new claims.

Thus, the reporting year cohort can help us to monitor the development of notified claims to assess the delay before reliable estimates can be observed for claims once they are notified to the insurer.

The major disadvantage is that projection methods based on this cohort will not allow for the IBNR. A separate allowance will therefore be needed for IBNR claims. A further disadvantage is that the claims will have come from several different exposure periods, each of which may have differed in respect of volumes of business, cover applying and claim settlement patterns.

Comments on Q9(i): *This part was standard bookwork and attempted well by most candidates. A not insignificant number were confused by whether IBNR was allowed for or not in the various approaches and many did not give sufficient advantages or disadvantages.*

- (ii) The paid and outstanding amount as at the end of 2009 in relation to all claims that occurred in the 2008 calendar year.

Comments on Q9(ii): *A number of candidates could not give a full definition of the meaning of this figure. Many answers specified the answer as “claims” or “incurred claims” whereas what is required is “cumulative paid claims plus outstanding claims”. A few candidates defined a development ratio despite the question clearly stating “incurred claim amounts”.*

- (iii) *Choosing development periods:*

Stability of data (including currency effects)
Class of business
Seasonality (e.g. household)
Existence of trends
Taking alternative approach/obtaining a different view
Time available and budget
Availability of data
Length of tail of data/reporting delays
Systems capability
Age of company
Reason for review (including importance)
Frequency of review / work done previously
Ability to see big picture or spot trends
Ease of allocation of occurrence to a specific time
Management requirement – some reports require quarterly reviews

Choosing claims cohort periods: as above plus
Availability of corresponding premium information

- (iv) (a) *Advantage:*
No interpolation required as no need to adjust the 9 month position.

Disadvantage:
May not be able to use previous projection patterns if they were based on December diagonals

... or assuming accounts on a calendar year basis December figures are likely to be more accurate than September figures.

- (b) *Advantage:*
Simple and quick to use as it uses the previous December 2007 projection work.

Disadvantage:
There is limited reliance placed on the latest experience or trends ... or needs judgement on how to make the adjustments.

Comments on Q9(iv): *This question required an understanding of what a claims development triangle represents.*

Several candidates thought that the projection was to September 2009 rather than to December 2009 when all triangle projections are to ultimate with the introduction of a tail factor where necessary.

Some candidates incorrectly stated the last diagonal was only for $\frac{3}{4}$'s of a year whereas previous diagonals were for full years.

Some candidates stated that the last year was incomplete without noting that this is the only way of using the triangle data to obtain an ultimate figure for the 2009 year (as against using other date e.g. an expected loss ratio approach). With data at 31 December 2009 the year is going to be "incomplete" (for example on an underwriting year basis with many claims being incurred in the next year).

(v)

Year of Accident	Development Year		
	1	2	3
2007	21,637	82,585	116,213
2008	17,481	67,487	
2009	13,689		

$$\begin{aligned}
 21,637 &= 873 + 8,106 + 12,658 \\
 82,585 &= 14,698 + 18,096 + 27,488 + 22,303 \\
 116,213 &= 25,096 + 24,912 + 30,701 + 35,504 \\
 17,481 &= 493 + 5,322 + 11,666 \\
 67,487 &= 12,105 + 11,668 + 20,508 + 23,206 \\
 13,689 &= 297 + 3,215 + 10,177
 \end{aligned}$$

Comments on Q9(v): *This involved the addition of a few figures from the quarterly development triangle and to use basis (a) as given, i.e. annualised triangles based on September diagonals.*

END OF EXAMINERS' REPORT