Actuarial Society of South Africa

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Subject A311 — Actuarial Risk Management

PAPER ONE

EXAMINERS' REPORT

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

<u>Examiner's comments:</u>

Most candidates managed to list at least some relevant points, but many failed to provide sufficient points given the number of marks available or make some application to the setting of a defined benefit fund. Some failed to notice the word "list" in the question and would elaborate unnecessarily.

- Investment regulation, such as:
  - Limits on asset class exposure
  - Liquidity requirements
  - Prohibition of certain asset classes
  - Requirement to invest in certain asset classes
  - Regulation requiring a custodianship of assets
  - Regulation around matching of assets and liabilities

- Tax regulation around the tax treatment of
  - Contribution and
  - Investment returns

- Governance related regulation
  - Accounting and auditing regulation of the fund's assets.
  - Regulation requiring regular actuarial valuations…
  - …as well as direction on assumptions/approaches to be used in the valuation.
  - What to do if there is a surplus or deficit.
  - Board of Trustees behaviour is regulated – fiduciary duty to act in members' best interests
  - Regulation requiring them to appoint experts and advisors where there is lack of expertise
  - ESG related regulation

- Regulation of benefits
  - Regulation on the size and type of benefits and size of contributions
  - Requirement for minimum benefits and maximum benefits
  - Requirement for certain types of benefits to be offered e.g., death, disability
  - Regulation around pension increases

- Regulation on the fees and expenses which can be deducted
- Regulation around timing of contribution payment and benefit payments
- Regulation if the fund should wind-up
- Regulation around options at retirement – lump sum commuted versus pension
- Regulation around adequate member communication

QUESTION 2

Examiner's comments:

Candidates generally scored well for this question. The setting related to financial markets specifically and hence required comments from an investment perspective to score well. Although the suggested solution is based on the course material, candidates were given credit where appropriate alternative measures were discussed.

Capital adequacy

- Regulators would require that financial institutions hold sufficient financial resources to cover their liabilities.
- Financial resources can include capital, cash, liquid securities, credit lines etc.
- Regulation would also require that there are sufficient margins in place to ensure that liabilities can be met in adverse/unexpected scenarios as well.
- The regulator may prescribe methods of calculating such margins…
- …or allow companies to model it within a prescribed framework.

Competence and integrity

- Regulators would want to ensure that financial practitioners operate with a minimum standard of competence and integrity.
- Individuals may have to prove their competence by obtaining specified qualifications…
- …or being a member of certain professional organisations.
- Regulators may also want to prevent someone from working in a particular industry or at a certain level…
- …if they don't meet "fit and proper" requirements.

Compensation schemes

- Regulators may establish compensation schemes…
- …either funded by the industry or the government…
- …which provide recompense to investors who have suffered losses.
- These typically cover losses due to fraud, bad advice or failure of a service provider…
- …and note market related losses (e.g. shares going down in value, because a company underperforms).
- Compensation may be limited to a maximum…
- …to ensure that investors also retain incentive to consider the financial integrity of providers.

Stock exchange requirements

- Companies listed on the stock exchange will have to fulfil criteria regarding financial stability…
- …and will have strict obligations around disclosure of financial and other information.
- Regulators will monitor aspects such as the prices at which trades are done and the reporting of trades/deals.
- Regulators will aim to limit insider trading.
- Regulations will be in place to govern issuance of new shares…
- …as well as takeover bids (or disclosure around acquisition of large portions of shares).

Other protection for investors

- Market regulators will seek to ensure that the market is transparent and orderly…
- …and provides proper protection to investors.
- This is especially the case for private investors, who might be less well informed than their institutional counterparts

QUESTION 3

<u>Examiner's comments:</u>

This question was not answered well by most students, even though part (i) was mostly a bookwork question. Part (ii) was challenging for many as students did not approach it from a principles perspective of using country-specific specialists in assessing equity investments. Students misunderstood the question to be about overseas investments in general and did not focus on equities specifically. Many elaborated at length on the practicalities of managing an overseas portfolio or of employing in-country locals, which was not what the question required.

i.

Advantages

- The grouping of equities according to some common factor gives structure to the decision-making and management process.
- The factors affecting one company within an industry are likely to be relevant to other companies in the same industry.
- Factors affecting one company in a sector that are relevant to other companies in the same sector include:
  - Resources: companies in the same sector will use similar resources (e.g. labour, land and raw materials)…
  - …and will therefore have similar input costs.
  - Markets: companies in the same sector supply to the same markets,…
  - …and will therefore be similarly affected by changes in demand.
  - Structure: companies in the same sector often have similar financial structures…
  - …and will therefore be similarly affected by changes in interest rates, inflation etc.
- Much of the information for companies in the same industry will come from a common source and will be presented in a similar way.
- No one analyst can expect to be an expert in all areas, so specialisation is appropriate.
- By specialising, an analyst can become an expert in an industry and understand it very well.
- Companies within industrial groupings tend to correlate more closely with each other than with companies in other industries.

Disadvantages

- Specialising by industry can mean that analysts miss out on companies which are between sectors.
- Some shares may not move with their industries…
- …or may be influenced by different factors from those the analyst is focusing on. (e.g. company could have a significant overseas earnings base).
- It might require a relatively large number of specialists if many sectors are to be covered.
- Not all companies can be easily categorised.

ii.

- Knowledge of the particular country in which a company operates would be critical.
- One would not expect all companies in a certain sector to be subject to the same risks and opportunities in all countries.
- Different countries, whether developed or emerging, may have very different drivers of their economies…
- …which will impact the performance of certain sectors of their equity markets.
- They may be in different stages of the economic cycle…

- …meaning certain sectors are poised for growth in one country while facing headwinds in another.
- Different countries have different legislative and regulatory regimes…
- …which may impact the potential to earn profits in certain sectors.
- Tax regimes in different countries would impact their net profitability.
- Accounting treatment may be very different in different territories.
- Knowledge of political, cultural, social trends would be valuable in understanding potential investments in a country.
- Certain industries may be well developed in certain countries while still a growing industry in others e.g. technology and telecommunication.
- The global portfolio may make use of index trackers to gain exposure to certain countries in which case country specific analysis is more relevant.
- The currency risk associated with investing in overseas markets is significant driver of risk and should be incorporated into any analysis of a company.
- Many of the points above may be beyond the scope of a domestic analyst specialising in an industry.

QUESTION 4

Examiner's *comments:*

Part (i) was a bookwork question which was generally answered well by a majority of candidates. Part (ii) also saw candidates generating a lot of different ideas and scoring well. However, some candidates still made reference to the distribution of profits to policyholders in spite of the question indicating that the policies are without-profits.

i.

An analysis of profit/loss will enable Trust Life to:

- Show the financial effect of divergences between the valuation assumptions and the actual experience
- Determine the assumptions that are the most financially significant
- Show the financial effect of writing new business
- Validate the calculations and assumptions used
- Provide a check on the valuation data and process (if carried out independently)
- Identify non-recurring components of profit…
- …thus enabling appropriate decision to be made about the distribution of profit
- Reconcile values for successive years
- Provide management information
- Provide data for use in executive remuneration schemes
- Provide detailed information for publication in Trust Life's accounts.
- Demonstrate that the variance in the financial effect of the individual sources is a complete description of the variance in the total effect
- Give information on trends in the experience of Trust Life to feed back into the actuarial control cycle.

ii.

- Trust Life would consider their current capital situation…
- …as working capital can be increased by deferring the distribution of the latest profit arising and retaining it as capital within the business.
- The company will also consider their current solvency situation…
- …and assess whether it needs to rather retain/distribute profits in order to increase/decrease the solvency position.

- If there is significant uncertainty around potential future adverse experience the company may decide to retain some of the profit as a margin against such uncertainty.
- The company's short term objectives (and hence need for capital) should also be considered,…
- …for example there may be objectives to expand into other products/markets,…
- …or invest in new infrastructure/systems etc.
- Policyholder expectations should also be considered to some extent,
- …but since the products are without profit, the concern will not be about profits being used to increase benefits, but more around issues such as policyholder benefit security, service levels…
- and the perception that policyholders might have when hearing about the company making excessive profits.
- Since it is a proprietary company, there will also be shareholders to consider as they expect a return on their investment in the company.
- Shareholders may expect a dividend to be paid out…
- …or alternatively be given confidence that any profits retained in the company will lead to more profit in future.
- Staff expectations should also be taken into account,…
- …as some would reasonably expect to share in the profits in the form of bonuses or other incentives.

QUESTION 5

<u>Examiner's comments:</u>

Most candidates performed well with this question, because there were many stakeholders that could be considered relative to the marks available. The best performing candidates covered a wide range of stakeholders and related parties and included <u>practical explanations</u> as to how they would be affected.

The policyholder (current and future)

- Will the enhancements still be meeting the needs and interests of the policyholder.
- Are we only enhancing benefits for new policyholders or also existing ones?
- What will the response be if only new policyholders benefit?
- Will the amendments be seen in a negative light e.g. more difficult to claim?

The broker

- The distribution channel is crucial for the success of this product.
- Do they understand the changes…
- …and are they comfortable marketing this new product to their clients?

The regulator

- Are the changes within any regulatory requirements?
- HappyLife will need to make sure any roll-out is still viewed as fair to the customer.
- Are there any implications to the company's solvency position as a result of the upgraded product?

Shareholders

- Will shareholders be expected to provide more capital as a result of the initiatives?
- How will their future return on investment be influenced?
- How will the changes affect the company or embedded value for example?

Board of directors / Executive management

- What will the impact of the changes be on the competitive position (also reputation) of the company?
- Consideration would need to be given to expenses incurred to achieve the changes.
- Does the company possess the necessary skills to achieve the upgrade.

Actuaries / Statutory actuary

- Do we understand the impact the change will have on the company's balance sheet / solvency position?
- What new assumptions (or basis changes) are required to quantify and calculate the risks involved?
- How will any existing valuation processes need to be changed?

Staff

- HappyLife would need to understand how processes (e.g. admin, claims, underwriting etc.) would change as a result of this change.
- Any additional training and the cost of such would need to be considered.

Reinsurers

- The extent to which existing reinsurance treaties will need to be changed would have to be considered.
- Are there any additional requirements imposed by the reinsurer as a result of the changes.
- To what extent was the reinsurer included in the discussions to upgrade and amend?

Systems providers

- The company would need to understand whether the existing admin system can accommodate the changes…
- …or how long and expensive it would be to do so.

Competitors

- How will the competition react if news of the changes reaches the market?
- Care needs to be taken to keep developments confidential,…
- …in case competitors can steal the idea and bring it to market faster.

QUESTION 6

Examiner's comments:

Generally, students could explain why surplus was chosen over quota share in part (i), but many could not describe the basic features succinctly and some made inaccurate statements about surplus reinsurance capping large losses. In part (ii) better students would list the various types of non-proportional cover and explain how each would be advantageous to the portfolio. Weaker candidates would explain why CommSure should use non-proportional reinsurance instead of proportional reinsurance which was not what the question had asked. Part (iii) was a well answered book work question.

i.

- Type of proportional reinsurance cover
- The proportion reinsured can vary by risk reinsured.
- The % ceded will determine the % of each claim that the reinsurer will settle.
- Unlike a Risk XL this does not cap the maximum loss on large claims.
- Usually written by treaty
- For high volume business, the maximum cover and retention limit specified in treaty.
- For more commercial/specialised business, the cedant can decide on the proportion to cede for each risk.
- Under a quota share arrangement this proportion would need to be fixed.
- Given the nature of commercial property risks, namely that they are highly variable in size and complexity…
- …it would make sense that CommSure would want to the flexibility to tailor the amount retained/reinsured per risk.
- This will allow them to fine-tune their exposure…
- …by ceding more of the larger, more complex risks...
- …and rather retain more of the risk (and hence potential profit) on the exposures they are comfortable with.

ii.

Non-proportional arrangements could be introduced to the portfolio and may be as follows:

- *Per risk XL…*
- …will enable the insurer to limit the maximum amount payable in the case of a single large risk.
- This will further help in smoothing the profits and limiting volatility…
- …as well as enable insurer to write larger (and hence more) risks…
- …and improve diversification.

- *An aggregate XL…*
- … may be used to address certain problematic areas in the portfolio such as excessive exposure to a specific peril or concentrations in certain geographical areas/industries etc.

- An all inclusive case of an aggregate XL is a *stop-loss cover*…
- …which may be used to limit the overall adverse experience on the total book within a given year.

- *CAT XL…*
- …may be used to limit the amount of total claims resulting from a catastrophic event e.g. earthquake, fire.

All of the above address risks not explicitly addressed with a surplus cover.

iii.

- Provision of cover not otherwise available
- Stabilisation of results
- Cheaper cover
- Tax advantages
- Greater security of payment
- Management of solvency margins
- More effective provision of risk management.
- Source of capital.

QUESTION 7

<u>Examiner’s comments:</u>

This question on insurable risks was well answered by many candidates, with many listing all the basic and ideal requirements. Better candidates made effort to make practical application to the specific setting and would not just consider whether a requirement was met or not, but also what could perhaps be done practically to meet it.

Requirements of insurance risks

The policyholder must have an interest in the risk

- Business and property owners should not want such events to occur to their own business/property…
- …since this would hamper their ability to generate an income.

The risk must be of a financial and reasonably quantifiable nature

- The value of goods or property and/or the cost to repair damaged property can be quantified in monetary terms…
- …and hence a sum insured (exposure measure) can be determined for such risks.
- A financial payment can clearly assist in making up for losses suffered.

The claim amount must bear some relationship to financial loss

- It is reasonable to expect that any insurance for such losses will be based on the principle of indemnity, i.e. based on the actual loss suffered by the business owner.

Ideal requirements of insurance risks

Individual risks should be independent of each other

- In the case political unrest, this requirement is often not satisfied…
- …since political protest/unrest is often coordinated and happens in many places at the same time.

The probability of the event should be relatively small

- In the case of political unrest, the extent to which this is true can vary wildly depending on the political climate.
- If widespread looting was a permanent feature of an economy, one would not expect this risk to be insurable.
- Over short periods of time the probability of the risk event might be very variable.

Large numbers of potentially smaller risks should be pooled in order to reduce the variance and hence achieve more certainty

- If cover for political unrest is a compulsory feature of a regular insurance contract, one can expect that a large number of policies would contribute to the risk pool…
- …and hence the variance in expected experience can be reduced.
- In the case of a state-owned insurer such as SASRIA which is the only carrier of this risk, the risk pooling is further improved since there are no competitors writing similar risks.

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

- This requirement should be relatively easy to meet per policy/business/shop insured.
- However, given the very high concentration risk of these events, the extent to which this requirement can be met on a per event/occurrence/period basis is unclear.
- Reinsurance structures can potentially help with limiting the overall exposure per event/period.

Moral hazards should be eliminated as far as possible

- It would generally not be easy for a businessowner to fraudulently claim for politically motivated looting or damage to their property.
- As with a regular insurance policy, one would expect a measure of claims underwriting and investigations to take place to ensure only valid claims are paid.

There should be sufficient, existing statistical data to enable insurer to estimate the extent of the risk and likelihood of occurrence

- There would likely be some historical data on the number of political unrest events…
- …and estimations of associated losses.
- This will however depend on how long an insurer has been in business.
- The usefulness of which past data to predict future experience is likely very limited…
- …given the large impact of the social/political/economic climate at any given time.

QUESTION 8

<u>Examiner's comments:</u>

Part (ii) was very poorly answered and relatively few candidates scored well. Unfortunately, many students had a very limited understanding of the concept of economic capital, which obviously then made this question even more challenging. Many hence struggled to explain how to determine the capital position by projecting the balance sheet, i.e., assets and liabilities, of the company. The use of stochastic vs. deterministic models for the various components was also not well understood by many of the students. Better candidates would also spend some time describing how to assess the modelling results. Candidates did well in part (ii), but this was relatively few marks.

i.

- An assessment of an insurance company's economic capital position requires the company to look at its economic capital requirement …
- …and also, the economic capital it has available.

Economic capital requirement

- The economic capital requirement is the amount of capital that the company determines is appropriate to hold …
- …given its assets, its liabilities, and its business objectives.
- Typically, it will be determined based upon the risk profile of the individual assets and liabilities in its portfolio as well as…
- …the correlation of the risk
- …the desired level of overall credit deterioration that the company wishes to be able to withstand.
- For each major risk type (e.g., credit, market, operational),
- a stochastic model …
- … or a deterministic model with scenario or stress testing …
- …will generally be used to determine the capital requirement.
- A suitable stochastic model must produce internally consistent possible future scenarios
- …e.g., for market risk a downturn in investment performance and inflation will have an impact on levels of withdrawals and new business.
- Such a stochastic model can automatically allow for correlations between different risk scenarios.
- The company would project its balance sheet for each of a large number of future scenarios, which are intended to represent all the risks the company faces
- A risk measure, e.g., Value at Risk or Tail Value at Risk, would be used to determine the economic capital requirement,
- …e.g., sufficient capital to maintain solvency in 10 years' time in 99.5% of scenarios.

Economic capital available

- The starting point for assessing the economic capital available is for the company to draw up an economic balance sheet, …
- … which shows the market value of the company's assets and the market value of its liabilities.
- From this, the economic capital available would be determined as the excess of the market value of the assets over the market value of the liabilities
- For tradable assets, the market value of assets should be easily available.

- It is possible that the portfolio may include some assets which are not tradable or for which a market value is not available, and so an alternative valuation approach is needed.
- In the unlikely event that any of its liabilities are tradable, the insurance company could look up the market value of these liabilities.
- However, for the majority of its liabilities it is likely to have to use an alternative approach,
- e.g., use the market value of a replicating portfolio of assets whose cashflows replicate the liability cashflows in all circumstances, if available.
- The market value of liabilities can also be determined using a discounted cashflow approach.
- Alternatively, the company could determine the expected value of the unpaid liabilities stated on a present value best estimate basis …
- …and add a risk margin
- In addition to its current available economic capital, the company may also look at the availability in the market …
- … and the likely cost of various sources of further capital

ii.

- Capital has a cost, i.e., the providers of the capital will require a return on their capital.
- All else being equal, holding a larger amount of capital means that a given level of profits ….
- … is spread more widely among the providers of capital.
- Another way to consider this is in relation to the opportunity cost of the extra capital, …
- … and whether it is being used to generate the optimal level of return.

QUESTION 9

<u>Examiner's comments:</u>

Candidates did not read the question for part (i) carefully, which asked them to discuss the risks in adopting the MIC approach. Many candidates just provided a list of generic retirement fund risks unrelated to MIC (such as poor returns, high expenses etc.). Others listed the risks associated with particular asset classes used in the structure. Both these approaches scored poorly. The question also split the discussion of risks between the fund and the employer, but many did not lay out their answer in this way which would have helped them generate more points.

Part (ii) was a more unusual question and might have been quite difficult, however there were many more marks available than required for this question, so candidates could address a wide range of ideas and still score well. Some candidates did not "explain" their points as required in the question and just listed points, often vague without explanation. Candidates needed to link the information given in the question to the <u>application of the ACC in this specific setting</u> – for example it was not good enough to just refer to the "economic outlook" under "general commercial and economic environment" without explaining why this is important (for return assumptions etc.). Under "specifying the problem", they needed to discuss risk appetites and underlying liability – not generically refer to the "needs" of members. Under "developing the solution" many candidates provided what they thought would be an appropriate investment strategy and asset allocations, which was not what was asked. Rather the focus should have been on how one would develop the strategy and allocations – using modelling etc. Explanations of "monitoring the experience" were also often poor – instead of referring specifically to actual fund and manager returns vs benchmarks and objectives, candidates generically stated that the "actual vs expected experience" should be compared.

It remains alarming, in the response to both parts, how many candidates do not understand the difference between DB and DC schemes (or did not read the question), and referred to funding levels and solvency and discussed modelling the assets and liabilities separately.

i.

Members

- Investment risk – members may choose an inappropriate investment portfolio and not achieve the required benefits at retirement.
- Late payment of contributions which will result in poorer than expected fund growth.
- Mismatch between the performance of the underlying asset portfolio and the cost of the annuity to be purchased as members approach retirement date.

Fund

- Communication risk – the risks and structure of the various portfolios may be poorly communicated and understood by members
- Members may not appreciate the choices being offered and may prefer a broader range of options
- Poor take-up by members who are unsure of which portfolio to select may result in most of the assets being allocated to a default portfolio
- Reputational risk may arise if members are dissatisfied with their choices and investment returns
- Operational risk will arise as such an offering may be more complex to administer – for example wrong portfolios allocated to members.
- Fraud by fund administrators
- Appointment of poor underlying fund managers

- Modelling risk – that the assumptions and modelling used to develop the investment strategy for each of the portfolios is flawed

ii.

Consider the general commercial and economic environment

- In this case trustees would consider the characteristics of the asset markets in which the fund operates,…
- …and the expected returns and correlations of asset classes.
- Any legislative or regulatory framework and governance requirements which need to be met…
- …for example limits on which assets may be invested in.
- Tax environment
- Benefits offered by other similar/industry funds.

Specifying the problem

- Trustees should consider the risk appetites of their underlying members
- And analyse the underlying liability in terms of time horizon and income levels of members
- In order to arrive at a clearly defined set of objectives for each of the portfolios
- They should also consider the size of the fund as this may impact the selected investment strategy
- And consider any risks associated with the selected strategy

Developing the solution

- Trustees would employ the use of risk-return modelling…
- …taking into account the stated objectives of each portfolio…
- …in order to arrive at a strategic asset allocation which maximises the probability of achieving the objectives for each portfolio.
- The assumptions used in the model are critical and sensitivity testing would be essential
- They would then consider the adoption of active or passive investment strategies for each portfolio and/or component of the portfolio.
- For active strategies, appoint investment managers to manage the portfolio.
- These decisions could be aided by a risk budgeting exercise
- Once determined, the investment strategy needs to be effectively communicated to members

Monitoring the experience

- The performance of the portfolios should be evaluated on an ongoing basis
- To assess managers' performance against benchmarks
- As well as portfolio performance against stated objectives
- It will be important to assess performance over appropriate time periods
- Assessment of the take-up rates of the various portfolios in terms of member behaviour would also be very useful
- Should the outcome of the monitoring process suggest a change is needed to the investment strategy for one or more portfolios, this would be reviewed by starting the ACC process again

Professionalism

- Needs to be demonstrated throughout the process
- Trustees are required to appoint professionals where required in order to ensure the effective development of the strategy
- And said professionals will need to behave in accordance with their standards and requirements.