

EXAMINATIONS

September 2003

Subject 303 — General Insurance

EXAMINERS' REPORT

Introduction

The attached subject report has been written by the Principal Examiner with the aim of helping candidates. The examiners are mindful that a number of interpretations may be drawn from the syllabus and Core Reading. 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.

The report does not attempt to offer a specimen solution for each question — that is, a solution that a well prepared candidate might have produced in the time allowed. For most questions substantially more detail is given than would normally be necessary to obtain a clear pass. There can also be valid alternatives which would gain equal marks.

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Chairman of the Board of Examiners

25 November 2003

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1 *This question was generally well answered. Each of the two terms examined in this question can be found in the Core Reading glossary. The distinction between long-tailed (long delays from occurrence to notification/settlement) and long term (long exposure period i.e. long period of cover) is important but is not always appreciated by students. Most candidates seemed unaware that latent claims could be short-tailed.*

- (i) (a) Types of insurance in which a substantial weight of claims take several years to be notified and/or settled....
....from the date of exposure and/or occurrence.
- (b) Claims resulting from perils or causes of which the insurer is unaware at the time of writing a policy....
....and for which the potential for claims to be made many years later has not been appreciated.
- (ii) Long-tailed relates to known / anticipated features of claims at the time of writing whereas latent claims are by definition not anticipated at time of writing.
Latent claims can be short-tailed.

2 *The question focuses on outlining considerations when allowing for investment returns in pricing mortgage indemnity guarantee business. It does not require a discussion about which assets would be suitable, although many candidates took this approach. Points in relation to an appropriate choice of assets are only relevant in this question to the extent that assets actually held are mismatched to liabilities. Those candidates who discussed the nature of the liabilities and applied their bookwork points scored better.*

Need to consider likely return on assets backing technical reserves:

- consider past investment returns on those assets
- and investibility of those assets, including premium payment pattern of lender.

Technical reserves

- Term of policy is the term of the mortgage, so premium may be received 25 years or so before claim is paid.
- Most of the risk though is in the early years of the mortgage term, and premium is usually earned within the first 10 years, although even in those 10 years the risk is not uniform and premium earning patterns are not constant.
- Delay between claims occurrence and settlement is relatively short so more concerned with assets backing unearned premium reserve ("UPR").
- The UPR is very large....
- ...and allowance for investment return is very significant.

Need also to allow for investment returns on assets backing capital:

- These will be particularly significant....
-as MIG has relatively large capital allocation due to uncertainty of writing this business.

Allow for mismatching of assets and liabilities:

- This is particularly important....
-as will be very difficult to determine future economic/property cycles and hence claims costs.
- Examples of mismatch are due to currency and legislative/solvency changes.
- Downwards adjustment to investment return assumption may be high.

Other points to consider

- Consistency with other assumptions eg inflation.
- Regulatory / statutory restrictions on pricing methods/assumptions.
- Investment return should be net of expenses.
- Investment return should be net of tax.
- Take into account likely future tax changes given long term nature of MIG.

3 *Candidates scored reasonably well on this largely bookwork question, though there were many more points available than required for full marks. Candidates did not demonstrate a full understanding in part (ii) on how delays might impact the ultimate claims cost.*

- (i) Identification of damage / loss, manifestation
Reporting of damage / loss
Delays in processing claim
Assessment of extent of damage / loss
Monitoring / delays due to business interruption
Verification / agreement on extent
Processing payment / settlement delay
Recovery of reinsurance
Recovery of salvage
Closing of claim file
Reopening / resettlement

- (ii) Possible causes:
- Change of brokers.
 - Change of claims handlers — affects efficiency levels and delays.
 - Change in types of claim — as different types of claim will have different features affecting handling time.
 - Change in mix of business or cover eg increased excesses so change in size of claim.
 - Surveyors assessing the cost of claims take longer to assess.
 - External factors such as postal strikes, legislation, judiciary, economic.
 - Internal factors eg staff shortage, system breakdown.

Likely effect on ultimate claims cost:

- Claims may be turned down if reporting delay period extends dramatically (depends on policy wording) so reducing overall cost.
- Delays to repairs will result in increases in average settlements due to inflation so increasing overall ultimate cost.

- Changes in delay will affect amount of investment return achieved, which will affect discounted value of ultimate claims cost.

Although not required to gain full marks, some credit was given for the following additional points:

- If reinsurers default (infinite delay) then the net ultimate cost will increase.
- Claims handling costs may increase if more time is spent dealing with claims.

4 *For part (i), the majority of candidates know the four insurance cover types, which appear in the Core Reading. However, candidates' performance on part (ii) were disappointing given the importance in general insurance of understanding the characteristics of different claim types. Most noticeable was the lack of breadth and detail in candidates' answers, with many candidates confining themselves mainly to a discussion of the delays in settlement and notification. It should have been clear to candidates producing short solutions that they were too brief to score the full 8 marks on offer.*

- (i) Liability
 Property Damage
 Financial Loss
 Fixed Benefits

- (ii) Claims origination:
- sudden cause of loss
 - cause easily determinable

Claims notification:

- usually notified quickly
- biggest claims notified very quickly
- although minor knocks may be delayed

Claims settlement / payment:

- settled over time as repair scheduled
- small claims can take a long time to settle
- most claims settled within 3 years....
-longer than most property damage type claims
-but still relatively short-tailed
- settlement delays due to disputed liability

Claims amount:

- repairs will be subject to claims inflation
- reported amount can rise when inspection reveals more damage
- actual settlement cost can be quite different from estimate
- policy excess may result in nil claims
- salvage recoveries will lead to reductions in paid claims

- currency fluctuations may cause amounts to differ from expectations
- damage exacerbated by continuation of journey
- moral hazard due to false claims
- lack of independence of claims assessor

Potential for accumulations / catastrophes

- geographic concentration and exposure to storm, harbour fire

Claims distribution

- low frequency (in ship years)
- occasional total loss (actual/constructive)
- skewed claims distribution

5 *Well prepared candidates scored well on part (i), which was essentially bookwork. Some candidates appeared to ignore the details given in the question (eg one class, motor, medium-sized company) and lost marks for application. It was clear from scripts that some students were confused about how risk XL and aggregate XL contracts operate. In part (ii) the quality of candidates' answers was variable. The stronger candidates were able to build upon the Core Reading's list of steps required to build a model and thought about the specific requirements in this situation.*

- (i) Stability of profits....
-More excess of loss protection (i.e. lower excess point) may result in more stable results
 -stability of profits will affect ability to pay stable dividends (which shareholders may prefer)
 -particularly relevant as company writes only one class
- Nature of inwards claims with respect to frequency and amount....
-several small claims but a few individual large losses on bodily injury claims
- Consider management/shareholder attitude to risk
- Size of free reserves: to what extent can the free reserves withstand adverse large loss experience? A couple of large bodily injury claims could cause problems.
- Company strategy: is the company expecting to expand its business? How much of a strain will this place on the free reserves?
- Potential for accumulations...
 -is there too much exposure in one geographical area?
-individual excess of loss will not address this
 -may decide need more quota share in order to write a wider range of risks but maintain similar levels of net exposure, or aggregate XL
- Statutory solvency: how will changing the reinsurance protection impact the statutory solvency position?
- Technical assistance: does the company benefit from technical help from existing reinsurers? How will a change in the reinsurance programme affect this arrangement?
- Relationship with existing reinsurers
- Regulatory requirements to hold reinsurance

Market reputation: how will investors, analysts, brokers, customers react to any significant change in reinsurance programme?

Security status: reinsurers with better security may charge more for the cover

Availability of reinsurance

Value for money

Availability of reinsurance

(ii) Type of model/high level points:

- Prefer to use a stochastic model but could use deterministic with lots of sensitivity testing.
- Construct a model that projects cashflows over a 5 to 10 year period.
- Projections need to be realistic so assumptions must be on best estimate basis.
- Include new business

Define objectives:

- By varying the retention level, determine the effect of the excess of loss reinsurance on profitability and statutory solvency.
- Need to define profitability and solvency eg statutory definition?

Projections need to be realistic so assumptions must be on best estimate basis.

Collect claims data:

- Determine future gross claims expected therefore need gross and reinsurance data separately.
- Use individual claims data.
- Collect and use individual claims data for last 5– 10 years, gross of reinsurance, grouping by risk categories

Group data by risk categories eg bodily injury vs property damage

Makes adjustments for:

- Claims inflation
- Cover provided
- Deductibles
- External factors
- Changes to claims handling or settlement
- IBNR by standard methods such as chain ladder or average cost per claim

Choose variables to be modelled stochastically

- Fit separate claims frequency and amount distributions
- So can calculate individual recovery amounts
- Check goodness of fit (can apply this to frequency/amount distributions and/or combined distributions)
- Derive a combined claims distribution function...
- ...by simulating separate claims frequency and amount distributions.

Also model:

- Gross premiums

- Reinsurance premiums – investigate likely reinsurance market premiums for XL cover at various excess points
- Reinsurance recoveries - compare these reinsurance premiums against modelled recoveries expected to be paid at different lower excess limits
- Compare these reinsurance premiums against modelled recoveries expected to be paid at different lower excess limits.
- Expense cashflows
- Investment cashflows

Specify correlation between variables

- e.g. allow investment strategy to react to claims experience and level of free reserves

For each lower excess limit, run large number e.g. 1000 (say) simulations, projecting the cashflows of the model over the period.

Construct model so as to produce output relating to solvency and profitability.

6 *Part (i) was straightforward with the perils listed in Core Reading. Candidates' knowledge of the bookwork in part (ii) was disappointing, with many candidates failing to provide sufficient items. Partial credit was given to solutions that mentioned "rating factors" without listing them, although the number of marks available should have prompted more detail. A surprising number of candidates did not provide a clear definition of burning cost premium, although most were able to talk about adjustments to it. Noticeably, many candidates omitted to mention that the burning cost premium would need to be adjusted for IBNR claims. Most candidates appeared uncomfortable in dealing with the non-standard questions in part (iv) and (v) and did not generate sufficient ideas.*

- (i) Perils covered:
- accidental damage to the insured vehicle
 - malicious damage to the insured vehicle
 - fire of insured vehicle
 - theft of insured vehicle
- If the policy includes motor third party liability then the insured is indemnified against compensation payable to a third party for personal injury or damage to their property.

Although not part of Core Reading, credit was given for the following point:

Breakdown where roadside assistance included as part of cover

- (ii) Policy data as it was at the date the claim occurred:
- policy number
 - start date
 - end date
 - endorsement date
 - policy term

- type of cover
- date of birth / age of drivers
- gender of drivers
- additional drivers
- licence type
- years held licence
- risk address / postcode
- broker code
- details of previous accidents and convictions
- claims history
- security devices / safety devices
- profession
- marital status
- transmission type
- smoker / non-smoker (proxy for lifestyle)
- vehicle group rating or other classification
- make of car
- model of car
- engine size
- fuel type
- body type
- modifications to vehicle
- annual mileage
- policy limits
- excess compulsory and voluntary
- use of vehicle e.g. private / business
- where vehicle kept overnight
- age of vehicle
- value of vehicle
- NCD
- payment method
- where insured to drive
- policy number / link to claims data

Claims data:

- claim number / link to policy data
- accident date
- notification date
- claim amounts paid
- dates claims amounts paid
- claim recoveries made
- dates recoveries made
- estimated outstanding
- dates the estimates were made
- type of claim, TPBI, theft etc
- claim description code e.g. collision with stationary vehicle
- claims expenses e.g. loss adjusters fees, NHS charges

- claim event number, to link claims from the same event for reinsurance recoveries
- settled indicator, settled, outstanding, re-opened
- driver at time of accident
- currency

Current rating structure

Changes in policy conditions

Results of portfolio movement analysis

Risk premium relativities implied by relativities of competitors' office premiums

Reinsurers' opinions

Underwriters' opinions

Changes in legislation on allowable rating factors

Future inflation assumption

- (iii) (a) The actual cost of claims incurred during a past period as an annual rate per unit of exposure
- (b) Include allowance for IBNR
Adjust for unusually heavy/light experience, build in an average amount of bodily injury claims
Allow for trends in claims, e.g. greater recovery of health costs from insurers by the government
Adjust for legislative / judicial changes
Allow for changes in risk and cover
Allow for change in mix of business eg new/renewal
Allow for estimated future claims inflation

Different expense / commission assumptions:

- Underwriting expenses
- Claims handling expenses split fixed variable
- By new business and renewals
- Allow for expense inflation

Allow for any discounts given

Commission if payable

Profit loading

Contingency margins

Tax

Reinsurance cost allocated to a policy

Levies

Investment return

Competitive issues, insurance cycle

- (iv) New rates are higher:
Customers complain, expense impact in dealing with this.
Customers don't renew, expenses impact with the operation of fixed expenses.

New business drops, fixed expenses not spread.
Bad PR which further reduces new business and retention rates.

New rates are lower:

Lots of new business, financial impact of new business strain, can't get enough staff, premises etc to cope with the influx of new business.
Existing customers feel that they have been overcharged in the past and move their business elsewhere.

Brokers are unhappy with the resultant reduced commission.

Competitors do not react as expected.

New rates are differently structured.

Cost of implementation may exceed expectations.

Reinsurers not happy with the new rates.

Risk of anti-selection if the rates are different to those offered by competitors in the market.

May write volumes of business where little previous experience and rates uncertain.

- (v) Easiest method is not to implement the new rating structure. Could then move the old one to look like the new one but gradually.

Renewal

Manage price offered to existing customers, for example no premium increases or decreases by more than 10%. May mean that prices on renewal will be different to those for new business.

Run the renewals as a closed book retaining the current pricing structure and use the new rates for new business only. Again this will mean that the rates will be different for new business and renewals which could lead to customer complaints.

Give the customers an incentive to renew to soften the blow of price increases e.g. free mobile phone / road map / holiday vouchers.

Rather than reduce premiums significantly, offer loyalty discounts.

New Business

Test the prices for a short period, measure the effect on volumes, conversion rates and decide whether to fully implement.

Move gradually to the new prices.

Communicate to brokers, customers and staff the expected changes as a result of the implementation.

Check if the levels of increase /decrease seen will be different to those being applied by competitors.

Offer brokers profit commission.

Offer brokers volume commission.

Increase advertising / marketing campaign.

Spread distribution channels (not just broker).

Arrange more reinsurance / get technical assistance.

If all prices have increased then another option is to reduce the cover instead of increasing the prices. The effectiveness of this depends on what is already included in the cover that can be removed without making the product stand

out in the market.

7 *Some candidates gave very strong answers in parts (i) and (ii) but in general the examiners were disappointed with the lack of understanding that was shown in many scripts. The examiners gave credit for alternative solutions in part (iii) where the question had not specified the as at date for the discount factor. Although 31 December 2002 was the most logical choice, calculations as at 31 December 2000 were also accepted. The ability to produce payment patterns has been examined a few times in recent years and yet candidates seemed to be very poorly prepared for these calculations. Part (iv) was bookwork and well answered.*

(i) Paid triangles:

Factors less than one may appear in the paid triangles when the incremental net paid for a particular accident year and development year is negative.

This in turn may occur for the following reasons:

- Data error — some of the underlying records may have been recorded incorrectly or the triangle may have been constructed incorrectly.
- Extraction of large claims — only if the history of a large claim isn't extracted fully from the "non-large" triangle.
- Currency — if the underlying currencies have not been converted at current exchange rates, some of the movements in the triangle may be due to currency fluctuations.
- Third party recoveries — the insurance company may have been able to recover monies from another insurer or via salvage from the insured.
- Reinsurance lag — there may be a time delay between payment of a gross claim and a subsequent reinsurance recovery.
- Policyholder repayment of amounts subsequently decided not covered eg due to fraud.
- There may be some premium adjustments due to experience rating, and it is possible, although unlikely, that these may included incorrectly within affect the paid triangle.

Incurred triangles:

Factors less than one may appear in the incurred triangles when the incremental net incurred for a particular accident year and development year is negative.

This is more common than with paid developments.

This in turn may occur for any of the above reasons plus the following:

- Large claim settled at less than case reserve, outweighing positive incurred claim movement on other claims.
- Case reserving strength changes so that there is a one-off decrease in case reserves, and this outweighs paid movements in that year.
- Generally conservative case reserving philosophy so that negative incurred but not enough reported ("IBNER") claims development outweighs paid claims.

(ii) Comments on methodology and assumptions

- Selected factors look reasonable....
-except no paid tail factor and paid development unlikely to stop dead.

- Incurred pattern reflects run-off savings => case reserving is prudent.
- Using paid and incurred information — good to use both but paid factors to ultimate very high on latest accident years so paid chain ladder less reliable.
- Would expect more weight to incurred methods on later accident years as incurred has more information and factors to ultimate are lower.
- Large losses have been treated separately - good if distort factors in triangle ie if large claims develop faster or slower than non-large.
- Large losses in danger of being over/under projected if remain in triangle.
- Large losses likely to be complex bodily injury claims therefore probably longer-tailed on average than non-large claims.
- If remove large losses from triangle won't project emergence of new large losses.
- Is \$500,000 an appropriate level? Large loss definition of \$500,000 is being used on all accident/devt years. Inflation means that company will effectively be removing more losses from the non-large triangle on the 2002 row than the 1995 row.
- Large losses will be bodily injury claims — case estimates use skill of claims assessors but may not be consistent from year to year
- Company has included an additional 10% of large loss case reserves. Is this amount appropriate. This may be held to bolster case reserves if believed to be insufficient or it may be held as an allowance for new large losses to emerge.
- Suggest use Bornhuetter-Ferguson or expected loss ratio method on 2002 accident year as a minimum

Suggested alternative approaches

- Establish paid tail...obtain further historical data, benchmark or do curve fitting / fit tail by eye.
- Apply more weight to incurred methods on later accident years.
- Use Bornhuetter-Ferguson or expected loss ratio methods on the 2002 accident year where the factor to ultimate is high.
- Should project gross then allow for reinsurance separately to avoid distortions due to changes in reinsurance programme.
- Project by country to avoid currency distortions.
- Split into homogeneous groups (eg BI vs PD, Large fleets vs small fleets).
- Test 10% allowance for large IBNER/IBNR by looking at historical claims developments for individual large claims or compile triangle of large claims.
- Adjust large claim definition by year to allow for inflation.
- Perform ACPC or inflation-adjusted ACPC for large &/or non-large losses.

- (iii) (a) Use paid pattern
[some candidates incorrectly used the incurred pattern or the average of the paid and incurred]

Assume no tail factor required or make suitable adjustment

Development year	0	1	2	3	4	5	6	7	8
Use paid cdf (=ult/pd)	23.933	4.351	2.560	1.790	1.377	1.167	1.061	1.020	1.000
Calculate 1/cdf (=pd/ult)									
Cum % developed	4.18%	22.98%	39.07%	55.87%	72.63%	85.70%	94.27%	98.04%	100.00%
Subtract adjacent %'s									
Incr % developed	4.18%	18.80%	16.09%	16.80%	16.76%	13.07%	8.57%	3.77%	1.96%
For 2000 accident year*				27.57%	27.51%	21.45%	14.06%	6.19%	3.22%

27.57% in the above row = $(100/(100 - 4.18 - 18.8 - 16.09)) * 16.8\%$

[As at 31 December 2002, the 2000 accident year has reached the end of development year 2. Need to normalise pattern so that percentages add up to 100% and can therefore apply pattern to reserves.]

- (b) Assume that payments occur on average mid-way through the year
Calculate $x_t v^{(t-1/2)}$ for each future time period where $v = (1 + 0.05)^{-1}$
and $x_t = \%$ payable in year t :

Development year	0	1	2	3	4	5	6	7	8
t				1	2	3	4	5	6
x_t				27.57%	27.51%	21.45%	14.06%	6.19%	3.22%
$v^{(t-1/2)}$				0.9759	0.9294	0.8852	0.8430	0.8029	0.7646
$x_t v^{(t-1/2)}$				0.26905	0.25564	0.18991	0.11857	0.04969	0.02461

$$\begin{aligned}\text{Discount factor} &= \text{Discounted reserves} / \text{Undiscounted reserves} \\ &= \text{Sum of } x_t v^{(t-1/2)} / \text{Sum of } x_t \\ &= 0.90746\end{aligned}$$

- (c) Discounted mean term defined by:
Discount factor = $(1 + i)^{-DMT}$
Take logs of both sides:
 $\text{Log}(0.907458) = -DMT * \text{log}(1.05) \Rightarrow DMT = 1.99 \text{ years}$

[Also possible to use accurate formula: $\text{Sum}\{(t-1/2)x_t v^{(t-1/2)}\} / \text{Sum}\{x_t v^{(t-1/2)}\}$
but this would be more time consuming. Answer in that case would be 1.99 years]

- (iv) Legislation/supervisory regulations
Investment return earned on assets covering technical reserves....
....allowing for non-investible assets (e.g. broker/reinsurer balances)
Purpose of reserving / degree of prudence required
Extent to which assets are mismatched to liabilities / uncertainty
Rate used previously for consistency

Allowance for tax
Allowance for investments expenses.