

INSTITUTE AND FACULTY OF ACTUARIES

EXAMINATION

25 September 2014 (pm)

Subject ST7 – General Insurance: Reserving and Capital Modelling Special 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 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 nine questions, beginning your answer to each question on a new page.*
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.

<p><i>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.</i></p>
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- 1** Outline possible sources of recoveries that insurers may make that reduce the cost of a claim. [3]
- 2** A general insurance company has been approached by a car manufacturer to provide all purchasers of new cars in the next twelve months with one year's comprehensive insurance free of charge. The scheme may be extended beyond the initial pilot period depending on how well the scheme performs.
- Outline the main factors that the insurance company should consider before agreeing to the manufacturer's initial proposal. [6]
- 3** (i) Define "market risk" in the context of an insurance company. [1]
- A general insurance company invests all its investible assets in high-quality on-demand bank deposits and gilt-edged securities with a term of less than one year.
- (ii) Explain why such a strategy may not necessarily lead to a minimum level of market risk capital charge. [4]
[Total 5]
- 4** (i) Explain the practice of fronting. [2]
- (ii) Describe the possible reasons for insurers to enter into such arrangements. [3]
- (iii) Describe the risks and implications, including advantages and disadvantages, for the insurers concerned. [3]
[Total 8]
- 5** A general insurance company writes a book of commercial-property business, which it protects with a surplus treaty.
- Describe how such a treaty operates. [8]
- 6** A general insurance company has for many years sold various liability policies to banks. The company is considering extending its product range to include a policy covering risks relating to external non-physical attacks on a bank's data and systems (cyber risks).
- (i) Suggest losses that the banks may experience that may be covered by this additional product. [4]
- (ii) Discuss risks to the insurance company of introducing this new product. [5]
[Total 9]

- 7 (i) Give examples of requirements that a regulator may set regarding validation of a capital model. [3]
- (ii) Describe methods of validating a capital model. [9]
- [Total 12]

- 8 A general insurance company has been writing a certain class of business since 1 July 2009. The following table gives the cumulative claims paid as at 31 December each year, together with development factors and ultimate claims using the basic chain ladder method.

Claims Paid (000s)

<i>UwYr/DYr</i>	<i>1</i>	<i>2</i>	<i>3</i>	<i>4</i>	<i>5</i>	<i>Ultimate</i>
2009	2,332	4,221	5,394	5,993	6,205	6,205
2010	3,749	5,550	6,855	7,401		7,663
2011	4,012	5,901	7,286			8,249
2012	3,998	5,912				8,343
2013	4,512					9,753

Development factors

<i>DYr</i>	<i>1–2</i>	<i>2–3</i>	<i>3–4</i>	<i>4–5</i>	<i>5–ultimate</i>
Year to Year	1.5318	1.2465	1.0935	1.0354	
Year to ult	2.1617	1.4112	1.1322	1.0354	1.0000

UwYr = underwriting year

DYr = development year

- (i) Calculate the following diagnostic statistics:
- (a) Individual year-to-year factors for each underwriting year.
- (b) Percentage developed to ultimate by year for each individual underwriting year. [2]
- (ii) Give reasons, using the two sets of diagnostics and the information supplied, as to why the calculations above when used without adjustment may not give a best estimate of the ultimate claims. [6]
- (iii) Estimate the outstanding claims (using all the claims paid information for all underwriting years), by adjusting the data or methodology where appropriate, giving any assumptions made. [9]
- (iv) Comment on your assumptions from part (iii), considering updated diagnostics from part (i) based on the adjusted triangles. [5]
- [Total 22]

- 9 A reinsurance company writes motor excess of loss reinsurance contracts with an indexation/stability clause that is linked to wage inflation from the date of the accident.

The following formula is used to determine the indexed retention for each individual annual time period i :

$$\frac{\sum C_i W_i R}{\sum C_i}$$

where C_i = payment during period i

W_i = compounded wage inflation at time of payment

R = reinsurance retention

- (i) Explain how the stability clause formula operates. [2]

A loss that occurred on 1 July 2011 has just been settled, exactly three years from the date that it occurred. The claimant has been awarded a lump sum payment of £1.6m with a further annual, wage-inflation-linked payment of £250,000 first paid on the anniversary of the lump sum settlement. Owing to the severity of the claimant's injuries, the medical evidence is that the claimant will live between five and six years from the date of settlement. The company writes a 15% line on a £3m excess of £2m excess of loss reinsurance treaty.

The company's internal discount rate is 2% and it is assumed that the average wage-inflation rate will be 3% per annum for the foreseeable future.

- (ii) Calculate the discounted reserve that the reinsurer should hold for this loss at the date of settlement, stating any assumptions made. [8]

Changes are made to the law of a particular country that make it much more likely that claims will now be settled in the form of annual payments rather than lump sums.

- (iii) Describe modifications that may be required to the reinsurer's investment policy following this change. [6]

- (iv) Suggest how the reinsurer's capital modelling may need to change if an increased number of claims were to settle in this way. [6]

- (v) Discuss advantages and disadvantages of the reinsurer seeking to commute these liabilities in exchange for a lump sum. [5]

[Total 27]

END OF PAPER