

EXAMINATION

8 November 2017 (am)

Subject F103 — *General Insurance* Fellowship Principles

Time allowed: 3 hours

INSTRUCTIONS TO THE CANDIDATE

1. *Enter all the candidate and examination details as requested on the front of EACH OF your answer booklets.*
2. *You have 15 minutes at the start of the examination in which to read the questions.
You are strongly encouraged to use this time for reading only, but notes may be made.
You then have three hours to complete the paper.*
3. *You must not start writing your answers in the booklet until instructed to do so by the supervisor.*
4. *Mark allocations are shown in brackets.*
5. *Attempt all seven (7) questions, beginning your answer to each question IN A SEPARATE BOOKLET.*
6. *Candidates should show calculations where this is appropriate.*

AT THE END OF THE EXAMINATION

Hand in your answer booklets, with any additional sheets firmly attached to the correct booklet, AND this question paper.

<p><i>In addition to this paper you should have available the 2002 edition of the <i>Formulae and Tables</i> and your own electronic calculator from the approved list.</i></p>

QUESTION 1

A student actuary has commented that a situation where claims regularly exceed the Expected Maximum Loss (EML) on a surplus reinsurance treaty should not matter to the reinsurer because it gets the agreed proportion of the premiums to cover the same proportion of claims, and in fact it should be pleased since if the insurer made a higher estimate of EML this would have resulted in the reinsurer having to pay an even larger proportion of the claim.

- i. Discuss the student's statement.

[3]

Company X, a general insurer, writes commercial property insurance. It has a 9 line surplus reinsurance treaty in place with Reinsurer A. The treaty specifies a maximum retention of \$6m and a minimum retention of \$R, based on EML. Company X cedes as much as possible to Reinsurer A on each risk.

You have been provided with the following extract of claims-related information:

Policy	Sum Insured	EML	Claim	No. of lines used	Surplus recovery
1	\$15m	\$8m	\$12m	3	(a)
2	\$75m	\$50m	\$60m	(b)	(c)
3	\$27m	\$18m	\$30m	(d)	(e)

- ii. Determine R (the minimum retention), and the amounts (a) – (e) in the above table.

[5]

[Total 8]

QUESTION 2

Financial statements for two local general insurance companies (X and Y) are provided below:

Profit & Loss Account for year ended 28 February 2017 (R millions)		
	Company X	Company Y
Net premium written	2000	800
Gross premium written	1900	600
Gross premium earned	1600	800
Net premium earned	1520	600
Gross claims incurred	1000	600
Net claims incurred	950	540
Commission paid	200	160
Other expenses paid	200	80
Investment return	170	40
Tax	50	0
Dividends	60	0

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Balance Sheets as at 28 February 2017 (R millions)		
	Company X	Company Y
Investments:		
Equities	410	0
Fixed Interest	1300	1320
Cash	500	900
Deferred Acquisition Costs	100	80
Broker balances	10	40
Total Assets	2320	2340
Net outstanding claims (incl. IBNR)	1000	1400
Unearned Premium Reserve	800	400
Current Liabilities	60	40
Free Reserves	460	500
Total Liabilities	2320	2340

i. Calculate the following ratios for X and Y, assuming that any taxes and dividends are paid on 27 February each year:

- a. Net claims ratio;
- b. Operating ratio; and
- c. Return on capital employed.

[6]

ii. By making use of the ratios calculated in (i) above, and any others you require, compare the financial strength and profitability of the two companies, suggesting possible reasons for the differences.

[7]

iii. Discuss the suitability of the investments made by X and Y.

[4]

[Total 17]

QUESTION 3

A pricing actuary is setting up a generalised linear model that can be used to price commercial motor insurance and needs to decide on which factors to include in the model.

i. Describe the requirements of a good rating factor.

[6]

ii. Outline the considerations the actuary should take into account when deciding on which rating factors to include in the model.

[9]

[Total 15]

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QUESTION 4

A general insurance company sells domestic household insurance policies, and has made use of NCD on its premium rates for many years. The company is considering introducing Protected NCD, to be offered to policyholders (for a small additional premium) who have been at the highest level of premium discount for the past three years

- i. Define what is meant by “Protected NCD”. [1]
 - ii. Outline the advantages and disadvantages for the company of implementing the Protected NCD proposal. [5]
 - iii. State and explain 2 reasons why the company may decide to impose higher excesses on the policies that have Protected NCD. [2]
- [Total 8]

QUESTION 5

You are the reserving actuary for a newly established general insurance company that writes a diverse range of general insurance business. The company does not own any reserving software and all reserving calculations are performed in spreadsheets. The company is investigating whether it should acquire reserving software, preferably before the next year-end valuation.

- i. Discuss the key issues which the company should consider before purchasing any reserving software. [5]

You have just viewed a presentation by an actuarial consultancy firm demonstrating their latest reserving software. You were impressed by the ease with which the software estimates the full claims reserve distribution.

- ii. Define the term “prediction error” in the context of modelling the uncertainty present in claims reserves. [2]
 - iii. Outline briefly 6 ways in which the outputs from a stochastic claims reserving model could be used by the general insurance company. [3]
 - iv. Discuss the key issues you should consider when using a stochastic model to estimate the full claims reserve distribution. [5]
- [Total 15]

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QUESTION 6

An insurance company has been approached by a waste-management company to underwrite environmental liability risk for a landfill site, where hazardous materials are dumped into deep holes in the ground. The site uses new technology to contain the waste and decompose it over time.

- i. Outline briefly the benefits generally provided, and perils covered, under an environmental liability policy. [3]
 - ii. Suggest, giving reasons, a suitable exposure measure for this product. [2]
 - iii. List 4 potential rating factors, and give a brief justification for each. [2]
 - iv. Discuss the extent to which the insurer may face an increased risk of claims by offering this policy on a claims made basis. [3]
 - v. Outline 5 key challenges in modelling capital requirements for this class. [5]
 - vi. Suggest, with justification, one other type of liability insurance that may be appropriate for the waste-management company. [1]
- [Total 16]

QUESTION 7

The government of a certain country is planning to implement a compulsory third party motor liability insurance scheme funded by a levy on fuel, as a solution to the large proportion of drivers on the roads of the country that currently have no form of motor insurance. The design of the insurance product, including limits, will be specified by the government and insurers will be asked to tender to provide insurance cover. The insurer with the most competitive quote will be allowed to underwrite all vehicles in the country for five years, before the next tender goes out. The size of the levy per litre of fuel will be determined based on the premium charged by the successful insurer.

- i. Outline the advantages and disadvantages of this approach compared to a system where all individuals insure directly through various insurers, which are each allowed to change the design of the product and charge different premiums. [7]
- ii. Outline briefly the key risks to an insurer tendering to offer the abovementioned insurance product. [5]

An insurance company that currently offers motor and household insurance is considering tendering for this business. Before it does so it is exploring the potential effect of this business on its capital requirements.

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- iii. Define “claims reserving risk”, outline how it may arise, and highlight the difference to claims underwriting risk. [4]
 - iv. Explain 3 reasons why the claims reserve risk may be positively correlated between the classes offered by this insurer, including the new liability business if it is successful in the tender process. [3]
 - v. Outline the main reason why claims underwriting risk and claims reserving risk may be positively correlated. [2]
- [Total 21]

END OF PAPER