INSTITUTE AND FACULTY OF ACTUARIES

EXAMINATION

22 September 2022 (am)

Subject SP7 – General Insurance Reserving and Capital Modelling Specialist Principles

Time allowed: Three hours and twenty minutes

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

If you encounter any issues during the examination please contact the Assessment Team on T. 0044 (0) 1865 268 873.

1 An insurance company writing household insurance in Europe currently performs a quarterly estimation of Incurred But Not Reported (IBNR) reserves. The actuarial team uses annual origin period cohorts for its run-off triangles.

Discuss the advantages and disadvantages for the insurer of using an annual origin period cohort versus a quarterly origin period cohort for estimating its IBNR reserves. [4]

2 Company B is a large personal lines insurer and has recently acquired a commercial lines insurer that has been writing several lines of business, including Employers' Liability (EL).

(i) Suggest possible reasons why the EL reserves may be highly uncertain. [4]

Due to the volatile nature of the EL business, Company B is considering run-off reinsurance options.

(ii) Outline how Company B could implement the following:

(a) Loss Portfolio Transfer (LPT)

(b) Adverse Development Cover (ADC).

[4]

A Director has proposed purchasing an ADC arrangement rather than an LPT arrangement for the acquired EL business.

(iii) Discuss the advantages and disadvantages for Company B of the Director's proposal. [4]
[Total 12]

3 (i) Discuss how an insurance company can calculate the premium and claims liabilities for 'silent cyber' in a property insurance portfolio. [5]

Company C is a general insurance company. For the past several years, it has offered insurance against liability arising due to a loss of data as an add-on product under its General Liability (GL) policy for small-to-medium enterprises. The premiums for this add-on cover are typically 3%–5% of the premium for the GL policy.

It launched a standalone cyber insurance policy for individuals at the beginning of this year. The Chief Actuary at Company C has suggested combining the premiums and claims information for the loss of data insurance component of the GL policies with that of the individual cyber insurance policy for reserving and pricing.

(ii) Comment on the Chief Actuary's suggestion. [7]
[Total 12]

4 Company A is an established general insurance company that started writing marine and aviation liability insurance 2 years ago. Company A has a risk-attaching Quota Share (QS) reinsurance arrangement on this portfolio, ceding 40% of its Gross Written Premium (GWP).

Company A measures its capital adequacy using the Capital Adequacy Ratio (CAR), defined as follows:

$$\text{CAR} = \frac{\text{Total Capital Available (TCA)}}{\text{Total Capital Required (TCR)}} \times 100\%$$

The TCR is calculated by summing the risk charges arising from:

- credit risk.
- market risk.
- insurance liabilities risk.
- operational risk.

A new Director has joined Company A's Board and has suggested that the QS cession should be reduced from 40% to 30%. Their reasoning for the reduction is that the marine and aviation liability portfolio has been profitable in the first 2 years and Company A should retain more of its profits.

(i) Comment on the Director's suggestion considering the impact of the reduction in the QS cession rate on the company's:

(a) net underwriting result. [4]

(b) CAR. [4]

One of the components of the risk charges arising from credit risk is the investment credit exposure to any corporate bonds held by the company. This is calculated by multiplying the amount invested in a corporate bond by a risk charge percentage, which varies depending on the corporate bond's credit rating, as shown in the table below:

Credit rating	*Risk charge (%)*
AAA	1
AA	4
A	6

The company has $120 million invested in an AAA-rated corporate bond. The TCA of the company is currently $300 million and the TCR is $145 million. The ratings agency has recently downgraded this bond and the new rating is AA.

Company A has a target to maintain its CAR above 200%, and their Chief Risk Officer (CRO) has raised concerns that the bond downgrade has impacted their capital adequacy position.

(ii) Comment on the CRO's statement, clearly showing the CAR calculations for before and after the bond downgrade. [6]

[Total 14]

5 (i) Justify, with reasons, whether the following expenses could be categorised as loss adjustment expenses:

(a) Actuary's salary

(b) Annual dinner for all employees

(c) Profit commission to an Agent

(d) Bonus payment to the Chief Executive Officer.

[4]

Company K's portfolio is equally split between long-term construction insurance and annual Personal Accident (PA) covers. At its first quarterly meeting in March, Company K's Board decided to declare dividends for that year in line with the sum of the company's year-end underwriting profit and investment income.

The company's entire investment portfolio is invested in the country's government bonds. The company uses the yield on the government bonds to discount its claims reserves during the valuation exercise. Due to a recent economic downturn in June that year, the yields on these bonds have halved.

(ii) Discuss the possible impact of reduced yields on the company's dividend pay-out. [4]

The Chief Distribution Officer (CDO) of the company has made the following statement at the September Board meeting:

'Considering the very good loss ratios on the PA product, we should immediately reduce the premium rates for the PA business to double the company's PA portfolio premium income in order to maximise the amount of dividends paid out'.

(iii) Comment on the CDO's statement. [7]

[Total 15]

6 Insurer R writes property insurance in a country that is exposed to windstorms that tend to occur seasonally between July and September each year. The policies underwritten by Insurer R incept on 1 January each year for a 12-month period of cover. Windstorms are the only natural catastrophe peril affecting Insurer R's portfolio.

Over the 30-year history of the portfolio, in the July–September season, the earliest windstorm event losses have occurred on 10 July and the latest on 4 September.

The estimated GWP for the current underwriting year is $1 million, and the projected Unexpired Premium Reserve (UPR) at the end of June and September was $500,000 and $250,000, respectively, calculated linearly throughout the calendar year by the finance team.

(i) Outline the advantages and disadvantages for Insurer R of using linear earning of premiums. [4]

The budgeted attritional loss ratio for Insurer R across the portfolio for the current underwriting year is 20%. The catastrophe modelling team has estimated a 40% loss ratio for the windstorm losses, based on a 1-in-200-year return period.

(ii) Discuss the factors to consider when selecting an appropriate loss ratio for Insurer R for the purpose of deriving the gross Unexpired Risk Reserve (URR) as at 30 June. [6]

For the first time in its 30-year history, Insurer R has received a reported loss earlier than usual on 25 May due to a windstorm that day. The loss has been reported at $200,000. The Finance Director has suggested that the UPR and URR should be revised.

(iii) Comment on the Finance Director's suggestion. [4]

[Total 14]

7 A large insurance group owns various insurance entities, with each entity arranging its own reinsurance independently. The group wants to restructure the reinsurance arrangements with the aim of retaining more premium in the group.

(i) Explain possible ways that the group can restructure the reinsurance arrangements of the owned entities to retain more premium in the group. [6]

The group is considering setting up a new reinsurance company in Country L, which has very favourable corporate and regulatory requirements. In recent years, there have been many reinsurance companies set up in Country L and it is known that some hold very little capital. The Regulator for Country L is under pressure to impose stricter regulations on reinsurance companies in the country.

(ii) Propose, with reasons, three possible capital requirements that the Regulator of Country L could impose on reinsurance companies. [3]

[Total 9]

8 Company D is a large general insurance company that has a small but growing motor insurance book. The motor insurance book is protected by a combination of risk Excess Of Loss (XOL) treaty reinsurance and QS treaty reinsurance. Both the risk XOL and QS treaties renew on 1 January. The risk XOL policy is purchased on a 'loss occurring during' basis. The QS policy is purchased on a 'risk attaching during' basis.

The 2021 QS policy has a loss limit that is equal to the 2021 risk XOL deductible of \$500,000, such that the QS operates net of the risk XOL recoveries. A stability clause, linked to wage inflation from the date of the accident, applies to both the QS loss limit and the risk XOL deductible. The QS ceding percentage is 40% and the risk XOL is unlimited in respect of bodily injury claims.

The following formula is used to determine the indexed QS loss limit and risk XOL deductible for each individual annual time period, n:

$$\frac{\sum_{i=0}^{n}(C_i W_i R)}{\sum_{i=0}^{n}(C_i)}$$

where

C_i = gross claim payment during period i.
W_i = compounded wage inflation at time of payment.
R = QS loss limit or risk XOL deductible.

(i) Explain the purpose of the stability clause. [2]

A bodily injury motor loss occurred in 2021 from a motor policy written in 2021. Company D's Reserving Actuary has been advised that the expected ultimate settled claim amount is \$2.5 million. The Actuarial Analyst has provided the following payment pattern for this claim:

Year	0	1	2	3	4	5
Cumulative payment pattern (%)	5	10	50	80	90	100

The average wage inflation rate is assumed to be 3% p.a. for the foreseeable future.

(ii) Calculate, showing all workings and stating any assumptions made, the following:

(a) Risk XOL deductible applicable to this claim for each year (years 0–5) [7]

(b) Expected recoveries to be collected each year from the risk XOL and QS treaties for this claim. [5]

For the upcoming 2022 reinsurance renewal, it has been suggested that Company D should consider increasing its risk XOL deductible to save on reinsurance costs.

(iii) Discuss the factors Company D should consider with regard to this suggestion. [6]

[Total 20]

END OF PAPER