Actuarial Society of South Africa

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Subject A301 — 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

- *Candidates displayed very poor knowledge of the bookwork required for this question*
- *Credit was given where candidates displayed a clear understanding of the concept or paraphrased (e.g. referring to maximization of profits by maximization of shareholder returns)*
- *Some candidates provided very lengthy responses, which made it difficult to mark and which generally scored poorly (due to lack of the required knowledge)*

i.

A substantial number of candidates:

- *were unable to reproduce the definition*
- *mentioned points on sources of obtaining capital which were not required*
- *did not cover the point of liabilities being required to be met in all reasonable future circumstances*
- *did not answer clearly or were vague (e.g defining capital by using the word capital)*
- *provided general comments on capital (e.g. uses of capital, capital requirements by individuals) which were not required*

ii.

A substantial number of candidates:

- *were vague in their responses (e.g. referring to risk profile consideration of assets and liabilities as just risk profile considerations)*
- *mentioned risk mitigation techniques which were not required*
- *did not provide the definition but rather comments on economic capital (e.g. purposes of economic capital; it being an internal measure)*

iii.

A substantial number of candidates:

- *failed to specify that assets and liabilities were to be calculated using a market-consistent basis*
- *confused economic capital for available capital*
- *provided generic and unrequired balance sheets items (current liabilities, goodwill etc)*
- *provided generic and unrequired income statement items (premiums, claims, expenses etc)*
- *provided a breakdown in the available capital (by free assets and required capital) which was not required*

i. Capital management involves ensuring that a provider has sufficient solvency and cash flow to enable both its existing liabilities and future growth aspirations to be met in all reasonably foreseeable circumstances. It also often involves maximising the reported profits of the provider.

ii. Economic capital is the amount of capital that a provider 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
   - the correlation of the risks

- the desired level of overall credit deterioration that the provider wishes to be able to withstand.

iii. An economic balance sheet shows:
- the market values of a provider’s assets (MVA)
- the market values of a provider’s liabilities (MVL)
- the provider’s available capital, which is defined as MVA – MVL.

The available capital is then compared with the economic capital requirement to assess the provider’s solvency status.

QUESTION 2

Examiner’s comments:

This question required candidates to outline the differences between critical illness and motor insurance ***and*** *to discuss whether “shopping around” is viable for both types of product. While most were able to list the key differences, only a minority were able to fully argue whether shopping around is viable by discussing how the premium rates for the products change over time.*

- CI is an example of a life insurance contract (or contract offered by life insurance companies).
- …while car insurance is an example of a short-term insurance contract (or contract offered by a general insurer).
- Generally, you have that a CI policy would be long-term over many years…
- …while a car insurance policy is likely to be annual.
- Car insurance is based on the concept of indemnity…
- …where the insurer will endeavour to put you in the same financial position as before the claim.
- CI does not provide indemnity from anything…
- …but will provide a benefit payment in the event of a critical illness event / procedure.
- Comprehensive car insurance generally covers the same set of perils…
- …while under a CI policy there can be significant variation in the scope of illnesses/events covered.

- Car insurance does lend itself to “shopping around” and making sure one is getting good value for money all the time.
- One can generally change providers fairly easily and cover is usually very similar between providers…
- …so comparing premiums is relatively straightforward.
- There is also much less risk of being declined cover as one ages...
- …in fact, one can argue that cover might even become cheaper as you grow older.
- With a CI policy one faces the real danger of perhaps becoming uninsurable as one ages.
- CI risk also generally increases over time…
- …so lower premiums at a higher age may be indicative of reduced levels/scope of cover.
- At the same time, comparing one CI policy with another is far less trivial than with car insurance.
- Unlike car insurance, one can obtain guaranteed rates for many years into the future…
- …as well as level premium structures, where the premium stays constant even if the underlying risk cost increases over time.

QUESTION 3

Examiner's comments:

This question was generally poorly answered. This question required the application of insurance product development principles to a new type of product. A number of candidates listed generic insurance product principles without applying them to the features of the new product. In addition, many candidates did not appreciate the key risks that the new products would introduce to the insurer.

i.

- Would definitely meet a customer need
- Many plumbers might be self-employed and insurer would probably exclude self-employed people
- But might be too expensive for a plumber (might not have the disposable cash)
- Insurer might be concerned about the current economic conditions and the effect on the incidence of claims
- Insurer might be concerned about the cyclical effect of the product as whole
- Insurer should be concerned about anti-selection (those expecting to be retrenched buy the cover)
- Insurer might be concerned that the incidence could be too high or too correlated with economic cycle

ii.

- What is the insurable interest?
- Major moral hazard risk as the owner might decide to kill their pet for the cash payout
- Doesn't really meet a customer need as no expenses/losses are incurred with the loss of a pet (Note to marker: candidates might argue that there is a cost of cremation/burial in which case you could award for that)
- For the insurer, what statistics are available to be able to price the product?
- Not likely to have past experience and no known national tables available
- Insurer would have the advantage of being the first in the market with such a product and his could give them a lot of marketing mileage

iii.

- Meets a customer need especially if you are concerned about breakdown, your car is prone to breakdown, you drive long distances etc
- Insurer would be concerned about pricing appropriately for different risk groups (age of car, distance travelled annually etc are all risk factors to be considered)
- Insurer would need to ensure the benefit closely matches the loss to the customer otherwise moral hazard might occur

QUESTION 4

Examiner's comments:

Bookwork question, however very few were able to demonstrate their understanding, with most answers being vague and imprecise. It asked that various accounting concepts be explained, however many candidates provided an actuarial description rather than an accounting one.

i.

The accounting basis normally required for an insurer's published accounts, which is based on the assumption that the insurer will continue to trade as normal for the long-term future.

ii.

The accruals concept states that income is recognized as and when it is earned

iii.

The matching concept states that income and expenses which relate to each other should be matched together and dealt with in the same income statement.

iv.

The materiality concept states that there is little point in providing information which is so detailed as to be unintelligible, or in the making minute adjustments which have no real effect on the picture portrayed by the financial statements.

v.

The prudence concept states that financial statements should avoid presenting an unduly optimistic position. Thus, the lowest reasonable figure should be used for profits / assets and the highest reasonable figure for liabilities. However, you should still not deliberately include margins. Prudence should only be applied in situations when there is uncertainty.

vi.

The consistency concept states that the figures published by the company should be comparable from one year to the next. Accounting policies should therefore not be changed from one year to the next unless there is a good reason to do so. Any changes should be highlighted and their effect explained.

QUESTION 5

Examiner's comments:

The first part of the question was well handled with most candidates getting full marks for the bookwork question. The second part was always handled well by most candidates. Most candidates were able to generate enough points focusing on how the proposed revamp will achieve the regulatory objectives and also points focusing on the cost impact of the revamp. Some candidates tended to focus more on the cost impact and lost marks as a result. It was a brainstorming question and candidates could generate a wide range of points, however only a handful of candidates got full marks for the question.

i.

- to correct perceived market inefficiencies and to promote efficient and orderly markets
- to protect consumers of financial products
- to maintain confidence in the financial system
- to help reduce financial crime

ii.

<u>to correct perceived market inefficiencies and to promote efficient and orderly markets</u>

Given the information asymmetry in financial markets, it is likely that consumers might have made incorrect decisions due to inconsistent remuneration incentives for advisers. Therefore, advisers might have recommended products based on remuneration levels instead of what is truly the right decision for the client. If the regulation is implemented successfully, then this can be avoided. The transparent disclosure requirements will further assist in delivering this aim of regulation as it should ensure consumers can make more informed decisions regarding financial products.

There will likely be a direct costs of regulation in this context as any form of regulation needs to be implemented and monitored – this can ultimately result in higher fees to the consumers as these are passed on to them in product pricing.

<u>to protect consumers of financial products</u>

It is not stated how remuneration levels were determined in the past, but there might have been some practices that did not always benefit consumers – advisers might have charged too high fees, or might not have disclosed that consumers can negotiate the fees (if relevant). By regulating the format and level, this should result in more fair outcomes for consumers.

The cost, however, for regulated levels of fees might sometime remove the natural competitive forces in the market, and as a consequence can lead to sub-optimal outcomes. For example, it is conceivable that advisers will charge the maximum allowable regulated fee for all transactions – something which is unlikely to have been the intention of the regulator.

to maintain confidence in the financial system

All of the above should result in better outcomes to consumers –at least in the medium to long term – which should affect the sentiment towards the financial system.

It should, however, ensure that the costs (direct or indirect) should not negate the additional value being created by these initiatives in the form of higher product and/or advice costs.

to help reduce financial crime

It is likely that financial crime or fraud has occurred in the past due to lack of regulation around remuneration/commission structures. If the regulation is implemented well, then this can be avoided or reduced in future.

QUESTION 6

Examiner's comments:

This was not a difficult question however many students failed to do well on this.

i) Well answered by most students, this question was easy marks.
Some students incorrectly stated that the amount above the excess will be fully covered by the insurer - no marks were awarded for this.
For no claim discount students confused no claims discount with no claim bonuses.
For short tailed business most students only mentioned either short reporting delays or just settlement delays.

ii) This was very poorly answered question. Students showed that they did not understand what peril is. Many students answered "loss of data" as peril, no marks were awarded for this as one does not suffer an insurable loss for just losing data. An insurable loss is suffered if you lose data and suffer financial or reputation.

iii) This was an easy question that was generally well answered however some students incorrectly listed risk or rating factors.

iv) Very few students achieved high marks for this question.
A mitigation for anti-selection was incorrectly answered as strict underwriting. With this type of business underwriting is difficult if not impossible - no marks were awarded for this.

i.

Excess – the sum, specified in the policy, that the insured must bear before any liability falls upon the insurer

No-claim discount – a form of experience rating in which policyholders are allowed a discount from the basic premium according to a scale that depends upon the number of years since the most recent claim

Short-tailed business – types of insurance in which most claims are usually notified and/or settled in a short period from the date of exposure and/or occurrence

ii.

- loss incurred (either directly or indirectly) due to theft of data

  - could include the costs incurred to fix/restore data
  - could include the PR/communication costs to inform customers
  - could include cost to hire experts to neutralise the threat in future (or to stop the current threat)

- 3rd party liability – loss incurred by a 3rd party (eg. a client) due to the theft of your data

- Business interruption – loss suffered due to loss of data or due being unable to access your systems (ransomware)

- Ransom payment

- Loss due to cyber fraud (e.g. Theft from bank account)

(max 2)

iii.

- risk premium which needs the expected claim frequency and expected claim cost
- profit loading/target
- commission
- expense loading
- contingency loading
- investment income
- cost of reinsurance
- tax

(max 4)

iv.

Difficulty is that you don't know either the expected claim frequency or the expected claim cost for these events as you have no past experience. (No historical data available)

Other places in the world might be more advanced in these covers and so there might be data from elsewhere in the world that you could use.

You could ask a reinsurer for assistance with setting the risk premium (though they too might not have statistics)

There might be industry statistics available for these types of covers

You could build in an explicit safety margin to the risk premium.

You might seek a higher profit and/or contingency loading to allow for the extra uncertainty.

You are a small insurer and these covers might be large which means you might be taking on too much exposure

You could reinsure the bulk (or a substantial portion of the risk)

You could cap the maximum of cover you offer

You could introduce an excess that means the insured's interests will be more aligned with yours as the insurer

Do we have the resources and skills to manage the underwriting and the claims management for this type of business

You could ensure that staff with the right experience are employed

You could agree that your reinsurer provides you with the expertise when needed

You could use a consultant with the relevant experience

Clients who are more at risk might select against you and buy the cover and there might be limited ways to underwrite or price for this risk

QUESTION 7

Examiner's comments:

Generally speaking the question was poorly answered, even though the bulk of the marks was for work that was well within the scope of the core reading. Knowing how to perform a mortality investigation is a basic skill, and students also demonstrated a poor understanding of the factors that cause mortality rates in a company's underwritten business to differ from the industry average.

i.

Why support the project:

- This might be the first study of its kind
- No industry life tables exist currently
- By pooling of data the result should be statistically significant/reliable
- Local life offices will have the opportunity to compare their own experience against the industry's…
- …and investigate/understand any significant differences.
- …and whether these possibly indicate areas in the rating chart(s) where the company can be more competitive.
- Might also be useful to get an idea of what the competition's experience looks like

Contributing to its success:

- Key would be the agreeing to make their data available
- This would likely require them to provide data in the format as specified by LARG
- Which would consist of exposure and claims information
- …as well as any other information that may be required e.g. underwriting guidelines etc.
- Providing financing to support the work…
- …and/or providing expertise/manpower e.g. actuarial resources, computing power etc.

ii.

- LifeCorp's target market comprises a different socio-economic group…
- …that experiences lighter mortality than the average observed in the market.
- For example, LifeCorp may be targeting educated professionals.
- LifeCorp's sales method leans toward selecting risks with lighter mortality…
- …perhaps by avoiding call centre / internet sales channels, associated with higher mortality…
- …whilst sourcing business from a tied agency or broker channel which may have lower mortality.
- LifeCorp's product design/positioning might be different to the rest of the market…
- …perhaps by incentivising healthy living…
- …and hence attracting better than average risks
- LifeCorp may be employing much stricter underwriting rules at inception…
- …perhaps applying special terms to risks that the industry treats as standard.
- Claims underwriting may also be stricter.
- The base rates might be too light but the company is making up for these by means of other margins
- There may be a deliberate cross-subsidy between the mortality business and another class of business where LifeCorp is very profitable.

iii.

Data required

- Exposure information on LifeCorp's insured lives…
- …with all the necessary rating factors present that are in the in-house as well as industry tables
- One would also need all the claims that have happened over the same period.

How to use it

- First allocate each claim to the relevant piece of exposure
- It might be useful to summarise collated the exposure and claims information into homogenous risk groups
- For each risk group look up the mortality rate for the in-house table as well as industry table.
- Using the exposure in that group one can then calculate the expected number of deaths for that group under each basis.
- Create/document/present summaries showing actual vs. expected numbers.
- One would be particularly interested in the actual vs. expected on the in-house mortality basis

Assumptions

- It might be that the industry tables do not have the same rating factors as the in-house basis…
- …or that the levels within factors are different.
- This will necessitate that one split up either the in-house exposure…

- …or the basis used in a sensible way…
- to calculate the expected claims in a given exposure group

QUESTION 8

Examiner's comments:

i. *It appears students did not really focus on the question. They did not seem to pay attention to the design factors that would change because of the change in target market. Most students did not score well on this question because of this. It also appears students do not really understand endowment products. In cases where students mentioned the appropriate factors they did not discuss or articulate well the implications to score marks.*

ii. *A significant number of students scored average marks on this question. This was because students seemed to have limited appreciation of endowment products and therefore the key assumptions that impacts pricing. Key assumptions like the distribution of premium and profit margin were left out by a lot students. It also appears that students struggled to articulate reasonable data sources. Even though this was a typical book work question, students failed to score marks.*

i.

<u>Customer needs / Marketability / Competition</u>

Given that this is a new target market, one need to investigate whether the market will find the adaptation of the existing product attractive. How does it compare to competitor products aimed at a similar target market?

<u>Level and form of the benefits</u>

Generally speaking, the level of complexity of products in the affluent market is higher than those in the emerging markets. One would therefore need to consider how the benefit structure can be adjusted to adhere to this.

<u>Premium size and pattern</u>

The affordability in the emerging and middle market is not as high as in the affluent market, and lower minimum and average premium sizes will have to be considered.

<u>Pricing/Charges</u>

Given the previous point, one would need to carefully consider whether the value for money for lower premium sizes will be sufficient to meet clients' needs – generally speaking, the expense component of lower premiums are higher, and as such lower benefits can be provided relative to higher contributions. One might consider charging structures that have inherent cross-subsidies between lower and larger premiums, but the fairness thereof should be carefully considered.

The pricing of the benefits might also need to be reviewed, especially the mortality assumptions utilised in the pricing of the endowment assurance benefit – the mortality experience in the emerging and middle market might differ materially from the affluent market. This might affect the (relative) value for money even further as mortality will be expected to be worse.

Discontinuance benefits

Given the affordability, one can expect that lapses or surrenders might be higher in the new target market. The contract design might allow for ‘premium holidays’ or a similar feature. However, the pricing should allow for higher expected surrenders – this might further erode value for money.

Profitability

The profitability of the product will need to be considered, and this might need to be balanced with the value for money being offered, given the points raised under Pricing. One will need to assess whether the required shareholder return can be offered, and this might affect the viability of the solution.

ii.

Mortality rates: Unlikely to have any inhouse experience, and therefore might need to rely on industry statistics or reinsurance data.

Persistency rates: Current experience on affluent product can be used as basis, but will need to assume experience will be worse. Sensitivity analysis might indicate the need for more accurate assumptions.

Distribution of premium size: Unlikely to have any inhouse experience. Given the target market, the distribution is likely to be heavily skewed towards the minimum premium size.

Expenses: Existing assumptions might be equally relevant. One can make minor adjustments where difference in operating model is expected.

Profit margins: Will be determined by shareholder return requirements.

QUESTION 9

Examiner's comments:

Part (i) was generally well answered, but the better candidates made more application to the situation at hand. Many candidates proposed both a quota share and surplus arrangement, which required additional explanation as to why/how this would work, since surplus was the more obvious structure, given the business risks. A surprising number of students also displayed a lack of understanding of the difference between a risk XL and a catastrophe XL. In some cases credit was given for other structures that were motivated properly e.g. facultative arrangements.

Part (ii) could have been handled better by many students. As can be seen from the solution outline, there was a lot more marks available than required. A subminimum of 2 marks were required on all points except for professionalism where there was a subminimum of 1½. This enabled flexibility in deciding on which topic the candidate wants to elaborate on, while still requiring sufficient comments under each heading.

*The question required proper application of the control cycle to the problem at hand, namely making reinsurance decisions. Candidates who made even basic application scored better than those with a lot of generic comments. When considering developing the solution, a lot of candidates spent a lot of time explaining how to **build** a model, instead of telling the examiner what it should **do** and **how it helps with the decision**. When considering monitoring, many candidates simply said that experience should be monitored and fed back into the earlier steps. This was too generic and didn't score well. Better candidates elaborated on what experience should be monitored and how it affects earlier decisions.*

i.

Surplus treaty/arrangement

- Allows the insurer to fine tune its exposure to risk…
- …since they can select a different retention % on each risk.
- This is preferable, given the heterogeneous nature of business risks

Risk XL

- Limits the insurer's exposure to any one claim/risk…
- …by passing the losses above a certain limit to the reinsurer.
- This allows the insurer to write larger risks

Catastrophe XL

- Limits the insurer's exposure to an accumulation of losses from a catastrophic event
- All losses occurring within a defined period can be combined...
- …and passed to a reinsurer if it exceeds an agreed limit.
- This will protect the insurer from financial difficulty in the event of a catastrophe/natural disaster.

Whole account protection (Stop loss)

- Protects the insurer's overall financial result (profitability)…
- A whole account protection aggregates all losses over a given year, for a given portfolio (or the entire company)

- If these losses exceed a certain limit, the reinsurer(s) will pay out an amount (usually subject to an upper limit)

ii.

Specifying the problem

- MaxiSure would want to purchase reinsurance in the most cost effective way possible…
- …because reinsurance generally cedes away profits to the reinsurer
- MaxiSure would want to consider some of the reasons for purchasing reinsurance in the first place
  - Reducing claims volatility / smoother profits
  - Reduced capital requirements
  - Increased capacity to write more/larger risks and diversify
  - Limiting large losses either from single claims or accumulations thereof
  - Reducing their risk of insolvency
  - Accessing expertise of the reinsurer.
- At the same time MaxiSure can also be relying on advice from their reinsurance brokers
- They also need to keep in mind the existing relationships they have with the reinsurance market

Developing the solution

- Each year MaxiSure would need to decide on what reinsurance products they want to purchase and with what levels of retention
- They could possibly build a model that simulates claims for the next year…
- …as well as project their profitability and/or solvency
- By overlaying a variety of proposed reinsurance structures…
- …including the expected costs and recoveries…
- …they should be able to get an idea of what the outcome (or their financial position) would be under various strategies

Monitoring the experience

- Each year (at every renewal) MaxiSure would need to consider how well the reinsurance structure performed…
- …taking into account the major reasons for purchasing reinsurance discussed above.
- They would also compare the actual underwriting results with that predicted by their models…
- …and improve these models to make sure that the effect of reinsurance is modelled in the best way possible
- They would also revisit whether their capital position and/or risk appetite has changed over the last year…
- …which would inform whether they cede more/less in the next year.
- They would also consider the level of technical/actuarial/product/underwriting support they received from the reinsurer(s)…
- …and whether they can get the same support for cheaper elsewhere.
- They would also need to monitor the relevant credit risk associated with the reinsurer(s)…
- …and take appropriate action if anything changes in this regard e.g. if a counterparty gets downgraded

General economic and commercial environment

- The company would need to conform to regulatory/legislative restrictions on reinsurance…
- …which may be applicable to the nature of reinsurance contract…
- …and/or the allowable counterparties (approved reinsurance etc…)
- The company would need to be aware of any underwriting cycles…
- …that affect the availability and cost of reinsurance…
- …some of which may be driven by international factors.
- There may also be a general expectation from rating agencies (or clients/brokers) to have reinsurance in place.
- MaxiSure also needs to consider the impact that any changes to their reinsurance programme might have on their ability to obtain cover in future

Professionalism

- The actuaries involved with these decisions would need to give due consideration to any professional guidance…
- …especially as it pertains to the giving of advice and/or the building of actuarial models.
- There is also an element of public interest in that the actuary would want to keep in mind…
- …to make sure that any reinsurance arrangements do not put the company's ability to meet valid client obligations at risk…
- …or treat them unfairly.