

# INSTITUTE AND FACULTY OF ACTUARIES

## EXAMINATION

4 October 2012 (pm)

### Subject SA3 – General Insurance

*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 both 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.*

<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** A medium sized general insurance company with an established portfolio of personal motor and household business publishes aggregate paid loss data. The data consists of annual paid development triangles for the combined motor and household portfolio on a net of reinsurance basis.

An insurance market analyst has used the published data triangle to perform some projections using a basic chain ladder approach. The analyst's projections indicate that there may be a material shortfall in the company's disclosed provisions, which are stated to include a prudent margin.

The analyst has contacted the company to discuss the results.

- (i) Discuss the potential implications to the company of:
- (a) a reserving shortfall as perceived by the market
- and the additional implications of:
- (b) an internally recognised reserving shortfall requiring an increase in provisions
- [8]

The reserving actuary has access to more detailed claim and exposure data, and the published reserve estimates are based on an aggregation of various analyses.

- (ii) List the additional data that the reserving actuary may have used for his reserve estimate. [4]
- (iii) Discuss the impact this additional data might have on the reserve results. [10]

The reserving actuary has applied the following six methodologies:

- (a) Paid Chain Ladder
  - (b) Incurred Chain Ladder
  - (c) Inflation Adjusted Chain Ladder
  - (d) Average Cost per Claim
  - (e) Bornhuetter-Fergusson
  - (f) Exposure based method
- (iv) Give a brief description of each method and describe how they might each explain the apparent discrepancy in required provisions. [12]
- (v) Outline five further distinct methods that might have been used. [5]

In addition to the impact of more detailed data, the internal reserving actuary's projections have been influenced by some operational and strategic changes that the company has recently undergone. From regular discussions with the claims department, the reserving actuary has been made aware of the introduction of a new claims handling initiative in 2010 which is believed to have significantly accelerated claims settlements. The company has also recently been rebalancing its business with a greater focus on motor products. This has been achieved by disposal of some of the household business and more competitive underwriting in certain motor products.

(vi) Describe the features that you would expect to see in claims development triangles for each business line to reflect these changes. [10]

(vii) Based on the triangles below:

(a) outline any effects that can be seen in the triangles below that might result from the changes and

(b) discuss any possible distortions (whether from the changes or from other factors), giving supportive numerical examples where appropriate. [13]

*Candidates are not expected to carry out a comprehensive analysis of the entire dataset, but rather to use their actuarial skill and judgement to identify key features of the data. However, the marks available for each valid point reflect the time constraints associated with the large volume of supporting data.*

[Total 62]

**Motor****Paid Amounts (£m)**

Accident Year	Development months									
	12	24	36	48	60	72	84	96	108	120
2002	379	548	612	671	719	743	753	758	760	763
2003	330	475	527	584	621	638	648	650	649	-
2004	336	498	560	615	665	689	696	702	-	-
2005	377	588	653	705	752	782	796	-	-	-
2006	463	693	768	839	888	921	-	-	-	-
2007	505	738	831	890	946	-	-	-	-	-
2008	454	671	747	799	-	-	-	-	-	-
2009	469	696	751	-	-	-	-	-	-	-
2010	650	847	-	-	-	-	-	-	-	-
2011	699	-	-	-	-	-	-	-	-	-

**Motor****Paid Development Factors**

Accident Year	Development months									
	12-24	24-36	36-48	48-60	60-72	72-84	84-96	96-108	108-120	120 Ultimate
2002	1.445	1.117	1.097	1.071	1.034	1.013	1.008	1.003	1.003	
2003	1.439	1.111	1.107	1.064	1.026	1.016	1.004	0.998		
2004	1.480	1.124	1.100	1.080	1.036	1.010	1.009			
2005	1.561	1.111	1.079	1.067	1.040	1.018				
2006	1.497	1.109	1.092	1.058	1.037					
2007	1.462	1.126	1.071	1.062						
2008	1.478	1.112	1.070							
2009	1.484	1.079								
2010	1.303									
2011										
All years volume weighted	1.452	1.111	1.086	1.066	1.035	1.015	1.007	1.001	1.003	1.015
Cumulative	2.011	1.385	1.247	1.148	1.077	1.041	1.026	1.019	1.018	1.015
2 years volume weighted	1.379	1.095	1.070	1.060	1.038	1.014	1.007	1.001	1.003	1.015
Cumulative	1.851	1.343	1.226	1.145	1.080	1.040	1.025	1.019	1.018	1.015

**Household****Paid Amounts (£m)**

Accident Year	Development months									
	12	24	36	48	60	72	84	96	108	120
2002	341	511	533	543	549	553	555	556	557	557
2003	335	503	520	528	533	535	537	537	537	-
2004	289	416	443	461	470	477	477	477	-	-
2005	292	480	507	515	520	523	524	-	-	-
2006	383	606	632	645	653	657	-	-	-	-
2007	600	950	994	999	1,012	-	-	-	-	-
2008	411	665	697	708	-	-	-	-	-	-
2009	403	606	630	-	-	-	-	-	-	-
2010	407	499	-	-	-	-	-	-	-	-
2011	212	-	-	-	-	-	-	-	-	-

**Household****Paid Development Factors**

Accident Year	Development months									
	12-24	24-36	36-48	48-60	60-72	72-84	84-96	96-108	108-120	120- Ultimate
2002	1.499	1.045	1.018	1.010	1.008	1.003	1.003	1.001	1.000	
2003	1.501	1.032	1.016	1.010	1.004	1.003	1.000	1.000		
2004	1.440	1.064	1.040	1.021	1.014	1.000	1.000			
2005	1.645	1.056	1.016	1.009	1.006	1.003				
2006	1.584	1.043	1.020	1.012	1.007					
2007	1.582	1.047	1.005	1.013						
2008	1.616	1.048	1.016							
2009	1.502	1.040								
2010	1.226									
2011										
All years volume weighted	1.513	1.046	1.017	1.012	1.008	1.002	1.001	1.000	1.000	1.000
Cumulative	1.648	1.089	1.041	1.024	1.011	1.004	1.002	1.000	1.000	1.000
2 years volume weighted	1.363	1.045	1.010	1.013	1.006	1.001	1.000	1.000	1.000	1.000
Cumulative	1.467	1.076	1.030	1.021	1.008	1.002	1.000	1.000	1.000	1.000

- 2 The country of Aqua has a competitive insurance industry. Most householders purchase buildings and contents insurance for their homes. However, all home insurance policies currently exclude claims related to flood.

While only limited data are available on flood risk in Aqua, the following high-level estimates have been prepared.

<i>Flood Risk</i>	<i>Annual Probability of Flood</i>	<i>Number of Homes</i>	<i>Annual Risk Premium for Flood Claims (\$)</i>
Almost nil	Less than 1 in 250	9,600,000	50
Low	Between 1 in 250 and 1 in 100	100,000	250
Moderate	Between 1 in 100 and 1 in 50	100,000	1,000
High	Between 1 in 50 and 1 in 20	100,000	2,500
Very High	More than 1 in 20	100,000	10,000

For reference, the average annual income in Aqua is \$40,000.

Unusually high rainfall during 2011 resulted in flooding across large areas of the country. Many homes were damaged, and there was widespread public anger that the losses were uninsured.

The Prime Minister of Aqua has declared that affordable flood cover should be available to everyone, and has ordered her staff to investigate how this can be achieved. The Prime Minister has proposed a possible solution where:

- Insurance companies would be required to include flood cover with every home insurance policy.
  - Insurers would be allowed to determine the premium to charge each household.
  - However, the Prime Minister has said there would be regulations to prevent insurers charging premiums that were “excessive”.
  - Individuals could choose not to purchase insurance if they considered it to be too expensive.
- (i) Comment on the likely increases in home insurance premiums if this proposal becomes law. [7]

A prominent insurance broker was overheard discussing flood insurance. He suggested it should be compulsory for householders to purchase home insurance.

- (ii) Discuss the advantages and disadvantages of making it compulsory for householders to purchase home insurance. For the purpose of this part of the question you should assume that the Prime Minister’s proposal goes ahead and that flood cover is included with every policy. [9]

High-And-Dry Insurance (HADI) is a small local insurer. Mr Mackintosh, the Managing Director, sends the following memo to his senior management team:

*“The government is currently considering flood insurance issues, but we should act now! HADI must immediately start offering home insurance with flood cover. As the only company providing flood cover, we will make enormous amounts of money!”*

HADI currently sells motor insurance, but has no experience of any other products.

(iii) Discuss any concerns arising from the Managing Director’s proposal. [15]

A committee has suggested establishing an insurance pool for flood risk. Home insurers would be required to include flood cover with every policy sold, but would be free to charge a premium reflecting the expected flood risk. The government will subsidise premiums for homes with a flood risk above a certain level, based on return periods.

(iv) Suggest which homes should be provided with subsidies, and how much the subsidy should be. Provide reasons for your answers. [4]

(v) The government is considering whether to fund the subsidies for high risk properties from general taxation revenues, or by adding a levy to all home insurance premiums. Discuss the advantages and disadvantages of funding the subsidies with a premium levy. [3]

[Total 38]

**END OF PAPER**