

2010 Examinations

SPECIMEN EXAMINATION

Subject ST7 — General Insurance: Reserving and Capital Modelling

Specialist Technical

Time allowed: Three hours

INSTRUCTIONS TO THE CANDIDATE

1. *Enter all the candidate and examination details as requested on the front of your answer booklet.*
2. *You have 15 minutes before 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 six questions, beginning your answer to each question on a separate sheet.*
6. *Candidates should show calculations where this is appropriate.*

AT THE END OF THE EXAMINATION

Hand in BOTH your answer booklet, with any additional sheets firmly attached, and this question paper.

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

- 1** You have been provided with the following financial information for general insurance companies X, Y and Z for the accounting year 2009. All amounts shown are in \$millions.

<i>Company</i>	<i>X</i>	<i>Y</i>	<i>Z</i>
Gross Written Premium	50	2,000	250
Additional Unexpired Risk Reserve c/f	15	100	0
Gross Outstanding Claims Reserve b/f	20	800	750
Gross Claims Paid	35	700	150
Gross Outstanding Claims Reserve c/f	30	850	700
Non Acquisition Expenses	5	250	30
Investment Income	3	100	16
Current Assets at 31/12/2009	5	80	30
Current Liabilities at 31/12/2009	11	100	40
Investments at year end	125	3,500	1,000
Share capital at 31/12/2009	15	500	125
Acquisition Costs as a % of Gross Written Premium	30%	15%	20%

- (i) Construct the balance sheet for each of the three companies as at 31 December 2009, stating any assumptions made. [5]
- (ii) Derive underwriting, solvency and return on capital employed ratios for all three companies, stating any assumptions made. Taxation should be ignored. [9]
- (iii) Comment on the results in part (ii). [4]
- (iv) Define five other insurance related ratios that could be derived from the data to compare the performance of the three companies and state each of their objectives. [5]

[Total 23]

- 2** You are a consulting actuary. You have been asked to review and comment on a client's reserving methodology, and to re-project some of the key classes of business, in order to form a view on the client's year-end reserve figures. The client is a large international company with a variety of classes of business being sold in the US and some countries in Latin America.

After reviewing their methodology you note the following:

- Incurred claims data are used for projections.
- Projections are performed at a net of reinsurance level.
- For the Bornhuetter-Ferguson (B-F) method, the expected loss ratio (ELR) is calculated as a rolling average of the ultimate loss ratios, using the chain ladder method, for the previous three accident years.

- The incurred claims data from the Latin American countries is converted into \$US prior to projecting. Due to concerns of possible hyper-inflation in these countries, only the latest diagonal is adjusted. All previous diagonals are equal to the data in \$US from the previous year reserve calculations. This is done using the latest exchange rates and by converting the movements in paid and outstanding claims only.

- (i) Comment on the advantages and disadvantages of these approaches and highlight any recommendations that you would make to the client. [10]

The company is writing some new books of business. For these classes the company has based the latest ELR on the underwriter's view.

- (ii) State the advantages and disadvantages of this approach, again providing any recommendations that you may have. [3]

You have decided to re-project the following data for a motor book of business. You have been told that the claims inflation has been steady at about 5% for each year. You have no information about premium rate increases, but you can approximate this using the increase each year in the average premium per policy.

<i>Year</i>	<i>Earned Premium \$000's</i>	<i>Earned Policy Years</i>	<i>Incurred Claims \$000's</i>	<i>Incurred Cumulative Development Factor</i>	<i>Selected Ultimate Loss Ratio</i>	<i>Selected Ultimate Loss</i>
2004	11,750	1,150	8,765	1.000	75%	8,765
2005	13,000	1,275	10,350	0.960	76%	9,936
2006	12,500	1,125	9,235	0.940	69%	8,681
2007	13,250	1,050	9,500	0.920	66%	8,740
2008	15,250	1,125	11,250	0.975	72%	10,969
2009	17,650	1,265	9,575	1.520		

- (iii) Calculate the incurred B-F ultimate for the 2009 accident year with the ELR based on the weighted average (by premium) of the last five accident years. [5]
[Total 18]

3 A small general insurance company specialises in motor insurance.

- (i) Outline the principles that you would consider in deciding in which assets the company should invest. [9]

- (ii) Explain how these principles differ from those of a large general insurance company specialising in employers' liability. [3]
[Total 12]

- 4** Describe the following characteristics of marine insurance:
- (i) Benefits [2]
 - (ii) Insured perils [3]
 - (iii) Exposure measures [1]
 - (iv) Claim characteristics [4]
 - (v) Risk factors [4]
- [Total 14]
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- 5**
- (i) List six of the main purposes for capital modelling. [3]
 - (ii) For five of the six purposes that you have listed, suggest how allowances for diversification might be made. [15]
- [Total 18]
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- 6** The run-off of claims reserves can be considered to be a random process, with many random factors influencing the final outcome.
- (i) List ten such uncertain factors. [5]
 - (ii) List the key assumptions when bootstrapping the over-dispersed Poisson (ODP) method in the context of claims reserving. [2]
 - (iii) Discuss briefly the issues surrounding stochastic modelling in the context of:
 - (a) model forms
 - (b) latent claims
 - (c) sparse data and data peculiarities
 - (d) extremes of tails [8]
- [Total 15]

END OF PAPER