

INSTITUTE AND FACULTY OF ACTUARIES

EXAMINATION

23 September 2022 (am)

Subject SP9 – Enterprise Risk Management Specialist Principles

Time allowed: Three hours and twenty minutes

<p>In addition to this paper you should have available the 2002 edition of the Formulae and Tables and your own electronic calculator.</p>
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If you encounter any issues during the examination please contact the Assessment Team on T. 0044 (0) 1865 268 873.

1 Company X is a new general insurance company set up by an experienced insurance industry expert, ‘The Founder’. The company was founded with \$250m of third-party investment, supplemented by \$10m directly from The Founder. The Founder was a very successful executive who worked in a variety of senior roles at several different organisations for over 30 years before setting up Company X. The Founder currently acts as Chair of the Board, Chief Executive Officer (CEO) and Chief Actuary for Company X, as well as owning 25% of the share capital.

- (i) Identify six risks to which Company X is more exposed than other established general insurance companies. [3]
- (ii) Explain, for each risk in part (i), why Company X is particularly exposed to this risk. [6]
- (iii) For three of the risks in part (i):
 - (a) describe mechanisms by which Company X could mitigate the risk.
 - (b) explain how any residual risks (if any) may be managed. [6]

At the end of its first year of trading, Company X has completed its recruitment of the senior roles:

- The Founder is no longer the company’s Chief Actuary and acts only as CEO.
- The Board has appointed an independent Chair.

Company X intends to remain a small and specialised company, writing mainly long-tailed casualty business with a headcount of less than 50 employees. To keep headcount low, risk management responsibilities will be spread throughout the organisation:

- All senior management will have a dual reporting line into the CEO and Chief Risk Officer (CRO), with just one employee reporting directly to the CRO.
- The CRO has a seat on the Board and chairs the Board’s Risk Subcommittee, which comprises the CRO and four Non-Executive Directors.

As with all senior management in Company X, the majority of the CRO’s compensation is in the form of a variable bonus, which is directly linked to the financial performance of the company each year.

- (iv) Compare the management structure and remuneration arrangements set out above to Enterprise Risk Management (ERM) best practice. [5]

Company X's new Chief Actuary is building a stochastic model of the company's Profit and Loss (P&L) statement over the next 12 months. The Chief Actuary made the following assumptions in the modelling:

Deterministic items

<i>Item</i>	<i>Value (\$m)</i>
Net premium	250
Expenses	25

Stochastic items

<i>Item</i>	<i>Mean value (\$m)</i>	<i>Standard deviation</i>
Net claims	200	50
Investment income	50	10

The model used is:

$$\text{Profit} = \text{Premium} - \text{Expenses} - \text{Claims} + \text{Investment income}$$

The Chief Actuary assumes that there is a -50% linear correlation coefficient between the net claims and investment income. They intend to model the combined claims and investment income distribution as a single lognormal distribution.

- (v) Calculate the parameters for this distribution. [3]
- (vi) Calculate the probability that Company X makes a loss next year under this model. [2]
- (vii) Comment on the design and calibration of this model. [5]

Over time, this model is identified as being too simplistic, so the Chief Actuary decides to build a stochastic model. Under the new stochastic model, the net claims are modelled using a lognormal distribution and the investment income is modelled using a normal distribution, in each case using the moments above. The Chief Actuary wishes to select a suitable copula by which to implement the dependency between net claims and investment income.

- (viii) Recommend, with reasons, a suitable copula to use. [2]

As a result of this modelling, Company X decides to invest in long-term corporate bonds, which it believes provide significant improvements to the overall level of return, with limited additional risk. The Board has expressed concerns about liquidity risk. However, the Chief Actuary has responded to say that they are not including liquidity risk in the model, on the grounds that it represents spurious accuracy.

- (ix) Comment on the Chief Actuary's response. [3]
- (x) Discuss how the company may monitor and manage its liquidity risk. [8]

As a result of these discussions, some Board members are concerned that there may be additional risks that Company X is not considering.

- (xi) Describe the risk management control cycle that Company X may use. [3]
- (xii) Explain how the risk management control cycle could be used to mitigate the Board's concerns. [5]

The Board has asked the Risk Function to come up with a set of quantitative risk appetite statements, to be presented to the Board each quarter.

Proposal 1

The Risk Function would like to use probabilistic statements, e.g. 'The probability of making a loss over the next 12 months should be no more than 15%', and then use the Chief Actuary's P&L model to monitor against these statements.

Proposal 2

The Chief Actuary is concerned about Proposal 1. They would prefer risk appetite statements to be deterministic, e.g. 'Under a specified scenario, Company X should lose no more than \$50m'.

- (xiii) Discuss the advantages and disadvantages of each of these two proposals. [12]
- [Total 63]

2 Company Y is a large, multinational life insurer based in Country Z. Company Y does not currently follow ERM principles. The CRO has suggested that the company should do so.

(i) Describe the key principles of ERM, using your own words. [3]

(ii) Outline the benefits to Company Y of following the principles described in part (i). [5]

(iii) Outline five key risks to Company Y, other than operational risks. [5]

Country Z has recently announced the completion of comprehensive trade agreements with several countries that are its largest trading partners. The agreements allow for citizens and capital to move freely between Country Z and each of the other countries. Over 95% of Company Y's business is in the affected countries.

(iv) Discuss how Country Z's announcement impacts Company Y's risk profile. [6]

Company Y holds a significant portion of its asset portfolio in direct property investments in Country Z. Company Y considers it likely that interest rates in Country Z will start to rise in the next 3 months and will continue to do so over the next 2 years. If this happens, Company Y believes that the value of property in the country will decrease significantly.

(v) (a) Describe three ways in which Company Y could hedge this risk.

(b) Discuss the advantages and disadvantages of each of the hedging strategies described in part (v)(a).

[8]

Company Y has decided to launch personal pension investment products to diversify its liability portfolio. These products will be provided by a separately capitalised subsidiary in each country and sold through the same distribution channels as its life insurance products.

(vi) Comment on this arrangement. [5]

Company Y proceeds to launch its first personal pension investment product, allowing customers to pick from a range of underlying funds with different risk profiles. To build market share, Company Y offers its pension customers a guarantee: each customer's total pension pot will have a minimum return of the local rate of inflation. This ensures that customers' pension savings do not decrease in real terms.

(vii) Identify the risks to Company Y of this arrangement, suggesting how each risk may be mitigated. [5]

[Total 37]

END OF PAPER