INSTITUTE OF ACTUARIES OF INDIA

EXAMINATIONS

13th November 2013

Subject ST7 – General Insurance: Reserving & Capital Modeling

Time allowed: Three Hours (14.45* – 18.00 Hrs)

Total Marks: 100

INSTRUCTIONS TO THE CANDIDATES

1. ***Please read the instructions on the front page of answer booklet and instructions to examinees sent along with hall ticket carefully and follow without exception.***

2. ***Mark allocations are shown in brackets.***

3. ***Attempt all questions, beginning your answer to each question on a separate sheet.***

AT THE END OF THE EXAMINATION

Please return your answer book and this question paper to the supervisor separately.

Q. 1) You are the actuary of a general insurance company in a country with a high inflation rate. The Company's investment manager, who has recently moved from an investment bank, wants to invest about 30% of the Company's assets in equities. He says that since most of the liabilities are inflation-sensitive and as investment return on equities is the best bet against inflation, this will be the appropriate strategy. Please explain the points you will make in response to his suggestion. **[3]**

Q. 2) What are the reasons for variation of data quality and quantity by different classes of business? **[4]**

Q. 3) What is Reinsurance to Close (RITC) in Lloyd's market? How are the RITC premiums assessed? **[4]**

Q. 4) TwoLine Insurance Company writes only 2 lines of business: Motor and Health. TwoLine's CEO has asked its Actuary to come up with the IBNR reserves in such a way so that the chance of the actual losses exceeding the actuary's estimate is not more than 25%. TwoLine's Actuary used the ODP Bootstrapping approach to calculate the loss distributions for Motor and Health. Then, she added the 75^{th} percentiles of the two lines to arrive at an aggregate 75^{th} percentile reserve amount.

Critique the Actuary's approach, suggesting alternative approaches. **[5]**

Q. 5) Describe what are Economic Scenario Generators and its use in Asset Liability Modelling. **[5]**

Q. 6) What measures can an insurer take to reduce fraudulent claims? **[5]**

Q. 7) "Pay as You Drive" is a form of insurance which uses telematics data to determine motor insurance premiums. List the key considerations for "Pay As You Drive" motor insurance **[5]**

Q. 8) **i)** Explain briefly the difference between correlation and dependency. (2)

ii) What are the advantages of copulas over variance-covariance approach with respect to aggregation of risks. (2)

iii) Comment on the dependencies of the following copulas:

a) $C(u,v) = uv$

b) $C(u,v) = \min(u,v)$

c) $C(u,v) = \max(0,u+v-1)$

(3)

[7]

Q. 9) **i)** Explain how reinsurance can help in improving solvency margin. (3)

ii) **a)** An Insurance company has insured 5 buildings with sum-insured amounts of Rs. 1 lakh, Rs 2 lakhs, Rs. 3 lakhs, Rs. 4 lakhs and Rs. 5 lakhs. The Company does not want to pay more than Rs. 50,000 on a single claim for this. Suggest and compare two different types of reinsurance contracts that the Insurance Company can buy to meet its goal. (3)

b) If the gross premium is 5% of the sum-insured, then calculate the total reinsurance premium to be paid under any one type of reinsurance that you have suggested in (a). (2)

[8]

Q. 10) TravelSure started its operations on 1st, January, 2013 with an initial capital of Rs. 50 crores. It writes only Travel Insurance for travellers to the USA. TravelSure writes Rs 50,000 premium each month. Each trip it insures lasts for exactly 3 months. Claims are reported with a lag of 15 days and paid exactly 30 days from the day of reporting. On July 1st, 2013, the exchange rate increased from Rs. 55/USD to Rs 60/USD. Assuming that the claims are paid in USD (and premiums and expenses are in INR), and everything else remaining same, produce the profit and loss account and balance sheet for TravelSure as of December 31st, 2013.

Assumptions: Loss Ratio: 55% (using exchange rate of Rs. 55/USD), Commissions: 30%. Other expenses: Rs 50 lakhs. Tax: 30% of profit. Investment income: Rs 50 lakhs (not affected by exchange rate fluctuations), no dividends. **[9]**

Q. 11) Risk measures can be defined in terms of the desired impact of the capital on the outcome considered.

The following are three examples of risk measures:

a) Value at Risk (VaR) is the loss at a predefined confidence level "@" (for example, 99%).

b) Tail Value at Risk (TVaR) quantifies the expected value of the loss given that an event outside a given probability level (again, say "@") has occurred.

c) Expected Policyholder Deficit (EPD) is the expected value of default amounts. If C is the firm's capital available to fund losses, then the outcomes where loss exceeds C represent insolvency and the amounts by which the loss exceeds C are the default amounts,

i) Derive the relationship between these three risk measures when the C is set equal to VaR at the confidence level of "@". (4)

ii) What are the perspectives of shareholders and policyholders with respect to risk and capital? Suggest measures that align with their perspectives of risk for policyholder vs shareholders (6)

[10]

Q. 12) A retrospecively rated plan is introduced to the Workers Compensation product line where the premium is adjusted after the end of the policy period to include a portion of insured organization's covered losses that occurred during the policy period.

i) What is the main difference of this approach with the No-Claim-Discounts? (1)

ii) Describe the characteristics of the employers (i.e., the insured organization) for which this plan would be more appropriate? (5)

iii) Name the advantages and disadvantages of this plan for the employers. (4)

iv) What are the considerations to be made in the economic capital modeling for this line? (5)

[15]

Q. 13) LoClaim is a General Insurance company. LoClaim's actuarial analyst has been asked to calculate the IBNR for its Motor Third Party segment. He has received the following claims-level data for this segment:

			Payments				
claim id	Loss year	Claim Status	31-12-2008	31-12-2009	31-12-2010	31-12-2011	31-12-2012
11111	2008	Open	100	100	100	30	10
22222	2009	Closed		200	2000		
33333	2009	Open		100	100	100	30
44444	2010	Closed			100	100	130
55555	2011	Open				200	30
66666	2012	Open					200

He also received the total amount of outstanding losses, which is 500. Using a basic paid chain-ladder method, with simple average of link ratios, the analyst has arrived at an IBNR figure of 525.

You have been asked to peer review his study

i) Recreate the calculations done by the analyst. (4)

ii) Explain briefly the points that you will mention in your peer review notes. (4)

iii) List down the additional data you would ask for in order to do a more robust IBNR study. (2)

iv) LoClaim is not able to provide any additional data. Re-estimate the IBNR based on the existing data, explaining your method and assumptions. (10)

[20]

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