

INSTITUTE AND FACULTY OF ACTUARIES

EXAMINERS' REPORT

April 2011 examinations

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

- 1** (i) Incurred claims development factors are:

<i>Underwriting</i>	<i>Development Year</i>		
<i>Year</i>	<i>1–2</i>	<i>2–3</i>	<i>3–4</i>
2007	1.1230	0.8928	1.0028
2008	0.7627	1.0487	
2009	1.1164		

And paid claim development factors

<i>Underwriting</i>	<i>Development Year</i>		
<i>Year</i>	<i>1–2</i>	<i>2–3</i>	<i>3–4</i>
2007	1.9652	1.1319	1.0552
2008	1.4787	1.1965	
2009	1.9182		

Development	Incurred Claims	Paid Claims	
2007: 1-2	1.1230	1.9652	$\frac{1}{2}$
2007: 2-3	0.8928	1.1319	$\frac{1}{2}$
2007: 3-4	1.0028	1.0552	$\frac{1}{2}$
2008: 1-2	0.7627	1.4787	$\frac{1}{2}$
2008: 2-3	1.0487	1.1965	$\frac{1}{2}$
2009: 1-2	1.1164	1.9182	$\frac{1}{2}$

Incurred development factor for 3-4 greater than 1 so a tail-factor might be expected

Data should be split into subgroups if applicable, or more years required, but data are not available

The development factors are very unstable

In particular, the incurred development factors for revenue year 2008, the 2nd diagonal, are less than one

And paid development factors are very low for 2nd diagonal

So there is an obvious diagonal effect

Other sensible comment, e.g. 4500 incurred claim large for 1st development period

Chain ladder should not be used without some adjustment
e.g. using BF

- (ii) The data should be adjusted by dividing incremental claims paid and outstanding claims for revenue years 2007 and 2008
... by 2 to allow for the devaluation.
(Only) underwriting years 2007 and 2008 need to be revalued for rates of exchange

*Subject ST7 (General Insurance: Reserving and Practical Modelling Specialist Technical) —
Examiners' Report, April 2011*

Incremental Paid Claims

2007	2,010	1,940	521	247
2008	2,960	1,417	860	

Revalued Paid Claims

2007	1,005	970	521	247
2008	1,480	1,417	860	

Revalued Outstanding Claims

2007	1,482	818	516	283
2008	2,250	1,313	730	

Cumulative Paid Claims

2007	1,005	1,975	2,496	2,743
2008	1,480	2,897	3,757	

Incurred Claims

2007	2,487	2,793	3,012	3,026
2008	3,730	4,210	4,487	
2009	5,035	5,621		
2010	6,201			

Development Factors

<i>From-To:</i>	<i>1–2</i>	<i>2–3</i>	<i>3–4</i>	<i>4–Ult</i>
<i>Year-on-Year</i>	1.1219	1.0708	1.0046	1.0050
<i>Cumulative</i>	1.2130	1.0812	1.0097	1.0050

It is reasonable to expect further development so a tail factor is necessary
1.005 has been selected (*other selections are possible, and were given credit*)

<i>Underwriting Year</i>	<i>Ultimate Claims</i>	<i>IBNR</i>
2,007	3,041	15
2,008	4,530	43
2,009	6,077	456
2,010	7,522	1,321
<i>Total</i>		1,836

The table of individual development factors for incurred claims is now:

<i>Underwriting</i>	<i>Development Year</i>		
<i>Year</i>	<i>1–2</i>	<i>2–3</i>	<i>3–4</i>
2007	1.1230	1.0784	1.0046
2008	1.1287	1.0658	
2009	1.1164		

<i>Development</i>	<i>Ratio</i>
2007: 1–2	1.1230
2007: 2–3	1.0784
2007: 3–4	1.0046
2008: 1–2	1.1287
2008: 2–3	1.0658
2009: 1–2	1.1164

The development is now reasonably stable

... with no diagonal effect.

... and development factors not large

So the CL method is now reasonable based on the data available

May be other reserves required, e.g. UPR, URR

An alternative answer might be given by converting to original currency before doing the projecting and converting back to £s at the end, arriving at the same answer, but would have to make an assumption about the actual exchange rates to do this. A candidate would not lose marks if this approach is used but it should be noted that this is more complex than the above solution. Within reason, whatever method is used to adjust the data, marks will be lost for methodology if not reasonable but marks will only be lost for the calculations if not done or mistakes are made, so always track through the calculations to check for mistakes.

- (iii) $\text{BF ultimate} = C + \text{ELR} \times P \times (1 - 1/\text{udf})$ or other reasonable description of the BF method

Travel Insurance:

A short-tailed class

The development factor is close to one so that the CL estimate has reasonable credibility

Also, the incurred claims are already greater than the expected claims based on $\text{ELR} \times P$ which is 2,254

Suggesting that the ELR may not be a reasonable estimate

Hence the CL figure should be used

Medical Malpractice:

A long-tailed class

The development factor of 2.100 suggests that there is low credibility on the CL projection

The BF credibility of CL projection is in effect $1/2.100$ or 47.6%

The BF figure is therefore likely to have greater reliability than CL assuming the ELR is a reasonable estimate

Employers' Liability:

Long-tailed but may be over-reserved initially (*no mark if only mention being long-tailed*)

The development factor is less than one

The BF formula should therefore not be used without careful consideration as it is effectively a credibility formula between the CL figure of 3,325 and $ELR \times P$ figure of 2,478

and in this case gives a result of 3,370 which is outside the range of the two figures

Other suggestions as to which is the better method for each class were given marks if the argument presented was reasonable.

This question was disappointingly answered, even though triangle projections with some form of currency or calendar distortion are standard ST7 content. Few candidates calculated the development factors to support their answer to (i) and few noted the calendar effect.

More worryingly, in part (ii) a material number of candidates chose to adjust for a 50% currency devaluation by dividing by 1.5 rather than by 2. This did not cost candidates many marks as credit was still given for calculations after that point, but in the real world this would be an embarrassing mistake to make. Few candidates considered tail factors in this section. Overall candidates displayed remarkable innovation in the range of ways in which they managed to get this question wrong.

In part (iii), very few candidates gave any real consideration to the specifics of the question and of the data provided. Very few candidates noted that the incurred claims for Travel are already above the expected claims on an ELR basis and therefore that the ELR might not be a good estimate which is a prerequisite for using BF. For Med Mal the suggestion was to use BF because Med Mal is long-tail but the actual data backs up the choice. For EL candidates often ignored the fact that df was less than 1, or suggested BF without noting there could be problems with using BF with such a df . Some answers that were clearly wrong suggested that the BF method was best because the df was less than 1 or said that the BF method should be used because it is a credibility method for basing the result on the weighted average of 2 methods.

- 2 The major consideration for Company A is that if the suggestion is taken up, the commutation amount must be at least adequate to allow for the claims which it would have made on Company B.
Company A should be looking for the highest payment possible, i.e. a prudent basis *making due allowance for the following factors:*
Employer's Liability business will have a long tail.
Consideration should be given to IBNRs
and pattern of future development based on past patterns
A conservative allowance should be made for IBNRs (i.e. for latent claims e.g. industrial disease such as asbestosis, deafness).
The net rate of return on reserves over a long period of time should be considered.
The rate of judicial and wage inflation affecting claims must be allowed for.
Some measure of credibility should be put on the current estimates of outstanding reported claims.
- Some claims may be settled by periodic payments
The expected outstanding duration on any periodic payments should be considered conservatively.
The basis of coverage should be considered e.g. for unexpired risks: LOD or RAD
Look at any treaty terms which may quote conditions for discharge of liability.
Effects of any commissions e.g. profit commission.
Effects of any underlying non-proportional covers A may have.
The effects, both on Company B and Company A's accounts must be looked at and the profit and loss arising from the transaction must be reviewed
In theory, Company B will be reserving a higher figure than the likely payment to be made to Company A if it has not discounted its reserves or discounted at a low rate
The actual allowance for inflation has to be looked at in conjunction with this figure
The tax effects on both companies need to be looked at carefully.
In respect of the Motor Excess of Loss Treaty company A again will be looking for the highest settlement possible, due consideration again being given to:
Assessing the IBNR; this only relating to further potentially very large claims.
The outstanding claims need to be assessed very carefully making allowance for: the expected date of settlement
and any potential out-turn in any Court award.
Look at claims handling expenses.
All these claims probably without exception will be liability claims.
If there are any material damage claims they should be considered separately.
Consider data on claims below the excess e.g. > £50,000 or > £75,000
Further consideration to be given to looking at a claims size distribution by year of origin to ascertain the further number of claims which potentially could increase in value to exceed the excess point.
Look at effects of any indexation clauses.
Reinstatement provisions for the XL to be considered
Note that each of the claims 1 and 3 could fall below the excess level but equally could increase in value.
Should determine the reserving basis used for estimating the motor outstanding claims and why claims are still outstanding, particularly for 1st claim

Look at the ground-up loss for Claim 1 as the higher this is above £500,000 the more likely the full amount to the layer will be paid

Claims that may be incurred in the period until 31 December 2010 should be considered

Although the commutation price is likely not to be finalised before 1st January 2011 by which time further claims information will be known

As far as company B is concerned similar considerations as to the above will be made but will obviously be looking at the lowest possible level of settlement.

Company A may have to consider further reinsurance protection elsewhere: cost and availability

Also, the reasons for B wishing to commute should be considered.

If in a run-off situation the chances of payments actually being made should be considered e.g. consider the security of company B.

The relative strength of each company or significance of this book of business for each company

The administration and other costs associated with the arrangement should be considered

Mark for pointing out error in question i.e. that (b) should say Company A, not B, if noted that it should be Company A is obvious e.g. from context of question and from description of claims in next paragraph.

This was a low scoring question, with candidates frequently failing to generate any significant volume of ideas. Where they did generate additional ideas, many failed to read the question properly and considered wider issues around whether they would want to go ahead with the commutation at all, in spite of the question specifically stating that the commutation was to go ahead.

There was a minor error in the question itself, with (b) referring to Company B's motor business where it should have referred to Company A. In the context of the rest of the question it was clear what was intended, but examiners were instructed to look for signs that candidates had been thrown by the possible inconsistency and award compensatory marks for any lost time. Almost no candidates appeared to have been affected however.

- 3** (i) The fee payable to cover the cedant's expenses may be less than the expenses that would have been incurred in writing the business directly
It may not be licensed to write a specific line of business in a particular country
...although a Lloyd's syndicate would have access to Lloyd's global licences enabling it to write business almost anywhere in the world
Its credit rating may be inadequate to satisfy the insured's minimum requirements
...unlikely for a Lloyd's syndicate with the backing of its own and Lloyd's central capital
Other reasons:
There may be tax advantages in issuing the policy via the fronting insurer
To obtain quick entry to the market
Has insufficient presence or standing in the market.

To gain experience in the market

(ii) **Proportional: Quota share**

If the book of business is large compared with the existing book

To ensure that there is not too much exposure to one area, i.e. diversification

Proportional: Surplus

Might not be used as unnecessary for personal property unless there are individual high risk properties

Non-Proportional: Risk XL

Unlikely to be used for personal property as not a major risk

... apart from liability which could be covered by treaty or facultative XL

Non-Proportional: Aggregate and catastrophe XL

Would definitely be used to cover exposure from natural catastrophes which in Japan include

Earthquake

Tsunami

Volcanic Activity

Non-Proportional: Stop Loss

If available at an affordable price to cover natural catastrophes

Financial Reinsurance

Providing financial support or improving the balance sheet not a consideration here

This part may be considered ambiguous in that it could refer to the whole of the syndicate's business although this would be an obtuse construction as the answer would be "anything".

This question was generally well answered, although as always candidates tended towards generic comments rather tailoring their response to the specific circumstances. A number of candidates also failed to read the question and described the types of cover in spite of the question only requesting comments on their appropriateness, wasting valuable exam time.

4 (i) Definition of "exclusion".

- An event, peril or cause
- ... defined within the policy document
- as being beyond the scope of the insurance cover.
- *(Or: exclusions are clauses in a policy that limit the circumstances in which a claim may be made.)*

(ii) *Reasons for use of exclusions.*

Exclusions are used to avoid payment by the insurer in situations where:

The policyholder is at an advantage through possessing greater personal information about the likelihood of a claim

... Knowledge of pre-existing subsidence

The claim event is largely under the control of the policyholder or actions of the policyholder can influence the levels of risk

...Leaving doors unlocked/not returning home to check if locked because covered by insurance
The claim event would be very difficult to verify
...Loss of money outside the home
Loss occurs as part of the normal course of events and could be considered to be depreciation.
...Wear and tear of clothes
There is the potential for illegal or immoral events
...Exclusion of property that has been illegally obtained
There is risk of fraud or non disclosure / underinsurance
...Although average often used i.e. scaling down of payments for failure to update property values insurer could exclude claims if underinsurance is excessive
Without an exclusion there would be a very high probability of a claim
...House on edge of cliff.
The risk could not be reasonably estimated.
...War risks to building
Exclusions are also used where the risk is covered by a third party such as the Government.
...Terrorism resulting in destruction of building
Or by another policy
...Goods outside of the home covered by travel policies
Exclusions are also used to limit the scope of the policy to make it more appropriate for a particular target market
...US policies may not cover flooding or French policies may not cover windstorm
Or to reduce the premium for competitive reasons.
...Exclude flood damage or possessions outside the home, or exclude certain claims which are not possible e.g. damage from falling trees if there are no trees
Or to be able to charge additional premiums as a tailor made product offering.

...Charging additional for possessions outside the home
Giving insureds the option to choose different cover elements can give additional information about their risk profile
...Charging additional for accidental damage cover as the nature of insureds who opt for this cover is considered more risky.
Marks were given for alternative valid examples, i.e. must be relevant to domestic property insurance (so no marks for Acts of God or for there not being reinsurance coverage for certain claims)

This question was reasonably well answered. Some candidates struggled to offer clear or concise definitions in part (i). In part (ii), candidates often offered non household examples or did not offer any context for why companies used exclusions to accompany their examples.

- 5** Medical expenses
Cancellation of holiday or flight
Missed departures
Airline failure
Loss of luggage
Delay of baggage
Repatriation after an accident/illness
Theft of cash/personal belongings/baggage
Loss of travel documents
Compensation from delay to travel
Additional expenses from delay to travel
Cash benefit for hospital stay
Personal accident
Death benefit
Legal expenses
Personal liability
Other reasonable optional covers (e.g. winter sports/piste closure)

This was a straight bookwork question and was generally well answered, although some candidates appeared to struggle to remember any particular volume of points to make.

- 6** ALM is useful in that it covers the assets and liabilities of the entity within one structure
..so enables the relationship between investments and liabilities to be considered

This may be particularly useful as the company is small so matching considerations will be important

A stochastic model will also allow the outcomes to be expressed as distributions

Typical structure of ALM is in three parts...

...inputs/assumptions, modelled variables and interdependencies and outputs

Model investment portfolio

Starting point is often the current investment portfolio

..with alternative portfolios/investment rules being tested in the model

Assets likely to be largely cash and bonds as in run-off

Types of bonds should be modelled separately e.g. index linked

Model investment income and gains

Model Liability outgo

Claims should be projected forward to time when they are fully run off

On a best estimate basis using reserving assumptions (or other methods)

Split claims by class of business

Reinsurance recoveries do not usually coincide with the claim payments and hence a timing difference exists

Future known reinstatement premium, and other reinsurance premium, payments will be modelled

Reinsurer default should be allowed for in the recovery estimates

Expenses will be significant as the company is in run-off
..and there will be no future premium income to offset them
Impact of inflation should be considered in both claims and expenses

Other

An economic scenario generator (ESG) will be required
...to produce different interest rate, inflation rates and other variables
...and therefore simulate asset values at different times
...and to ensure consistency between the assumptions for the assets and liabilities
The impact on solvency can then be tested based on different investment mixes

There were a variety of responses to this question, perhaps reflecting the variety of past ALM questions and examiner solutions. Many candidates fell down by providing poor descriptions on the liability side or by answering this through a list where they were asked to describe.

7

(i) *Credit Risk*

Credit risk is the risk that a counterparty to an agreement will be unable or unwilling to fulfil its obligations. Can be split into:

- Investment credit risk; for example, from holdings of non-government bonds.
- Counterparty credit risk, namely reinsurance recoverables, and where material, premium debtors, including pipeline premiums, and other balances with intermediaries and banks.

Operational Risk

Operational risk is the risk of loss resulting from inadequate or failed internal processes, people and systems or from external events.

(ii) *Examples of Operational Risk*

Administration risk:

The risk associated with the administrative aspects of the firm's operations.

e.g. outsourcing, centralised and decentralised functions, staff expertise, non-recovery of reinsurance.

Compliance risk:

The risk of non-adherence to legislative and internal firm requirements.
Mishandled complaints, cost of implementing future regulatory, health & safety issues, diversity/discrimination issues

Event risk:

The risk associated with the potential impact of significant events on the operations of the firm
Financial system crisis, a major change in the fiscal system, natural disaster

Event risk is not intended to cover the firm's underwriting losses from such events as this would normally be covered within insurance risk.

Fraud risk:

The risk associated with intentional misappropriation of funds, undertaken with the objective of personal benefit at the expense of the firm. Can be internal or external

Internal – intentional misreporting of positions, employee theft

External – robbery, computer hacking

Governance risk:

The risk associated with the board and/or senior management of the firm not effectively performing their respective roles.

Fiduciary breaches, sale of unauthorised products.

Strategic risk:

The risk arising from the inability to implement appropriate business plans and strategies, make decisions, allocate resources or adapt to changes in the business environment

Insufficient reinsurance purchased, not reducing costs in a recession, failing to implement a business plan, failure to take advantage of opportunities as they arise

Technological (or IT) risk:

The risk of error or failure associated with the technological aspects of its operations.

Hardware systems, software utilised, telecommunication problems and utility outages

Pension scheme risk:

The risk that the firm is required to make good any shortfall in pension scheme assets relative to its liabilities.

Events that impact upon the pension scheme funding position and the financial consequences for the firm in such cases.

(iii) *Parameterising an operational risk model*

Stochastic techniques are rarely used because not enough history of extreme operational failures

Identify all material operational risk scenarios specific to the firm's business – risk register

A brainstorming session may also be advisable, or desktop analysis.

Risks may be considered separately by personnel with the skills to appraise such risks.

Make judgements about the degree of loss that each risk may give rise to, the type of event that may cause the loss and the frequency of such a loss occurring.

Consider each loss gross and net of any mitigating controls.

A proportional method may be justified because operational risk assessment can be very subjective

Stress/scenario testing may be used to test the robustness of the model

Issues associated with modelling operational risks

A full assessment of operational risk requires significant input from across the business

Using a percentage load will not consider the unique risk characteristics of the business

It will not demonstrate that the business has undertaken a full assessment of its operational risks

This is a particular issue under Solvency II

Are we able to capture all risks within our register?

Are we able to understand the impact of all the operational risks?

Do we understand how the risks are correlated with each other and with other risk types?

Where elements of operational risk have been captured within other risk categories, it is good practice to identify and quantify these so we can avoid double counting.

e.g. insurance fraud event is left within the data. This event may lead to an increase in the volatility assumption used for insurance risk and this risk will therefore already be allowed for as a part of the insurance risk charge.

Lack of reliable internal data

Existence of suitable external data

Start building an internal database of failures and near misses

(iv) *Mitigation and Financial impact reduction*

Credit Risk

Counterparty risk mitigation

Only use reinsurers of a certain credit rating

Diversification over more than one reinsurer

Credit Control/bad debt teams

Letters of credit

Reduce duration of liabilities

Investment Credit risk

Maintain a well-diversified fixed-income investment portfolio across companies and industries.

Consider credit ratings of corporates whose bonds are purchased

Credit default swaps and other derivatives

Market Risk

Conduct some form of asset-and-liability management (ALM)

Match the expected claims and expense outgo to the expected premium and investment income by nature (real or fixed), term, amount and currency.

Stress and scenario testing e.g.

Interest Rate Risk: measure the potential changes in the expected earnings of the insurance operations over a time period of one year based on an instantaneous increase/decrease in interest rates of 1%.

Equity Risk: Through scenario analysis measure the potential changes in the

expected earnings of the insurance operations over a time period of one year
based on an instantaneous increase/decrease in equity markets of 10%
Diversification and widely invested portfolio
Consider hedging strategies

Operational

Scenario testing of impacts of risks within the risk register
Implement rigorous internal controls and processes
D&O cover reducing governance risk and other insurance cover for other risks
Disaster recovery planning
Internal fraud prevention processes
Complaints handling guidelines
Incentivise staff to enforce proper controls, staff training or vetting of hiring
ERM methods

- (v) Cost of capital = Cost of Risk \times Capital required (*mark by implication if calculation is correct*)

Before

$$\text{Cost of Capital} = (750 + 750 + 500 - 300) \times 0.15 = 255\text{m}$$

After

$$\text{Cost of Capital} = (750 + 750 + 500 - 300) \times 0.15 \times 0.7 = 178.5\text{m}$$

A reduction of 76.5m

$76.5 > 50$ so the company should pursue this option

Particularly as cost is one-off and reduction in risk is on-going

In part (i) candidates often struggled to provide a clear and concise definition of credit risk. A similar lack of clarity was observed in part (ii) where many candidates failed to structure their answer well, often repeating themselves between description and example. In part (iii), few candidates detailed where the information might come from. Part (iv) was generally well answered for credit risk, presumably as candidates are more familiar with questions on reinsurance, but candidates were less well prepared for mitigation of market or operational risks.

Part (v) was often poorly answered, with many candidates either failing to apply the 15% factor for cost of capital or even bizarrely dividing by 15% to produce extreme numbers that there was no attempt to sense check or comment upon.

END OF EXAMINERS' REPORT