

INSTITUTE AND FACULTY OF ACTUARIES



EXAMINATION

13 April 2016 (pm)

Subject ST9 – Enterprise Risk Management

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 before 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 three 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 (i) State reasons why an organisation might build a model as part of its overall ERM decision-making. [4]

Blue Ltd is a small specialist general insurance company which sells only mobile phone insurance and has been doing so for the last three years.

To calculate its Solvency Capital Requirement under Solvency II, it is currently using the standard formula in a spreadsheet.

An Executive Director has suggested developing an internal model instead.

- (ii) Assess the suitability of the Executive Director's suggestion. [6]

The Economic Capital Director has suggested buying an off-the-shelf software package to be calibrated internally rather than developing the model in-house. The following options are available:

- Model 1 is a replicating portfolio stochastic model with a benchmark run time of 9 hours. Once the run is completed, the model has functionality that automatically populates the regulatory returns. [A replicating portfolio model involves valuing liabilities as the market value of a portfolio of assets that is chosen to replicate most closely the duration and risk characteristics of the liabilities.]
- Model 2 is a nested stochastic model with a benchmark run time of 20 hours. [A nested stochastic model is one in which stochastic calculations are also required within each individual simulation.]
- Model 3 is a deterministic model using closed form solutions and which aggregates risks using a correlation matrix approach. It has a benchmark run time of 2 minutes. Once the run is completed, the model has functionality that automatically populates the regulatory returns.

- (iii) Discuss the advantages and disadvantages of each of these models. [9]

- (iv) Suggest additional information that the company should request before selecting a model. [7]

[Total 26]

- 2 Diamond Fitness Ltd. is a chain of three small specialist gyms which are open to women only. Diamond Fitness gyms also provide fitness classes, massage and physiotherapy services at an additional cost to members.

The company is too small to operate with sophisticated ERM.

- (i) Propose ERM-related actions that the company could take which would be practical, cost effective and useful. [5]

The company is owned by Joanna Smith, who is also the Chief Executive Officer. She set it up three years ago. She invested \$1 million in the company and the company borrowed \$3 million from a bank under a ten year loan to purchase the properties and buy the initial equipment.

Membership fees are saved in a business bank account and are used to cover the loan repayments and ongoing running costs including salaries.

- (ii) Describe how the bank would evaluate the credit risk within the loan at the outset, stating any assumptions that you make regarding the terms and conditions of the loan. [10]

The Board comprises Joanna as Chairperson, Claire (a former professional body-builder who teaches fitness classes at the gyms), Denise (a professional triathlete, a gym member and a school friend of Joanna) and Joanna's sister, Brenda (a hockey coach who also uses one of the gyms). There are no independent non-executive directors.

Performance appraisals of Board members are carried out by an external recruitment firm on an annual basis.

The Board meets annually to review the annual accounts, which are produced by an external accountancy firm.

Although the business is currently fully owned by Joanna, she is considering the possibility of a future share listing. She is therefore considering whether changes should be made in respect of the corporate governance of the company.

- (iii) Propose, with reasons, changes that Diamond Fitness could make to improve its corporate governance. [8]

Elite Fitness is another local gym chain. It has recently closed down, due to a loss of members following a report in a local newspaper which exposed illegal substances being traded on the premises.

The Board of Diamond Fitness is concerned about risks to its business.

- (iv) Describe two distinct tools that the Board can use to help it identify the risks to which Diamond Fitness is exposed. [4]

The Board has identified a significant number of operational risks.

- (v) Outline ten operational risks that the Board is likely to have identified. [5]
- (vi) Explain whether just holding additional capital is a suitable risk mitigation technique for operational risks. [3]
- (vii) Propose alternative mitigation techniques for the operational risks identified in part (v). [6]

Joanna has decided not to renew the flood insurance cover which she has purchased for her business premises. She believes that it will be more cost effective to hold a small amount of capital, since the likelihood of a flood event happening is very low.

- (viii) Explain which modelling technique would be most appropriate for the assessment of this capital amount. [1]
 - (ix) Outline the information that would be needed and how it might have to be adjusted. [3]
 - (x) Assess the overall corporate risk exposure arising from all financial and non-financial risks. Your answer should include assessment of the relative importance of each risk, after allowing for the impact of likely mitigation strategies. [15]
- [Total 60]

- 3**
- (i) List different ways in which a company can seek to reduce its financial market risk exposure without transferring risk. [4]
 - (ii) Explain how the extent to which assets and liabilities are matched can generate risk for an organisation. [7]

DEF Life is a life insurance company. It would like to match as closely as possible the cash flows from its asset and liability portfolios. For the purposes of this matching, it has chosen to match the net cash flow arising from the liability portfolio projected on its regulatory basis, which includes margins for prudence, rather than matching best estimate cash flows.

- (iii) Comment on this approach to matching. [3]
- [Total 14]

END OF PAPER