Actuarial Society of South Africa

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Subject A311 — Actuarial Risk Management

PAPER TWO

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:

This question was well answered, with most students scoring reasonably well. Those who performed poorly tended to have misread part (ii) and instead discussed the characteristics of equities rather than the characteristics of the cashflows involved with investing in equity. In some cases candidates also failed to apply their answers in part (iii) to the specifics of Share A and Share B, drawing a direct comparison to each other and forming a view.

i. An investor will receive a return either in the form of a dividend or capital growth.

ii.

- The initial purchase of a share (of equity) typically requires a once-off outflow from the investor.
- The distribution of profits to shareholders takes the form of regular payments of dividends.
- Since dividends are related to the company profits that are not known in advance, dividend rates are variable.
- It is expected that as company profits increase over time, dividends per share will also increase – though there are likely to be fluctuations.
- The relationship between dividends and profits is not, however, a simple one – from time to time, companies hold back some profits to provide funds for new projects or expansion.
- Since equities do not have fixed redemption date, they can be assumed to continue indefinitely…
- … unless a company fails, in case which the dividend income will cease and the shareholder will only be entitled to any assets remaining after creditors are paid.

iii.

a.

- Generally speaking, shares are expected to provide real returns, and both these shares should have an expected real return.
- Share B is likely to be more risk (new, specialised company, unlisted), and this risk should result in a higher expected return as compared to share A.

b.

- The marketability of equities varies enormously between companies. In general terms, the larger the company, the better the marketability.
- Therefore, share A is likely to have a higher level of marketability if compared to share B.
- This might, however, be influenced if a few investors already hold a large proportion of share A.
- Furthermore, given that share B is unlisted (privately owned), it's marketability will be further reduced if compared to share A.

c.

- From the information given, it seems only share B will be exposed to international markets – this should mean that the currency risk inherent with share B should be higher.
- It might, however, be dependent on whether share A imports any goods that they distribute in the local country.

QUESTION 2

Examiner's comments:

Part (i): This question was poorly answered by most students. Students explained the risk management and risk identify skills they could expect from the candidate which was not what the question asked. The question was specific that the candidate was an internal applicant and students needed to use this in their answers.

Part (ii): This was a very topical question that most students needed to apply their minds to. Unfortunately, most students did not provide enough points to do well on this question however there was a broad spectrum of answers provided. The better candidates were those that split their answers into operational impacts and financial impacts. A large number of students wasted time providing impacts that would relate to life or health insurance which scored no marks as it was clear that this was non-life focused.

i.

- Knowledge of the circumstances of ZetaSure…
- …for example, what products they sell, where they sell it, the capital position etc.
- Knowledge of the features of the business environment in which it operates…
- …for example, the distribution channels, the target market, the nature of competition etc.
- Knowledge of the general business and regulatory environment…
- …for example, the state of the economy, any regulatory changes on the horizon, nature of current regulatory requirement and how this fits in with the business.

ii.

- Staff of the company may have to (or choose to) stay at home so that the virus doesn't spread.
- This will have an operational impact on the business, for example:
  - Claims may be not be assessed fast enough
  - Service delivery via the call centre might be constrained leading to disgruntled clients
  - This might also affect the ability of the company make sales.
  - Strategic projects progress may grind to a halt…
  - …which may lead to delays in delivering innovative or cost saving solutions.
- Service providers' ability to deliver service to the company and it's clients may also be affected, for example:
  - Vehicle repairs and construction contractors fixing damages
  - Brokers visiting and servicing the clients
- In extreme cases, there may be a risk of key managers losing their lives and disrupting the business.
- This may also be some financial impact on the company as a result of the following:
  - Investment markets may react causing potential losses as money flows from risky equities to safer instruments.
  - Claims may be triggered/increase on some of the products, e.g. travel insurance policies
  - …or possibly on liability lines where a policyholder's negligence caused someone to be infected etc.
  - Increase in business interruption claims
  - One can also argue that some claims might decrease e.g. motor, since people are not driving around so much.
  - If economic activity in the country is severely impacted by the virus…
  - …this might hurt clients' ability to afford insurance…
  - …which might also affect ZetaSure's ability to grow in the immediate future.
  - It is likely that the company would incur costs to facilitate staff to work from home…
  - ...or may incur costs in the form of lost productivity as a result of the disruption.

QUESTION 3

Examiner's comments:

Overall, this question was not well-answered.

Part (i): this part was bookwork, and disappointingly few candidates knew the bookwork. The range of possible examples was broad, so students tended to score some marks here. Under emotional needs, no credit was awarded for the desire to "wear expensive clothing" or "going on holiday" if these weren't related to "spending as opposed to saving", i.e. putting these needs in terms of a financial services context/consideration. Often students were overly vague or random with the definitions/examples, e.g. short/single word phrases, not convincing the examiner they knew the bookwork or the context and lost marks unnecessarily as a result.

Part (ii): this part asked students to give a general framework for the analysing of needs. Many seemed to not understand the question, and tackled issues of product design, modelling and pricing, etc. thus straying far off-topic. Poor exam technique was evident – listing as opposed to describing; answering a different question to the one asked, vague phrases, etc. Very few candidates applied the information from part i – i.e. breaking up the needs into the various categories of logical/emotional, current/future and furthermore considering the "types" of logical needs and examples of each. Many candidates simply re-stated the info given in the question and didn't consider the practical implications thereof. Some creatively employed the actuarial control cycle/Risk management cycles and managed to identify some of the points using this approach, but were inevitably limited by the specific steps and not thinking more broadly and practically about these.

i. Logical needs: Needs that are established by a systematic and logical approach
Example: life insurance for a newly-married breadwinner

Emotional needs: Needs that are established by what the member feels is needed
Example: a life insurance policy providing overly generous benefits for dependants

Current needs: A need that has an immediate effect on a member's circumstances
Example: an employed person buying disability cover

Future needs: A need that relates to a member's future aspirations
Example: a retirement annuity policy that will pay out at the member's planned retirement age

ii. The process is as follows:

Identify the stakeholders

Develop a list of the distinct stakeholder groups …

…where members of each group have similar needs

The union is likely to cover a number of different industries so workers in each industry may have differing needs

Consider the position of each group and identify their particular needs

The products will need to target the needs of members in order to be attractive to them

Each product should be simple in meeting a small number of the identified needs

Their needs will differ depending on whether they are high-risk or risk-averse individuals …

… risk-averse individuals will worry about events that may occur and will want protection from them

… high-risk individuals will not want to spend money on protection as they will not feel that rare events will happen to them√

Classify the needs

Differentiate between the logical needs approach and the emotional needs approach

Logical needs approach determines needs as a result of analysis and prioritisation

Logical needs can be analysed in terms of

Maintaining current lifestyle

Protection

Accumulation for a known purpose

Accumulation for a purpose not yet known

The logical approach should also consider

any tax-efficient arrangements …

…or state-funded benefits

that might be available

Emotional needs approach may result in members getting what they want rather than what they need

This might be irrational, …

… but it is important to consider it so that members feel their feelings are being considered

Access to information or lack of financial literacy might impact on members emotional response

Distinguish between current and future needs

Current needs are those that could have an immediate impact on a member's life (such as death or disability)

Future needs relate to future aspirations, such as saving for retirement

Helps to ensure that all needs are identified, not just those that might be top of mind at any time

Many needs relate both to current and future

Prioritize the needs using the hierarchy of logical needs

This ensures that the most important needs are identified first

Consider needs and priorities of vulnerable stakeholders

Also need to take account of affordability

QUESTION 4

Examiner's comments:

General points

- *Overall the students seemed to struggle with generating enough points to really score well in this question (a good few students hardly wrote enough to score many marks)*
- *Stronger students correctly split out the 4 main drivers of profit/loss in general insurance company, being Premium, Claims, Expenses and Investment Return and spoke to these which scored well*
- *Unfortunately many students did not think about the drivers of losses in this way and put unstructured points down. Some of these scored but the lack of grouping made it difficult for them to score well / many marks*
- *Many students repeated points which could only score marks once*

Level of premium

- It may be that over time, the average premium rates have weakened on this class of business.
- This may be a result of new business being written at lower rates than before because of a more competitive market.
- It may also be because annual renewal premium increases did not keep track with the increase in claims costs in recent years.
- The company can consider increasing their new business rates…
- …or lower the extent of any discounts being granted.
- Premiums can also be increased by more than claims inflation at the policy anniversary date…
- …but this may well lead to increased lapse experience.
- The value for money from the reinsurance programme would need to evaluated and the structure re-negotiated if needed,…
- …because it may be that our net retained premium has decreased by more than our net retained exposure.

Amount of claims

- One would need to understand whether there have been any changes in the average frequency of claims…
- …as well as whether the average claim size (severity) has changed in the recent few years.
- Since commercial property is very heterogeneous, it may well be that there is a mix of large and small exposures in the portfolio…
- … and that the losses were the result of few single large claims in each of the past three years.
- In other words, the losses were purely the result of volatility, without a change in the exposure or rating of the portfolio.
- In such a case, the insurer may consider to use more non-proportional reinsurance in the business, e.g. Risk XL that can limit the exposure to single large losses.
- If reinsurance is already being used, it may be that the attachment limits are set too high and SureCorp is not getting enough benefit from them.
- If the frequency is increasing, it may be pointing to a change in the underlying nature of the risk that needs to be understood, for example…
- …the types of businesses being insured or changes in the risk environment e.g. reduced risk management leading to more fires etc.
- The general economic environment can also contribute to an increase in frequency…

- …since people are more likely to claim for every possible thing when business is tough…
- …and the risk of moral hazard is also higher.
- In these cases, SureCorp will need to consider whether it will be possible to increase rates to accommodate the increased risk exposure…
- …or whether it will make their underwriting criteria stricter to exclude companies that pose higher than expected risk profiles.
- The presence of any bad run of catastrophes should also be considered, e.g…
- …the result may have been positive in the absence of any catastrophes.
- The CAT reinsurance programme of SureCorp may be revisited to make sure that there is adequate protection from these events.
- Another area that can be investigated is the movement in reserves or claims relating to prior years.
- If there has been continuous under-reserving in older years, it might be that profits made years ago were as a result of not adequately allowing for claims incurred then, but only being paid now.
- This is relatively unlikely though, since property is relatively short-tailed business, with much less uncertainty as to the likely existence and size of any given claim.

Level of expenses

- One would need to investigate whether the expense ratio (expenses as % of premium) has increased significantly in recent years.
- One would need to understand if these costs are once-off or recurring.
- For example, setting up a new distribution channel might be once-off…
- …while a change in commission structures might be recurring.
- SureCorp would want to make sure that they get value for money from expenses such as underwriting and claims handling…
- …in the form of better risk selection and avoidance of invalid claims.
- Recurring costs in particular would need to be reduced if they have increased without noticeable increases in efficiencies elsewhere.
- Fixing some issues in claims might actually lead to potentially higher expenses.

Investment income

- The result may have been reduced by lower investment income,…
- …or investment losses in recent years.
- SureCorp may have to move away from riskier, higher volatility type assets (e.g. equity) to more stable assets (e.g. money market or bonds).
- The company can also consider using instruments (e.g. put options) to limit their downside on the investment portfolio backing the line of business.
- Of course, lower risk assets will lead to lower returns over time, which might lead to lower margins.
- This is potentially problematic if a large part of the profits (or all of it) on this class of business comes only from investments…
- …meaning that reducing expected investment profits will necessarily lead to the profits needing to come from somewhere else.

QUESTION 5

Examiner's comments:

Some candidates did not read the question careful and failed to identify the area of the notes being examined – discussing term, nature and currency of liabilities. Where the appropriate answers were given, the answers were generally complete enough. This fed through to whether candidates were successful in answering part (ii). For part (ii) the main mark was often earned (i.e. a single mark for identifying the matching technique per type of liability), but further development of the point was often missing resulting in lower marks being awarded. The question did ask candidates to "describe" the method.

Part (iii) was generally well answered.

i.

Guaranteed in money terms

This consists of benefit payments where the amount is specified in money terms.

Example: A pure endowment, or guaranteed life annuity.

Guaranteed in terms of an index of prices, earnings or similar

This consists of benefits whose amount is directly linked to an index. The index may not be a nationally published one – for example, the benefit accruing may be in line with benefits declared by the sponsor company.

Example: CPI-linked annuity.

Discretionary

This consists of any payment that are payable at the discretion of the provider.

Example: with-profit annuity, smooth bonus funds.

Investment-linked

This consists of benefits where the amount is directly determined by the value of the investments underlying the contracts.

Example: unit-linked investment contracts.

ii.

Guaranteed in money terms

Pure matching – a provider will want to invest so as to ensure that it can meet the guarantees. This means investing in assets which produce a flow of asset proceeds to match the liability outgo. This will involve taking into account the term of the liability outgo and the probability of the payments being made, so as to indicate the term of the corresponding assets.

Approximate matching – Except for certain types of liability, it will probably be impossible in practice to find assets with proceeds that exactly match the expected liability outgo. A best-match is all that can normally be hoped for which may be achieved by investing in high quality fixed-interest bonds of a term suitable to match the expected term of the liability outgo. Derivatives could be used to produce asset flows that match liability outgo.

<u>Guaranteed in terms of an index of prices, earnings or similar</u>

There are similar difficulties in matching liability outgo, as with liabilities guaranteed in monetary terms. The most suitable match is likely to be index-linked securities, where available, ideally chosen to match the expected term of the liability outgo.

<u>Discretionary</u>

The main aim of the provider will be to maximise the discretionary benefits (in context of the mandated risk), and hence the investment strategy should therefore also aim to do that. This means investing in assets that will produce the highest expected return. However, this is subject both the provider's appetite for risk, and also to the risk expectations of the client.

<u>Investment-linked</u>

The benefits are guaranteed to the extent that their value can be determined at any time in accordance with a definite formula based on the value of a specified fund of assets or index. The provider can avoid any investment matching problems by investing in the same assets as used to determine the benefits.

iii.

- Restrictions on the types of assets that a provider can invest in.
- Restrictions on the amount of any particular type of asset that can be taken into account for the purpose of demonstrating solvency.
- A requirement to match assets and liabilities by currency.
- Restrictions on the maximum exposure to a single counterparty.
- Custodianship of assets.
- A requirements to hold a certain proportion of total assets in a particular class, for example, government stock.
- A requirement to hold a mismatching reserve.
- A limit on the extent to which mismatching is allowed at all.

QUESTION 6

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

Part (i): This question was well answered by the majority of candidates.

Part (ii): This question was poorly answered by the majority of candidates. The question required a discussion of 2 key topics: a discussion of types of reinsurance other than quota share and secondly how and why these could be incorporated into a reinsurance strategy. Most candidates only focussed on one of these areas and ignored the other.

Part (iii): This question was poorly handled by most candidates. A number of candidates assumed claims data was available and made reference to calculation of actual mortality while only expected mortality can be modelled *from the information given in the question. In addition, it was clear that while most candidates knew what VAR is, the majority did not know how to construct a mortality model utilising VAR.*

i.

- A quota share treaty shares a percentage of each claim with the reinsurer…
- …and hence there should be a reduction in the claims volatility experienced by G-Life
- This will result in smoother profits…
- …as well as reduced capital requirements…
- …and reduced probability of insolvency.
- In addition, they can write more business with their capital...
- …and increase their diversification.
- A quote share treaty will be relatively easy to administer…
- …and cover is generally automatic.
- They will also have access to the expertise of the reinsurer…
- …who can assist with product development, pricing etc…
- …which might be valuable given the size of the company.

ii.

- G-Life may consider replacing the quota share with a surplus treaty.
- This will allow them to vary the % of each risk shared with the reinsurer.
- They may choose to keep a larger proportion of smaller sum assureds…
- …while ceding more of the larger sum assureds.
- Alternatively, they may choose to retain more risk on bigger, more stable schemes and cede more of the smaller schemes risk.
- Another option might be to cede more risk in industries where the expected mortality is higher or more volatile (e.g. dangerous industries) and retain more risk in industries posing lower risk.
- A surplus treaty on mortality cover should have the same benefits as a Risk XL treaty…
- …since mortality benefits are typically fixed lump sums.
- This means that G-Life can effectively limit the maximum exposure to any one risk if they wish to do so.

- It will also make sense for G-Life to consider a Catastrophe XL on their portfolio…
- …to cover losses above a certain limit as a result of a catastrophe.
- A CAT XL will address risk associated with concentrations of risk such as:
  - by client, e.g. explosion at a factory
  - by region or event, e.g. a natural disaster in a specific area.

- An aggregate XL treaty may also be introduced for a specific industry, peril, or portfolio…
- …which will cover the aggregate of losses above an excess point and subject to a limit…
- …over a defined period, usually a year.
- A particularly useful aggregate XL in G-Life’s case might be a stop loss treaty.
- This will cover all losses above a certain limit from the company’s whole mortality book/account…
- …which can limit the potential for overall losses on the book…
- …although this is likely to come at a cost.

iii.

- Given that they have the membership and pricing data,…
- …G-Life can strip out their margins and estimate the expected mortality for each life.
- A model can be built that simulates the experience of all group/schemes/lives over a one year period.
- Running this model multiple times will give a distribution of aggregate loss experience.
- This model can be used to set a Value at Risk at various probabilities.
- For example, the aggregate loss that exceeded in 5%, 1%, 0.5% of years.
- The output of this can be used to set parameters on the reinsurance structures…
- …or can be compared to the available capital to understand the types of outcomes the company can handle.

QUESTION 7

Examiner's comments:

Part (i): This part of the question was a bookwork question and most candidates did very well with this part of the question.

Part (ii): Candidates were expected to explore each of the main risks, with an emphasis on the business risks, and the risks particular to unit linked business and the launch of a new product. Some provided generic answers that were not relevant to the question. It seemed as if candidates ran out of steam with the last part of the question, with few providing additional risks specific to the development of a first unit linked product.

i.

Business Risk – Risks that are specific to the business written

Market Risk – Risks related to changes in investment values or features correlated with investment markets

Liquidity Risk – Risk that company does not have the financial resources to enable it to meet its obligations as they fall due

Credit Risk– Risk of failure of third parties to meet their obligations

Operational Risk – Risk of loss from inadequate or failed internal control processes and systems

External Risk – Risks arising from external events

ii.

Business risk

The sales, marketing and administration costs may be higher than expected …

… thus reducing the profit achieved per policy

The product development costs may be higher than expected, …

… making it more difficult to achieve an acceptable return on the capital invested

The withdrawal rate may be higher than expected…

… which would significantly reduce the profitability of the business, because a large part of the total charges emerging late in the term of a policy

For early withdrawals, there is a risk that the company has not recouped its initial expenses ...

… especially if the company pays upfront sales commission.

The average premium size achieved may be lower than expected, which would reduce the profitability, because …

… charges received depend on premium size and a reasonable proportion of expenses are fixed

The new product might be much more popular than expected, selling high volumes…

The consequent demand on capital may be higher than expected, placing a strain on the company's ability to finance the business…

…. or reducing the volume of business that can be written

Administration teams might also be put under pressure in those circumstances, causing operational or reputational issues

Market risk

The investment performance of the unit funds might be worse than expected.

This reduces the marketability of the product and may reduce new business volumes and increase surrenders

ln addition, the fund-based charges will be lower than expected

Credit risk

There may be issues relating to the performance of counterparties if some of the operations of the new product are outsourced, e.g. investment management.

Liquidity risk

If the unit funds invest in illiquid assets, …

… there may be liquidity issues if a large number of policyholders wish to surrender at the same time

Operational risk

There may be errors made in the pricing (i.e. setting the charges) of the new product

The business might be subject to fraud

External risk

Competitors may offer lower charges on a similar product in order to attract a higher market share, forcing the company to respond or to accept lower levels of new business

Future regulatory, legislative or tax changes may undermine the attractiveness of or profit from the product

iii.

They would have to invest in an administration system …

… if they do not sell enough business, they might not be able to cover the costs of the system

… they may experience problems in the training of the staff in the new system√

… the cost of making the system ready for production might be higher than expected

Insufficient new business may be generated to recover the costs incurred when developing the product…

…due to unrealistic plans, or …

… unfamiliarity of the existing sales outlets with the new product.