EXAMINATIONS

April 1999

Subject 303 — General Insurance

EXAMINER'S REPORT

Comments on each specific question appear in italics at the end of each solution.

1 Main objective is to maximise investment return whilst meeting all its contractual obligations.

Match characteristics of the assets with those of the liabilities by term, amount, nature and currency.

Premiums will be received in advance of claims, and these can be invested. Need to allow for the split between annual, and monthly premium business, and for the fact that some monies may be held by third parties.

Consider the effect of inflation on the liabilities. Can these be matched?

Matching considerations may run counter to solvency requirements - long term assets have high volatility.

Marketability of assets - the insurer is small, and claims may fluctuate from one month to the next.

Consider the free assets - you want to maximise the return, but in deciding on the investment policy the insurer needs to consider the size in relation to:

- annual premium income
- expected claims each year
- absolute size of the liabilities at any time
- SMSM

The effect of the reinsurance arrangements should be taken into account. The insurer will not want to stray too far from industry norms.

2 Actor,director or producer illness, accident or death
Contract disputes
Weather perils disrupting timetable of filming
Faulty film
Damage to negative during editing

3 (i) Whatever claims have developed in relation to an origin year, the future development pattern will follow that experienced for other origin years.
The past development for a given origin year does not necessarily provide a better clue to future claims than the more general loss ratio.
[2]

(ii)

U/W Year	*Initial Estimated Ultimate Claims*	*% not reported yet*	*Expected Future Reported Claims*	*Actual Reported Claims*	*Total Estimated Ultimate Claims*
1995	700,000	10%	70,000	500,000	570,000
1996	1,125,000	20%	225,000	500,000	725,000
1997	1,600,000	50%	800,000	1,000,000	1,800,000
1998	2,125,000	90%	1,912,500	400,000	2,312,500

The total estimated ultimate claims are 5,407,500

(iii) Reported claims are lower than original estimate by 142,500
Is the original LR appropriate?
Are the reported reserve estimates reliable?
Is the development table accurate?
Older years are below the initial expected losses, recent years above – has the initial expected loss ratio allowed fully for market developments?
There is a big jump in loss ratio from 1996 to 1997. Is there any particular reason for this?

4

- Investment portfolio evaluation, to assess the performance of investment managers
- Cash flow / asset-liability modelling to set investment policy
- Allocation of income and capital between classes for pricing and profitability measurement
- Risk-based capital allocation to enable solvency evaluation or profitability
- Calculation of return on capital to allow shareholders to assess management performance.

5 (i)

- To arrive at a risk premium per policy.
- To select rating factors
- To determine premiums using experience rating procedures
- To demonstrate the estimated effect of changing the level of cover
- To determine the effect of excess of loss reinsurance
- To estimate the variability of claims experience
- To estimate the impact on the reserves of industrial diseases
- Financial planning
- Workload management/staff planning

- Statutory requirement to do so

(ii)

- Specify the purpose of the investigation
- Collect data
- Group and modify data
- Compare data with a suitable density function
- Fit the data to the density function
- Check that goodness of fit is acceptable
- Fit different model if not

6 Valuation of the Assets

The asset valuation bases, and
method used for recognising capital gains will affect the stated surplus

Investments held

Weak security of investments undermines high asset value
Undue concentrations of investments do likewise.

Mix of business

Differences between the mixes of business – such as short tail or long tail will distort comparison.
Long tail classes require a larger solvency margin for same relative financial strength

Unusual events

Catastrophes – a company with little catastrophe protection needs more capital
High expenses from internal reorganisations

Third Party Exposure

Financial security of reinsurer affects quality of reinsurance levels
Or any other debtor, especially brokers, affects quality of assets

Presence of equalisation reserves, or other hidden types of capital.
Differences in reinsurance arrangements.

7 Restrictions on the type of business an insurer may write
Limits on the premium rates that may be charged.
A requirement to maintain a minimum level of solvency,
measured in some prescribed manner.
Restrictions on the type
or amount of assets that may be taken into account to demonstrate solvency
A requirement to use prescribed bases for valuing assets/liabilities
Legislation to protect policyholders should a general insurer fail
Licensing of agents to sell insurance
Requirements to provide information
Control of sales outlets
Approval of staff and directors
Restrictions on volumes written

8 Lack of previous experience
Variability of experience
Changing types of business
Changing risk characteristics
Antiselection by policyholders
Changing attitudes to claiming
Climate effects
Catastrophes
Exchange rate movements
Latent claims
New types of claim
Claims inflation
Legislative changes
Judicial changes
Poor management
Poor underwriting

9 (i) A catastrophe excess of loss policy normally allows the reinsured to make only one claim on the policy. Most policies allow the cover to be restored after a claim, so that the reinsured still has protection. This is called reinstatement. Normally there will be a limit on the number of times the cover may be reinstated.

A reinstatement may be free, or a premium may be payable. If there is a premium, it will normally be a proportion of the original premium. It will be payable whether or not the whole of the cover has been exhausted, and will be proportional to the amount of the claim to the layer.

(ii) Original premium ÷ width of layer. (Does not include reinstatement premium in calculation.)

(iii) The option with no reinstatements would have the higher rate on line. The low rate on line of the underlying risk suggests that the probability of two losses is very low. The expected value of a reinstatement premium is greater than the expected value of a second loss, so the expected net payments by the reinsured are lower under the second option.

10 (i) Class of business
Size of individual risks
Likely accumulation of risks
Volatility of claims experience - numbers and amounts
Size of class relative to total written premiums
Size of free reserves
Premiums written relative to size of free reserves
Availability of reinsurance
Availability of coinsurance

Need for technical assistance
Management attitude to risk
Security status of reinsurers

(ii) (a) Company A is directly responsible for 40% of \$750,000 = \$300,000 under the coinsurance agreement.
Company X takes 5% of \$300,000 = \$15,000 under the quota share agreement.
There are two possible approaches (or indeed anything between the two). However, candidates need to recognise that there is a need for an assumption, to state the assumption and then to follow it through in the calculation.
Assumption 1 Company A takes the full three lines of cover, ceding 75% to the surplus reinsurers. Therefore, its net claim is 25% × (\$300,000 – \$15,000) = \$71,250.
Assumption 2 Company A keeps the maximum \$50,000 retention, so that its proportionate retention is \$50,000 ÷ (95% × 40% × \$500,000) = 1 ÷ 3.8. Therefore its net claim is (\$300,000 – \$15,000) ÷ 3.8 = \$75,000.

(b) As company B is a coinsurer alongside A the insolvency does not affect the amount to be paid by A.
As company Y is a reinsurer of A the insolvency will affect the recoveries A can make. In the most extreme case, A will lose the amount it is owed by Y; in practice, there will almost certainly be a partial recovery from the liquidators of Y. The actual answer will lie between the answer in (a) and a revised amount, assuming that there is no recovery at all from Y. The answer in that case depends on the assumption made in (a) above.
Assumption 1 In this case A will have to pay an extra 75% × 50% × (\$300,000 – \$15,000) = \$106,875, so the total will be \$178,125.
Assumption 2 In this case, A will have to pay an extra 50% × (\$300,000 – \$15,000 – \$75,000) = \$105,000, for a total of \$180,000.

(iii) Details of loss:
Description of property, processes and materials used
Date and time of loss
Estimated cost
Cause of loss
Explanation why loss amount exceeded the EML

11 (i) (a) **UPR**

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

(b) **DAC**

A deduction from unearned premium
as they become earned
for acquisition
and commission costs

(c) **URR**

The reserve required to cover the claims
and expenses
which are expected to emerge from an unexpired period of cover

(d) **AURR**

The reserve held in excess of the UPR to allow for any expectation
that the UPR will be insufficient to cover the costs of outstanding risks

(ii) **Assumptions**

Claims in accident year 1998 occurred on average at 1 July 1998
The business resulting in AY 1998 claim was written on average on 1 January 1998
Period of cover is twelve months
June 1999 business was written on average in the middle of the month
Claim cost inflation period for June 1999 business is 17½ months
Claim frequency inflation is 0%
The mix/riskiness of business within products A and B is unchanged

Average written premium (AWP) of Product A is unchanged
AWP of product B is increased by $1.06^2 - 1 = 12.36\%$

Loss ratio of Product A at June 1999 is $75 \times 1.005^{17.5} = 81.84\%$
Loss ratio of Product B is $105 \times 1.005^{17.5} \div 1.06^2 = 101.97\%$

The GWP at June 1999 is £8 million for Product A and £2 million for Product B
Combined loss ratio = $81.84\% \times 0.8 + 101.97\% \times 0.2 = 85.90\%$

(iii) **Assumptions**

Risk spread evenly throughout the year

Unexpired Cover Jul 98 to Jun 99 in 24ths	*Loss ratio % for Product A*	*Loss ratio % for Product B*	*GWP A £M*	*GWP B £M*	*Ultimate Claim Cost £M*
Jul 98 1	$75 \times 1.005^{6.5}$	$105 \times 1.005^{6.5}$	5.0	5.0	0.387
Aug 98 3	$75 \times 1.005^{7.5}$	$105 \times 1.005^{7.5}$	5.0	5.0	1.168
Sep 98 5	$75 \times 1.005^{8.5}$	$105 \times 1.005^{8.5}$	5.0	5.0	1.956
Oct 98 7	$75 \times 1.005^{9.5}$	$105 \times 1.005^{9.5}$	5.0	5.0	2.752
Nov 98 9	$75 \times 1.005^{10.5}$	$105 \times 1.005^{10.5}$	5.0	5.0	3.556
Dec 98 11	$75 \times 1.005^{11.5}$	$105 \times 1.005^{11.5}$	5.0	5.0	4.369
Jan 99 13	$75 \times 1.005^{12.5}$	$105 \div 1.06 \times 1.005^{12.5}$	5.5	4.5	4.948
Feb 99 15	$75 \times 1.005^{13.5}$	$105 \div 1.06 \times 1.005^{13.5}$	6.0	4.0	5.657
Mar 99 17	$75 \times 1.005^{14.5}$	$105 \div 1.06 \times 1.005^{14.5}$	6.5	3.5	6.352
Apr 99 19	$75 \times 1.005^{15.5}$	$105 \div 1.06^2 \times 1.005^{15.5}$	7.0	3.0	6.888
May 99 21	$75 \times 1.005^{16.5}$	$105 \div 1.06^2 \times 1.005^{16.5}$	7.5	2.5	7.564
Jun 99 23	$75 \times 1.005^{17.5}$	$105 \div 1.06^2 \times 1.005^{17.5}$	8.0	2.0	8.229
				Total	53.827

Marks are given for:
Correct formula for one month (say July 1998)
= $[75\% \times 5.0 + 105\% \times 5.0] \times 1.005^{6.5} \times 1/24 = 0.387$
Combined GWP × Loss ratio for A + B
Claims cost inflation
Unexpired cover
Correct answer for July 1998
Correct answer for August 1998 to December 1998
Correct adjustment for January 1999 GWP
and loss ratio
Correct answer for January 1999 = 4.948
Correct answer for February 1999 to March 1999
Correct answer for April 1999 loss ratio
Correct answer for April 1999 = 6.888
Correct answer for May 1999 to June 1999
Correct overall unexpired claim cost = 53.827

(iv)

UPR	= 60.0
less DAC of 15% × 60.0	= –9.0
equals	51.0
Unexpired claim cost	53.8
less investment return of 10% × 53.8	= –5.4
plus claim handling costs of 2½% of 53.8	= 1.3
equals	49.8

Surplus of 1.2
Therefore no need for an AURR

(v) Difference in expected ultimate loss ratios
Difference in GWP distribution throughout the twelve months ending 30 June 1999
The acquisition costs might be different due to:
different distribution channels, for example
Product A may be sold direct, Product B through brokers
Commission rates may therefore be different
Value of investment return depends upon claim payments
Product A may have a greater Comprehensive mix (more short tail) than Product B