ACTUARIAL SOCIETY OF SOUTH AFRICA

EXAMINATION - MEMO

10 May 2023 (am)

Subject A311 — Actuarial Risk Management Core Principles

Paper One

This subject report has been written with the aim of helping candidates. This report summarises the main points that the examiners were looking for and some common problems encountered.

QUESTION 1

Examiner comments: *Most candidates could define risk appetite to some extent, but few could do so succinctly. Generally candidates struggled to come up with a reasonable list of how the risk appetite can be expressed. Many comments were based on activities/decisions of a company that might be interpreted as more/less risky (e.g. expanding rapidly) instead of express statements of what risk a company is willing to take/avoid. Most candidates came up with six reasonable points under part (ii).*

i.

- Risk appetite can be defined as being a statement of the maximum amount…
- …and types of risk(s) that an entity is prepared to take on…
- …in order to meet its objectives.

How expressed

- Risk appetite can be expressed by means of both quantitative…
- …as well as qualitative statements.

Quantitative statements may refer to the organisation's
- Solvency level…
    - …staying above a certain threshold with a certain probability.
    - Probability of ruin might also be a valid metric to consider
- Credit rating…
    - …with the rating not reducing beyond a certain level with a certain level of confidence
- Earnings and/or dividend paying ability…
    - …e.g. earnings volatility not exceeding X.
- Economic value…
    - …e.g. not losing a certain amount of economic value (or earnings) with a given probability…
    - …(e.g. only 1/200 year outcomes should exceed the risk appetite for example).
- In practice many risk appetites will be a combination of the features above…
- …since the board may need to address the needs of different stakeholders.
- The risk appetite might be expressed so as to maximise say economic value…
- …subject to for example solvency deterioration constraints.

- Qualitative statements may refer to risks that the company chooses to avoid altogether,…
- …e.g. not doing business with anyone that has a criminal record…
- …or avoiding doing business in certain territories or with certain organisations.

ii.

- Size
- Period of time it has been in operation.
- Level of capital available (*credit also to be given if structure of capital is mentioned*)
- Existence of parent company (or other guarantees)
- Level of regulations that apply to the company
- Corporate structure (e.g. proprietary vs. mutual)
- Previous experiences of board members
- Attitude to risk of owners or providers of capital
- Company's preference to maintain a certain credit rating
- Nature of the products being sold, e.g. more guarantees may dictate lower risk appetite.

QUESTION 2

Examiner comments: *This question highlighted again that candidates often don't understand the basics of retirement savings arrangements. Previous sittings often showed the lack of basic understanding of DB schemes and it was disappointing to see even simpler DC schemes being so poorly understood. The majority of candidates commented on the existence of liabilities that need to be funded and matched in part (ii) of the question.*

i.

- Requirement to offer a fund to staff or compel staff to join fund
- Min or max contribution rates
- Allow tax deductibility/incentives
- Limit commissions associated with insured benefits
- Require certain benefits to be insured
- Require minimum benefits to be offered
- Required qualifications or education of trustees
- Require appointment of professionals where expertise is required
- Requirement that trustees arrange education / advice for advice
- Allow for contracting out of state schemes
- Maxima to be applied to admin/investment charges and fees
- Minimum or max retirement age
- Prescribe the form of purchase at retirement
- Prescribe method and assumptions for benefit projections
- Require a minimum fund size or pooling of funds

ii.

- Types of assets the fund is allowed to invest in – exclude certain asset classes
- Limits of exposure to certain currencies
- Credit limits for fixed income investments
- Require custodianship of assets
- Max allocation to each asset class
- Require a min asset allocation to certain assets
- Limit exposure to single counterparty
- Require consideration of ESG criteria
- Regulate charges and fees related to asset management
- Prescribe method of valuation of assets
- Require minimum levels of liquidity

QUESTION 3

Examiner comments: *Part (i) of this question was bookwork and overall not answered well and many candidates did not know the basic definition. As for the actions could be taken, the majority of responses focused on aspects of good corporate citizenship (TCF, ESG, ethics) as opposed to the broader aspects of corporate governance (objectives, internal processes and controls, disclosure etc.). Part (ii) saw candidates generally come up with valid ideas, but weaker candidates took a scattergun approach including elements of the external environment not asked for. Exam technique was often lacking with many points listed cryptically, with little extra information.*

i.

- Corporate governance is the name given to a high-level framework…
- …within which managerial decisions are made within a company.
- Good corporate governance ensures that the company is managed efficiently…
- …in a way that meets the requirements of all of its stakeholders.
- A particular concern of corporate governance is that managers might make decisions based more on their own personal interests…
- …rather than on the interests of the shareholders.

Actions that can be taken:

- The establishment of clear corporate aims and objectives,…
- …and the setting of realistic short- and long-term company targets …
- … to meet the expectations of the key stakeholders.
- The production of regular internal management reports…
- … to compare actual performance with the company's aims, objectives and targets.
- The establishment of clear operating procedures for all critical processes…
- … and a system that checks that such procedures are being implemented.
- The establishment of an audit committee and clear audit trails
- The appointment of non-executive directors to provide a more impartial view.
- The regular publishing of audited accounts.
- The development and recording of job descriptions for management …
- … with key accountabilities and limits on authority.
- The establishment of effective performance measurement practices …
- … including the setting of performance standards, regular monitoring and feedback.
- The implementation of remuneration schemes…
- … linked to individual performance and/or corporate performance.
- Having a clear risk management framework.

ii.

Cultural considerations
- Society's view of the importance of funerals (and hence funeral insurance)
- Whether the people are comfortable with existing insurance providers…
- …as well as sharing of their personal information with them.
- Society's expectations of financial service providers,…
- …e.g. playing an active role in society development/education, …
- …or having strong views with regards to climate change etc.
- How will we market to the target market in the country (see also social media point later)

Demographic
- General mortality and morbidity being experienced in the country…
- …as well as the outlook/trends of these.
- What are the major local risks to mortality, which may include…
- …diseases, conflict, natural disasters.
- To what extent can these risks be underwritten and/or mitigated.
- What data is available on local mortality experience?
- Medical infrastructure in the country (give credit if mentioned under technology and not here).

Technology
- How are existing products sold?
- Is it via direct (tech) channels or mostly via brokers/agents?
- If the company is currently selling mostly over internet/phone,…
- …will the existing infrastructure/technology exist to continue doing it.
- The ease with which price comparisons can be done?
- Restrictions on data handling.
- Existence of banking infrastructure to support premium collection.
- Existence of competitors offering similar products,…
- …perhaps in the forms of big local banks offering life insurance together with banking services.
- Local adoption of social media…
- …and whether this is a platform already used in SA.
- Whether additional technology/data exists to support pricing…
- …e.g. client credit histories or other personal information,…
- …and the extent to which this can be used?
- Availability of locals to support the company's technology setup (if necessary).

QUESTION 4

Examiner comments: *Responses under part (i) generally identified the extra return required for the, but many candidates missed the point about the risk premium being relative a risk free rate. Part (ii) was answered well with most calculations being sensible, although many neglected to account for the tax. Many of the assumptions stated didn't add any value (e.g. annual dividend, which was implied). Most neglected to mention the share being held indefinitely and the reinvestment of dividends. Part (iii) was generally well answered, with better candidates elaborating on why assumptions may be different and not just stating such. Better students made an effort to come up with types of companies that illustrate difference reactions to the recession.*

i.

Equity risk premium (ERP)
- This is the additional return that investors require from equity investment…
- …to compensate for the risks relative to the risk-free rate of return.

Factors
- Greater risk of default (e.g. dividends or on wind-up).
- Lower marketability and liquidity of shares and higher dealing costs.
- Greater uncertainty and volatility of returns from shares.

ii.

Valuation using a dividend discount model: $V = D\,(1 - t) / (i - g)$, where:

D (annual dividend in a year's time) = R2 (1 + g) = R2.20
t = 30% = 0.3
i = 12% = 0.12
g = 10% = 0.1

Hence, V = R2.2 (1 – 0.3) / (0.12 – 0.1) = R77

Additional assumptions implied:
- Dividends are reinvested at i(12%)p.a.
- The share is held indefinitely.
- No expenses (e.g. on dividend reinvestment).

iii.

- The analyst's model is very simplistic (e.g. indefinite holding period) and may be giving an unrealistic valuation compared to other investors' models.
- Assumptions used by the analyst may be unrealistic:
  - e.g. constant dividend growth if the business is a cyclical one or in a mature industry.
- Other investors may incorporate dealing expenses in their calculation.
- Other investors may have a different view of the company's risks…
- …or may be using a different equity risk premium…
- …and hence requiring a different rate of return.
- Other investors may be taxed at a different tax rate.
- The analyst may be ignoring other relevant information in the valuation, which may include:
  - A potential take-over
  - share buy-backs,

    - rights issue having some impact on the share's value.
- An inefficient market (e.g. due to poor liquidity), so that the market value is not a good reflection of value.
- Market value represents a snapshot in time…
- …and may be influenced by relative supply vs demand (and sentiment)
- …which is likely volatile in the short-term…
- So, the difference may be attributable to short term volatility.

iv.

Possible changes

- Assumption of lower dividend growth.
- Use of less frequent dividend assumptions that reflect a possible decrease in dividends over the recessionary period
- …followed by a recovery in dividends thereafter.
- Required return may decrease, remain unchanged or increase:
    - Equity risk premium may need to be increased…
    - …to allow greater uncertainty, return volatility and default possibility.
    - Risk free rates may be adjusted downwards…
    - …if long-term rates are expected to decrease, which is likely in a recession.

Likely impact of company type

- For a *cyclical company*, share value is likely to reduce due to lower expected future dividends and possibly larger required return (due to larger ERP).
- For a *stable, defensive company*, share value could increase due to little/no reduction in dividends…
- ….little/no expansion in equity risk premium…
- …and lower risk-free rates resulting in a lower required return and lower discount rate.

- For *export companies, and/or companies with substantial operations in other countries*, there may be little/no impact of a local recession…
- …unless the value of the local currency is expected to change significantly…
- …and/or there is a change in required return (e.g. due to lower risk-free rates).

QUESTION 5

Examiner comments: *Candidates generally knew their bookwork well here and got the basic marks for that. Basic application was also made, but many students still demonstrate lack of understanding of these concepts. For example, many candidates commented on the concept of risk pooling not really applying since only this one animal/farm is being insured by the businessman as opposed to commenting on whether the insurer is able to pool similar risks across policyholders. Many missed the moral hazard posed by price fluctuations. Better candidates approached the problem practically, used simple examples and made basic application.*

Key criteria for a risk to be insurable

The policyholder must have an interest in the risk being insured
- It is clear that the businessman would lose money for the animal if it was to perish…
- …and that generally the policyholder would not want such an event to happen.
- However, the value of such an animal might be volatile…
- …and moral hazard or fraud risks exist if the value of the purchase was to drop dramatically.
- Requirement that policyholder must also be the owner of the animal.

The risk must be of a financial and reasonably quantifiable nature
- This ensures that a monetary claim amount can compensate for the loss.
- …and allows the insurer to set an appropriate premium.
- It is possible to assign an insured value based on what was paid for the animal and use that as a basis for compensation.

The amount payable in the event of a claim must bear some relationship to the financial loss incurred.
- if the claim amount is too large, this will encourage fraud and moral hazard.
- Similar to the previous point, the sum insured may be set with reference to the purchase price,…
- …but the actual value may be much higher/lower, depending on the market.
- Insurer may need to protect itself against moral hazard by paying a market related price…
- …perhaps based on recent auctions.
- Alternatively cover may be limited to only a % of the original purchase price.
- The sum insured may be decreased if the animal is beyond a certain age…
- …since breeding potential may be limited.

Desirable criteria for insurable risks

Individual risk events should be independent of each other.
- While the insurer might have a diversified book of animals…
- …there will be some concentration risks on each farm, e.g. a fire or disease outbreak.
- Overall, claims are expected to be relatively uncorrelated across different policyholders.

The probability of the event in a defined period should be relatively small
- Depending on the perils insured this may or may not hold.
- For example, one cannot insure animals against old age say.
- Insurer can insist on certain control measures being in place, e.g. veterinary inspections…
- …or security measures on the farm.

Large numbers of potentially similar risks should be pooled in order to reduce the variance
- It is likely that similar risks can be pooled if there is a market already for animals,…
- …but if these are the first animals to be insured, there might not be sufficient pooling yet.

There should be an ultimate limit on the liability undertaken by the insurer

– This is likely to hold as the insurer can limit the loss to a fixed amount…
– …as well as exclude potential additional losses such as liability to third parties explicitly.

Moral hazards should be eliminated as far as possible

– These can be difficult to quantify and be costly.
– The insurer can insist on a significant participation in the risk, e.g. a big deductible,…
– …but this might be a limited deterrent if market prices of the animals fall drastically.
– The insurer can insist on only certain perils being covered, e.g. lightning/diseases, that might be harder to stage "fake" claims with.
– Medical exams by a veterinarian may be required for very high sums insured.

There should be sufficient existing statistical data / information

– Without data, the insurer cannot estimate the extent of the risk and its likelihood of occurrence.
– It is possible that data exists, or that reasonable assumptions can be made.
– However, the rarer the animals, the more uncertain the data is likely to be…
– …and experts may need to be consulted.
– Premiums may also be reviewable annually…
– …giving the insurer the opportunity to update rates as more experience emerges.

QUESTION 6

Examiner comments: *Part (i) was generally answered reasonably well, but thereafter many candidates appeared ill prepared to comment on basic group life arrangements. Even after clear signposting that it is an annual arrangement, they "forced" responses into pricing and underwriting the risk similar to traditional underwritten life products under part (ii) with few articulating sensible ways to choose a free cover limit. Answers under part (iii) were generally fine, but a surprising number of students interpreted the setting as the premium being fixed, as opposed to the rate applied to the salary and hence making comments that scored poorly.*

i.

- Mortality rates
- Critical illness incidence rates
- Disability incidence rates (for lump sum)
- Disability incidence rates for income protection
- Recovery rates for income protection
- Interest rates (for value of income protection benefits)

- Number of employees / size of company
- Size of payroll
- Information on benefit structures required…
- …and details on what level of benefits are compulsory vs. voluntary.
- Assumptions on the demographic mix of the insured group of people is required, …
- ….since rates are likely also differentiated by:
    - Age
    - Gender
    - Education / salary / job description (if available)
    - Retirement age (for income protection)
- Assumptions above may be included as part of a detailed list of current employees.

Other assumptions required:
- Past experience of MegaCom's group scheme arrangements
- Commission percentage payable to broker
- Overhead expenses
- Underwriting expenses
- Profit margins
    - Which may include margins for prudency / uncertainty.

ii.

- LifeCorp may have in-house rules for fixed maximum limits without underwriting
    - While this is simple and consistent…
    - …it may not be practical as in some cases (e.g. low paying groups) very few if any might be underwritten,…
    - …while in other cases (e.g. high paying groups) too many employees trigger underwriting.
- May decide on underwriting a certain % of all lives in each group
    - This is also simple to apply, but its effectiveness might be skewed by the distribution of risks, where in some cases not a lot of additional risk will be identified,…
    - …despite the costs incurred.
- May consider the past claims history of the group
    - Especially considering the large claims to identify potential areas of risk

- LifeCorp may a decide on not spending more than a certain % of premium from each group on underwriting.
- They can consider the age profile of the group
  - with older groups perhaps warranting more underwriting than younger groups.
- If this client was also insured with LifeCorp at time of the expiry of current cover,…
- …the underwriting from the previous year may still be valid
- Any combination of the above criteria can be used.
- Should also consider what the market practice is (or what competitors are doing)
- LifeCorp may need to consider whether their reinsurers impose any underwriting requirements

Whatever the criteria used, LifeCorp:
- Should endeavour to accept a large proportion of lives on standard terms…
- …as this would simplify the administration and claims handling…
- …as well as make it easier to present the structure to clients.

iii.

Advantages
- MegaCom has certainty of cover and costs for the medium-term future.
- LifeCorp does not have to worry about competition stealing this client in the next four years.
- Underwriting is likely simplified and/or cheaper…
- …as it might not be necessary to underwrite the same lives more than once over the period.
- Broker benefits from guaranteed business over the time period.

Risks
- There is a risk that the underlying mortality, morbidity rates rapidly deteriorate over the next four years,…
- …e.g. in the event of a pandemic…
- …and that LifeCorp cannot change the terms.
- It might be possible to negotiate some contract terms/clauses to allow exit / renegotiation of terms in such cases.
- There is risk that the demographic profile (e.g. average age/gender mix) on which the group was priced changes drastically over the next few years…
- …a margin can be included in the pricing…
- …or the average four year risk cost used in the calculation.
- Risk that exposure (sum insured, as function of payroll) increases by more than LifeCorp is comfortable with,…
- …for example either by many new staff joining or by salaries increasing by more than expected.
- LifeCorp can impose maximum total sum assured under the agreement.
- There is opportunity cost to LifeCorp if the market hardens and they cannot also increase their rates on this scheme.
  - This risk is unlikely to be avoided and is somewhat offset by the opposite scenario being avoided.
- There is risk to MegaCom that more innovative products appear on the scene that they cannot get access to until the four years are over.
  - Can negotiate the opportunity to "upgrade" their cover, as long as it is not cheaper/worse than the original cover agreed to.

QUESTION 7

Examiner comments: *Part (i) showed the importance of students reading the question carefully. Candidates were required to comment on the features of the liabilities to consider and not to come up with the strategy or required matching assets as well. Candidates made poor use of the information provided in the question often referring to "options and guarantees" which are not the most obvious considerations in the medical scheme setting. The fact that the company is large should trigger ideas of more stable/predictable experience, but few made use of that information. Candidates also often said that the liabilities are long- and short-term, without more context, which scored poorly. Part (ii) had many candidates identifying some valid points, but often it wasn't clear if they understood why this would impact the strategy. Part (iii) was very generic and often were not even applied to the monitoring of investment strategy.*

i.

Liabilities are mainly ***short-term****...*
- …since they relate to acute (short-term) illnesses and hospital stays.
- In some cases chronic conditions may require medication for many years…
- …but cover is typically provided for a year and then renewed,…
- …so even longer-term liabilities might be subject to changes (depending on scheme rules).
- There can be delays in reporting and settling claims,…
- …but these are generally of short duration.

Liabilities are ***real*** *(linked to inflation).*
- Medical inflation is usually experienced to be higher than headline inflation.
- However, the short-term nature of claims means that the impact of inflation is not material.
- Medical scheme administration expenses are linked to wage inflation.

Liabilities will be ***in local currency****.*
- A portion of the liabilities may be linked to exchange rate fluctuations…
- …such as imported medicines and diagnostic equipment.
- Members may also be covered while they travel abroad, although the impact of this is expected to be minimal.

Some liabilities ***may be predictable in terms of timing or amount***
- e.g. some claims like for colds and flu will be highly seasonal
- One can expect that for a large, well-established scheme there may be a certain degree of claims stability…
- …with stable claims incidence and severity.
- However large, unexpected claims may occur…
- …such as a sudden pandemic…
- …or a new medical treatment/technology that sees sudden demand and can be very costly.

ii.

- The size of the scheme is important as a larger scheme will have more predictable claims experience.
  - This will impact the degree of liquidity required from the underlying assets.
- The solvency level of the scheme and level of surplus assets.
  - As determined on a prescribed statutory basis.
  - This will give an indication of the degree of mismatching which can take place.
  - It will also indicate the extent to which a company can invest in growth assets such as equities in order to pursue higher returns.

- Whether there are any unintended concentrations of risk e.g. by geography
- Any regulations (especially with regards to investments) need to be complied with.
    - E.g. restrictions on asset classes.
- If the insurer operates in different territories
    - Different regulations might apply
- Current valuation of assets. Are the current holdings deemed cheap/expensive?
- The risk appetite of the scheme.
- Outlook for the business
- Regulatory changes which may be coming
- Changes to the business strategy
    - e.g. entering a new market or offering new products
- Attractiveness of income vs. capital gains in terms of tax treatment.

iii.

Why important

- Monitoring is important to check whether the assumptions made when setting (and/or modelling) the strategy have been borne out in practice.
- Where there are deviations, updates to the strategy (or assumptions) can be made.
- Monitoring will identify new risks…
- …and allow for corrective actions to be taken.
- The strategy was set up to meet certain objectives…
- …and monitoring will enable the company to ensure these objectives are still being met.

The framework may contain

- The performance of the various asset classes
    - and comparing with objectives and assumptions.
- The performance of individual fund/asset managers
- As well as a comparison of this performance against benchmarks.
- Monitoring that fund managers are acting within their mandates.
- Identifying underperforming classes/managers.
- Monitoring the liabilities/cashflows/claims of the scheme…
- …to ensure the composition is similar to what was assumed at the outset.
- A regular report on the investment performance/strategy outcome of the scheme.
- Investigations/comments on trends/cycles…
- …as well as ensuring that abnormal events are explained.
- There may be updates on economic outlook…
- …and whether this requires a change to the investment strategy.

