

EXAMINATION

7 November 2014 (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

- i. Define what is meant by “facultative” reinsurance, and outline briefly the relative advantages and disadvantages of facultative reinsurance compared to treaty reinsurance.

[4]

XYZ, a general insurer, writes commercial property insurance. It has in place three reinsurance treaties with Reinsurers A, B and C, which operate in the order given below:

- 25% Quota Share treaty with Reinsurer A.
- Individual Surplus with Reinsurer B, having 5 lines.
The maximum retention limit is R750 000 (based on EML) and XYZ cedes as little risk to B as the treaty permits.
- Risk Excess of Loss with Reinsurer C, which covers 80% of losses in excess of R375 000. A Stability Clause will operate on the excess point. The value of the index is 1.0 at outset.

Consider the following policy:

Sum Insured: R5m; EML: R3m; Claim: R3.8m.

- ii. Determine the reinsurance recovery from Reinsurer A. [1]
- iii. Determine the reinsurance recovery from Reinsurer B. [2]
- iv. Determine the value of the stability clause index if a recovery (on the above claim) of R400 000 is made from Reinsurer C. [3]
- v. Outline two possible benefits to XYZ of having such a stability clause on this cover in an inflationary environment. [2]

[Total 12]

QUESTION 2

You are a pricing analyst working for a large reinsurer and have decided to build a generalised linear model (GLM) to predict the accident claim severity (of gross of reinsurance claims) for a book of motor insurance policies in order to help price a risk excess of loss reinsurance contract.

- i. Outline the modelling considerations you would need to take into account when setting up the GLM. [8]
- ii. Describing any additional modelling required, outline how you could use the results of the GLM model for accident severity to determine the risk premium on the excess of loss reinsurance contract for this book of motor insurance policies. [6]

[Total 14]

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QUESTION 3

You are a manager in an actuarial consultancy and your client is a large reinsurer reinsuring a diverse range of insurance business. You will be overseeing the upcoming 2013 year-end IBNR reserving valuation. This is the third time your company is performing an IBNR reserving valuation for this client.

You have been provided with the following information based on your actuarial analyst's calculation of IBNR reserves for a particular class of business.

Accident Year	Earned Premium (R)	Average Pricing Loss Ratio	Paid Claims (R)	Case Estimates (R)	IBNR (R)
2010	14 322 120	83%	8 444 912	97 713	-
2011	33 146 855	85%	25 664 475	339 424	443 564
2012	39 824 283	79%	15 968 012	1 693 986	789 076
2013	41 978 221	70%	16 863 406	3 632 936	4 690 591
Totals	129 271 479		66 940 805	5 764 059	5 923 231

The following information relates to the table above:

- The company's year-end is 31 December.
 - The earned premium, paid claims, case estimates and IBNR are updated with the latest information up to 31 December 2013.
 - The Average Pricing Loss ratios are those assumed at the time the policies were priced and represent an average over all policies where the date of loss is in the given accident year.
 - For all accident years prior to 2013 the IBNR is calculated by applying the chain ladder method to paid claims data.
 - For the 2013 accident year the IBNR is calculated using the loss ratio method with an ultimate loss ratio assumption of 60%.
 - All development factors have been included in the application of the chain ladder method.
- i. Outline briefly eight data issues specific to reinsurers accepting inwards reinsurance that you should consider when calculating the IBNR reserves. [4]
- ii. Calculate and interpret four diagnostics as a check on the IBNR reserves using the information above. [8]
- iii. Outline any additional analyses you should carry out before finalising the IBNR reserves for this particular class of business. [8]
- [Total 20]

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QUESTION 4

A small general insurance company in a developing country writes only Employers' Liability insurance.

- i. Define Employers' Liability insurance. [2]
 - ii. By describing in detail the characteristics of the liabilities that you would expect for this class of business, suggest suitable assets for the insurer. [13]
 - iii. Outline briefly the factors that will influence the extent to which the company decides to mismatch its assets and liabilities. [4]
- [Total 19]

QUESTION 5

You are a junior pricing actuary for an insurer that specialises in motor insurance. Your manager has asked you to write a report on the importance of keeping up to date with the improvement of technology in motor vehicles.

- i. List four recent improvements in technology that have influenced motor insurance claims costs and for each suggest what the associated affect has been on claims costs. [4]
 - ii. Explain briefly why it is important to adjust premium rates to keep up with new technology. [3]
 - iii. Suggest, with reasons, six factors that could determine the importance of regularly updating premium rates to take account of new technology in motor vehicles. [6]
- [Total 13]

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QUESTION 6

Cover Insurance Company (CIC) is a medium-sized short-term insurer writing several classes of business. As an actuarial consultant you have developed a stochastic internal model for CIC. The first model run revealed that CIC has enough capital to withstand a 1 in 250 year shock.

Most variables have been modelled stochastically, but certain variables such as expenses and premiums have been modelled deterministically. Your client, CIC, has questioned the fact that certain cashflows are not modelled stochastically. They suggest that a simple Normal distribution could be used to model such quantities because “including some random variation is better than not including it at all”.

- i. Explain the difference between economic capital and regulatory capital and discuss the factors affecting which type of capital (economic or regulatory) is likely to determine the amount of capital that CIC ultimately holds. [5]
- ii. Comment on the client’s suggestion that “including some random variation is better than not including it at all”. In your answer include:
 - a. the effect of modelling cashflows that are currently modelled deterministically using a Normal distribution;
 - b. the advantages of doing so; and
 - c. the disadvantages of doing so. [7]

[Total 12]

QUESTION 7

AviSure is a large insurer selling marine and aviation insurance covering both property and liability losses. In the last month some very large claims were made as a result of a plane crash and the collision of two large cargo ships. The claims have not yet been paid as investigations are under way to determine the cost of the losses.

- i. Describe three key risks/uncertainties to AviSure’s solvency arising as a result of the events mentioned, and explain how it can reduce its exposure to each. [6]
- ii. Outline whether, and how, AviSure might adjust its stochastic loss distribution parameters in its capital model to account for the above events. [4]

[Total 10]

END OF PAPER