**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

***Examiner's comments:***

*Part (i): Candidates generally performed well in this question.*

*Part (ii): Several candidates mentioned loss of confidence without justifying or explaining the reason for it. Credit was awarded for certain points which were pertinent to the question e.g. following self-regulation to improve or increase efforts towards innovation as a result of efficiencies gained in self-regulation.*

*Part (iii): Candidates performed poorly for this question. The bookwork knowledge required for this question was not evident from the responses. Several candidates restated or rephrased the advantages or disadvantages which were applicable to part (ii). Credit was awarded for mentioning that self-regulation may be required where there was no regulation present, or where the industry decided to do so due to its.*

i. A selfregulatory system is operated and organised by the participants

… without government / legislative / regulatory intervention

ii. Advantages of self-regulation

The system is implemented and managed by those with the best knowledge of the relevant market

The participants also have the greatest incentive to achieve an optimal cost/benefit balance

Responds quickly to market needs

It may be easier to persuade participants to cooperate with a self-regulated entity

Disadvantages

The closeness of the regulator to the industry it regulates means that it might not be truly independent, to the detriment of the consumers

It may not lead to strict enough regulation and this can result in low public confidence in the system

It can lead to barriers to entry for new participants by framing the entry requirements in such a way that it is diffiult for newcomers to comply

iii. The incentive is that regulation is an economic good …

… that consumers of financial service are willing to pay for …

…and which benefits all participants.

A government may threaten to impose statutory regulation …

… if an adequate self-regulatory system is not implemented.

## QUESTION 2

### ***Examiner's comments:***

*Part (i): Candidates performed generally well in this question.*

*Part (ii): Many candidates did not label or structure the response as a rationale for or against active management. To earn maximum credit, this structure should be clearly shown. Many candidates simply mentioned that active management was done to improve investment returns without elaborating how; no credit was awarded in these cases.*

*Part (iii): Candidates generally performed poorly in this question. Bookwork knowledge required was clearly lacking. Many candidates misunderstood strategic risk by interpreting it as the risk of an investment portfolio performing poorly in comparison to a benchmark portfolio, which is actually active risk. Many candidates failed to mention that active risk occurs as a result of having freedom of investment and the ability to apply judgement in investment decisions; candidates, instead, simply stated active risk occurs through active management, which does not explain the risk adequately and hence could not be credited.*

i.

Active management is where the manager has few restrictions on the choice of investments, perhaps just a broad benchmark of asset classes. This enables the manager to make judgements regarding the future performance of investments, both in the long term and the short term.

Passive management is the holding of assets that closely reflect those underlying a certain index or specific benchmark. The manager has little freedom to choose investments.

ii.

Active management is generally expected to produce greater returns due to the freedom to apply judgement. Active management could achieve higher returns by identifying:

- Under- or over-priced sectors, hence to make a sector selection profit,
- Individual stocks that are under- or over-priced, to make stock selection profits.

On the other hand, producing greater returns will not be possible if the investment market is efficient (and hence the efficient market hypothesis holds).

These active returns are likely to be offset by:

- The extra costs involved in more regular transactions, particularly when attempting to make short-term gains
- The risk that the manager's judgement is wrong and so the returns are lower.

iii.

Strategic risk of an investment portfolio is the risk of poor performance of the strategic benchmark relative to the value of liabilities.

Active risk is the risk taken when the investment manager have freedom over stock selection, and use their skills and research to maximise the return within their given guidelines. This typically therefore relates to any deviation from the benchmark that was given to the investment manager.

## QUESTION 3

***Examiner's comments:***

*Part (i): This was a bookwork question which was generally well-handled by the majority of candidates. However, candidates that ignored the first part of the question, requiring to provide a "list", earned lower marks.*
*Part (ii): This question was fairly well-handled by most candidates. Nonetheless, a number of candidates gave the full generic list of investment considerations (SYSTEM T) without applying these to the specifics of the question.*

i.

Given that you are a small insurance company, the following might cause challenges:

Size – many properties are too big for most investors to afford.

Diversification – many properties are needed to create a well-diversified property portfolio.

Lack of marketability – the time taken, and the costs associated, with buying and selling make properties unmarketable.

Valuation – property values are never known until sale.

Expertise needed – much of the profit to be made through property investment comes through detailed local knowledge, which might not be available in your organisation.

ii.

- Investment process followed (philosophy and process)
- Quality and expertise of staff
- Track record of investment staff
- Size of property investment portfolio
- Diversification (or lack thereof) of investment portfolio
- Fees and expenses to be incurred for each option
- Expected return and risk balance of the portfolio
- Liquidity and marketability of the REIT

## QUESTION 4

***Examiner's comments:***

*Part (i): Very poorly answered. Was a straightforward bookwork question. Candidates could not differentiate between different valuation methods as many points were put down which related to other valuation methods.*

*Part (ii): Poorly answered. Many candidates did not see any problem with the suggested methodology at all. Most candidates could not understand the implications of using inflation as the assumed investment return and how this related to the guarantee biting or not.*

*Part (iii): Poorly answered. Much of the answer was bookwork. Many candidates realised that a stochastic approach should be used to value the guarantee, but could not elaborate sufficiently beyond that. Most of the candidates that realised a stochastic approach should be used did not see a problem that a deterministic model was suggested in 4.ii.*

i.

Effectively the intent is to identify the assets that are best replicators of the future liability outgo, so that the price of these assets would be the market price of the liabilities in the market.

The inflation rate, discount rate and related assumptions are derived from market information as follows:

- Assets are taken at market value
- Liabilities are discounted at the yields on investments that match the liabilities – often bonds
- The bond yield may be based on government bonds or corporate bonds – the latter will allow for credit risk
- A better, but more complicated, approach would be to use term-standard discount rates that vary over time to reflect the shape of the yield curve
- The market rate of inflation is derived as the difference between the yields on suitable portfolios of fixed-interest and index-linked bonds

ii.

- By using the projected inflation rate as the investment return assumption essentially means we assume that all members will receive exactly the inflation rate as the investment return.
- However, some members will experience a return higher than inflation over his/her contribution period, which will then mean the guarantee will not be relevant.
- Other members will receive an investment return lower than inflation over the contribution period, and for these members the guarantee will bite.
- The guarantee also only kicks in upon retirement, and hence early-leavers or member transfers will not necessarily benefit from the guarantee.
- Given the above, the suggested approach is not valid.
- In fact, the approach suggested will likely result in the guarantee never biting as all members are assumed to receive exactly the relevant inflationary return.

iii.

- In order to assess the value of a guarantee, one would need to use a stochastic approach or a variety of deterministic scenarios.
- Guarantees are best valued using a stochastic approach as multiple simulations can be run.
- The parameter input to the model should reflect the purpose for which the results are required. The level of prudence will therefore be impacted by the reason for the valuation.
- The stochastic approach will typically be applied taking the retirement fund (and related benefits) as a whole. However, one would need to take cognisance of the fact that members will enter and exit the fund at different times.
- The model is therefore likely to be applied/calculated on a member-level, but the stochastic simulations will be applied consistently on the book as a whole.
- A large number of simulations can be run in order to assess both the likelihood of the guarantee biting, as well as the expected cost provided that it bites.

## QUESTION 5

***Examiner's comments:***

*This was a straightforward bookwork question and most candidates scored very well. The weaker candidates did not explain the interests sufficiently and some did not identify some of the key stakeholders.*

i. Advising Government

1) Government
   - might be looking to maximising savings to reduce dependence on the State and improve citizens' living standards
   - might be looking for favourable macroeconomic effects, as increased savings might impact economic activity and grow GDP
   - might be worried that the regime will reduce tax revenue
2) Regulators
   - interested in the clarity of the rules and how the new regime will be implemented and monitored
   - concerned that customers are treated fairly
   - concerned that the new regime doesn't adversely impact the financial strength of the product providers
3) Prospective Customers
   - Will want attractive, understandable products that meet their needs
4) Intermediaries
   - Will want products that are easy to understand and easy to sell
   - Products that offer them adequate commission
5) Product providers
   - Will want to design and sell products that meet customers' needs and provide an adequate profit margin

ii. Advising Insurer

1) Current and Prospective Customers
   - If they meet the criteria, their insurance costs will reduce
   - If they don't meet the criteria, they will need to find another insurer
2) Competitors
   - Competitors may be forced to adopt a similar structure …
   - … or they will lose the good risks and face a worsening in claim experience
3) Shareholders
   - If the volumes sold are good, and the business is profitable, the shareholders will receive higher dividends
   - If they do not succeed in getting enough business to replace the business they have lost, there will be a reduction in profits
4) Regulator
   - If the country has a requirement that insurers must offer a certain level of cover to all drivers, the regulator might need to put a stop to the plan …
   - … or require modifications

iii. Advising Department of Health

1) Department of Health / Government
   - Most important will be the cost to the fiscus under the two options
   - How the sharing of costs, revenues and risks would operate in practice
   - Wider political implications of partnering with the private sector
2) General public
   - Would be interested in the quality of care and the facilities
3) Unions and employees / potential employees of the hospital
   - Would be concerned about job security if the private sector is involved
4) Potential private sector partners
   - Interested in risk vs return

iv. Advising Retirement Fund

1) Sponsor
   - Would want to minimise their contribution …
   - … without jeopardising the scheme's solvency …
   - … taking into account available resources
   - May be keen to make contributions at the optimum time for the business
2) Members and their dependants
   - Would want the contributions to be as high as possible …
   - … to increase the security of the scheme…
   - … and reduce their contributions or increase their benefits
3) Trustees
   - Would be concerned with the security of the scheme and managing its investments
   - Would favour high contributions …
   - … without jeopardising the sponsor's solvency
4) Regulator
   - Need to know that all regulations and guidance has been followed

## QUESTION 6

***Examiner's comments:***

*The question was on the whole reasonably well answered.*

*However, there were some common mistakes:*

- *many students did not understand that most immediate annuities are not underwritten and wasted time on this;*
- *a number of students did not read the question sufficiently carefully, or did not understand that the sophisticated modelling system would be quite suitable for pricing annuity products;*
- *many students failed to pose a problem in the "Specify the Problem", namely that the company wishes to develop prices for annuities that are both competitive and profitable;*
- *quite a few students though the "problem" was how to use the modelling software.*

*Specifying the problem*

The client will be transferring risk to the insurance company…

… longevity risk - as the annuity will be paid for the remaining lifespan of the annuitant

… investment risk – as the client will receive a guaranteed income, irrespective of market conditions

… investment risk includes credit and market risk

Problem is …

… determine premium rates that …

… deliver acceptable profit…

… considering the risk accepted

… are competitive in the market

… bearing in mind that the company is new to the market and has no experience

*Developing the solution*

First step is to determine initial assumptions about future experience

Review existing industry annuitant tables

Discuss mortality basis with the underwriter

… and reinsurer, if being used ….

… including mortality improvements

Discuss investment returns with the investment managers

… and agree on suitable matching assets

… government bonds likely to form bulk of the portfolio

Use judgement as to

Extent of margin for prudence in the reserving basis

Should capital requirements be explicitly allowed for

The company will need to extend the profit-testing model to accommodate annuities

Run the model repeatedly, with differing parameters …

...To test sensitivity to different assumptions of

…premium rates and …

…profit emergence

Bring assumed reserving basis into the profit-testing model

*Monitoring the experience*

After launch, monitor experience regularly…

… to see how actual experience compares to that assumed in the pricing basis …

… and the reserving basis

May take time to get accurate picture of accuracy of assumptions …

… as improvements in mortality over time emerge gradually …

… and ultimate longevity is unknown at the outset

If it appears that the mortality assumptions are different from actual experience …

… re-run the profit test with the new assumptions, which means…

… premium rates may need to be re-calculated

… reserving basis may need to be changed as well

*Professionalism*

Be mindful of relevant regulation and professional guidance …

… when pricing the product

… when reviewing the experience

Consider regulations around distribution/sales as they pertain to the product

Ensure that the treating customers fairly principles have been applied

*External environment*

When deciding on rates initially, compare proposed rates to those available from other companies

Pay attention to changes in rates from competitors …

… reductions in rates may force a review of the premium rates

…to remain competitive

… may even force insurer out of the market if it cannot make a profit

Consider the current economic environment…

… when interest rates are low, annuities may be perceived as poor value

## QUESTION 7

### ***Examiner's comments:***

*Part (i): Students did not do well in this question especially if they did not focus on the nuances of critical illness products and a good understanding of the role of regulation. Even those who understood this struggled to generate enough points to score well for this question.*

*Part (ii): Most students did not score well in this question. It appears several students did not understand that the question was asking about setting the pricing assumptions not pricing the product. A student who would have understood that it's an assumption setting question would have thought how to use the data provided by the reinsurer to set its own assumption.*

*A few of the students understood this but struggled to generate points to score well on this question.*

i.

**To protect the consumer**

- CI products are potentially complex and there would need to be some requirement on the company to provide proper advice so that the client can make an informed decision.
- This is likely to affect the nature of the sales process.
- It might also affect the product design, in that claims definitions need to be reasonable…
- …which may even affect the policy wording of the product.
- The industry may even agree on standardised definitions for certain illnesses.
- Underwriting may be required not to differentiate on the basis of discriminatory factors e.g. race.
- There may also be cooling off periods.
- There will be requirements to treat the customer fairly…
- …which is particularly important at the claims' stage, where the product should respond in the way the client was lead to believe at sales stage.

**Maintain confidence in the system**

- CI is an example of long-term insurance, where the client needs to believe that the provider will be able to meet commitments made even if this is still far in the future.
- We can expect that only firms vetted and authorised to conduct life insurance business will be allowed to sell CI policies.
- There will also be some capital and solvency requirement to ensure that the company will operate as a going concern adequately capitalised to meet future commitments.
- Failure of one CI or life insurance provider should not trigger a collapse of the system.
- To reduce crime
- Since premiums are payable to the insurer over extended periods of time…

- …there may be requirements on the way such funds are handled, e.g. how quick brokers must pay over money.
- Given that CI payments can be deemed windfall payments, there may be a requirement to disclose such lump sums to authorities.

ii.

- Given that it is past data from another market, we would need to consider whether the data is relevant.
- The other market might have different underwriting practices,…
- …distribution channels,…
- …and target demographic profile/target market.
- This would likely require some adjustment to the rates to allow for these differences
- We would also need to understand the design of the product(s) represented by the underlying the data,…
- …for example, what the illness definition was…
- …and the level and form of the benefits, e.g. standalone vs. rider benefit.
- We would also need to confirm that we understand how the data was recorded…
- …and consider whether there are any errors present in the data…
- …or abnormally large claims or abnormal fluctuations.
- The provided exposure data will typically be split into homogenous groups…
- …for example, split by underwriting year/cohort, gender, age, smoking status etc.
- Crude incidence rates may be set by comparing the actual observed claims with the exposure in each homogenous groups.
- One would likely need to smooth these rates over ages…
- …to allow for the random variation that can be expected to occur.
- Consideration would need to be given as to whether there is any trends observed in the incidence…
- …perhaps because of medical advances or increased prevalence of lifestyle related illnesses.
- …and how to allow for it in the final rates.
- We can also consider using other sources of information e.g. medical journals.

## QUESTION 8

### ***Examiner's comments:***

*Part (i): this section was well answered, with many candidates getting at least 8 examples of sensitive information. Weaker answers tend to focus too much attention on one sensitive piece of information, e.g. health, instead of a range of ideas.*
*Part (ii): this was based on some of the newer bookwork in the subject and candidates that knew the bookwork here generally did better. Unfortunately, even with many of the bookwork ideas listed in the response, many candidates still fail to make adequate practical application of the ideas to the specific context provided, which was required to score well on this question.*
*Part (iii): most candidates could list some examples of measurable financial consequences of poor data governance, but generally candidates could have scored better here. Many candidates also started with consequences of poor data management, without actually giving an explicit opinion on whether there is any accuracy to the statement.*

i.

- Identification details e.g. ID number
- Race and gender information
- Physical address information
- Contact information, e.g. cellphone number and email address.

- Banking information.
- Occupation information
- Income details
- Education details
- Beneficiary information
- Medical history…
- …with details on present physical and mental health
- Criminal history.
- Membership of unions or religions (e.g. in the case of group contracts).

ii.

- Definition: A data governance policy is a documented set of guidelines…
- …for ensuring the proper management of an organisation's data

The policy is likely to set our guidelines with regards to:

- The specific roles and responsibilities of individuals in the organisation with regards to data.
- How an organisation will capture, process and analyse data
- Issues with respect to data security and privacy and..
- Controls that will be put in place to ensure that the required data standards are applied.
- How the adequacy of the controls will be monitored on an ongoing basis with respect to data usability, accessibility, integrity and security.

It may affect the underwriting department as follows:

- A specific person/manager in the underwriting team may be held accountable to make sure that data is handled responsibly.
- Access to underwriting information would be strictly controlled e.g…
- …the underwriting team may be the only ones authorised to have access to detailed information on a prospective client's medical history.
- …and certain information might be anonymised to not connect the u/w information with specific individuals.
- L-Sure would need to make sure that the client knows exactly what data is going to be collected and how it will be used and that explicit consent for such is obtained.
- Underwriting information would need to be gathered in a way as to not leak out sensitive information to other parties e.g. broker, without consent.
- Any other parties involved in providing/collecting data e.g. doctors, traveling nurses, laboratories etc. would also need to abide by a minimum standard of confidentiality as required by L-Sure.
- Without further consent the data may possibly only used within L-Sure…
- …and not for creating leads say for another part of the parent company.
- There might be IT hardware and/or software requirements to ensure the security of policyholder information.
- This may also affect the cost of running the underwriting department.
- There would need to be strict controls on the flow of underwriting information to other departments that may require it…
- …for example, actuarial or claims underwriting departments.
- Audits or investigations may also be necessary to confirm that the processes are adhered to.
- Data would need to be structured and managed to make sure it is useful for other purposes within L-Sure e.g. pricing, experience analysis, claims underwriting etc.

iii.

- While it is true that proper data governance is driven primarily by ethical considerations…
- …and that it can result in expenses to the company…
- …any shortcomings in data governance can result in real costs to the bottom line. Examples include:
  - Getting fined for non-compliance by the regulator…
  - …or worse, having business suspended because of legal and regulatory non-compliance.
  - Lack of sales or increased lapses…
  - …as a result of the company's poor reputation in the market with regards to data management.
  - Not having robust internal information on which the company can base decisions…
  - …leading to losses as a result of poor pricing, reserving etc.
  - …or additional costs since external parties need to be consulted on matters the company could resolve themselves if they managed their own data better.
  - Getting sued by a client for damages suffered as a result of his/her data leaking out into the public domain.
  - Increased risk of losses due to Cyber risks e.g. being hacked or data being held ransom.
  - Reduced risks of losses due to undetected fraud and/or operational errors.