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.

GENERAL COMMENTS

Paper 1 was extremely poorly handled by the majority of candidates. The examiners noted (with concern) that many candidates seemed to not understand basic actuarial concepts such as risk & rating factors and the actuarial control cycle. In addition, it seems students don't understand the difference between life insurance and P&C insurance. Many students showed they had not studied basic bookwork sufficiently.

QUESTION 1

Examiner's comments:

Most candidates did well with part (i) of the question, but some mistook the benefits to be the same as income protection. Candidates could identify some of the relevant points in parts (ii) & (iii), but many missed out on easy marks.

i.

Critical illness insurance provides a cash lump sum on the diagnosis of a critical illness as defined by the policy which can be used however the policyholder would like but usually to help cover the costs associated with medical care that aren't covered by medical or health insurance.

ii.

- Medical advances mean that some diseases which were considered 'critical' in the past are no longer 'critical' today and thus undermine the original reason the product was created
- Medical advances mean that some diseases are diagnosed that weren't in the past and some diseases are diagnosed sooner. This undermines the pricing of the product.
- Medical advances mean that the recovery time on certain diseases covered by the contract may have shortened significantly and so the same financial consequences may not be felt. (Candidate could also say the medical costs associated with disease could have declined)

iii.

1. Stop selling the product
2. Review the definitions to try and cover the effects of medical advances (known as future-proofing the definitions in case any candidates use this term)
3. Reinsure the majority of the risk
4. Don't guarantee the rates (i.e. reviewable rates)
5. Allow for reviewable definitions in the product design (though not likely to be popular with clients!)

QUESTION 2

Examiner's comments:

It was evident that the students did not read the question properly. Overall the question appeared to be poorly answered with few students scoring well. Key points to note were that the insurer operated in the US Group Life space, and not in P&C insurance, and that the war, riot and terrorism exclusion is applied at claims stage.

i.

- *Generally well-answered by stronger students*
- *Disappointingly many students wrote about 'damages' and 'unlimited liabilities' which is relevant to short-term P&C business, not Life. The question clearly stated the insurer was a large Life insurer. Life liabilities may be large, and hence the total claim size may be large for an act of war, riot or terrorism, but the total exposure is still known upfront.*
- *Marks were awarded for valid points around concentration of risk, as well as selection from policyholder actively selecting against insurer.*

ii.

- *Many students struggled with this question regarding the practical difficulties in imposing the exclusion at claims stage.*
- *Many students confused the imposition of the exclusion at claims stage with it being at sales stage. This is clearly incorrect – an exclusion is imposed at claims stage, where relevant, to repudiate claims. As a result, no marks were awarded for points relating to sales.*
- *Marks were not awarded for the period of claim being unknown – this can be set by the insurer similarly to Catastrophe claim windows. However valid points around the long-tailed nature of claims, and the difficulty in proving claims being related to event were awarded marks.*

iii.

- *Stronger students scored well with valid points being made.*
- *Anti-selective risk especially if the insurer is the only company to remove the exclusion was a valid point which scored marks.*
- *Notes made around internal sign off processes and risk management possibly not allowing the exclusion to be removed also scored marks.*
- *Considering market practice regarding the exclusion is a valid and critical point and scored marks.*

i.

Acts of war, riot & terrorism may not be insurable because

- Events may not be independent
- The potential claim size may be too large
- There may not be sufficient data available to be able to price for the risk appropriately
- The international nature (meaning it's diverse nature and unpredictability) of war & terrorism may also make the risk difficult to price

ii.

- The definition of what constitutes an act of war, riot & terrorism may be difficult to defend
- There may a level of subjectivity involved e.g. the ANC were considered terrorists by the Apartheid government in SA
- There may be political and public pressure to pay anyway even if the cause was clearly due to a war, riot or terrorism (reputational damage)
- Regulation might prevent the imposition of such exclusions
- Policyholders reasonable expectations must also be taken into account (which would be influenced by how this exclusion is communicated to them)

iii.

- Accepting the risk without any consideration of the potential size of the risk could be problematic
- The potential size could threaten the solvency of the company
- You could try get reinsurance cover for the risk to mitigate the risk
- You would need to start monitoring your exposures in particular areas to ensure you did not take on too much exposure in any one area
- You might have to turn down business in particular areas if the potential exposure in that area was too high for the company to take
- You might need to increase your statutory capital to make the regulator more comfortable with you taking on the risk (and to protect against insolvency)
- Might not need to remove the exclusion if the government already provides the cover (or there might be government owned/sponsored insurer that does e.g. SASRIA)
- You could increase the premiums to compensate for the extra risk

Other valid points were awarded marks as appropriate

QUESTION 3

Examiner's comments:

Students did not consider the holistic approach to providing services to clients and missed out on some easy marks. Students who considered a client engagement from the beginning to the end scored well in this question.

- Ensure that they are familiar with the context in which they are going to operate
- Understanding the implications of results or advice given
- Considering resources and timescales
- Define the task with the client
- Consider conflicts of interest
- Establish what are the questions that need answering
- Gather and asses the available information
- Set assumptions
- Decide on a method to arrive at answers / results
- Do the work / analysis / research / modelling to arrive at a solution
- Check the solution and possibly get someone else to check or peer review it.

- Communicate the answer in an understandable way to the client
- Consider all the professional implications of the work being done

QUESTION 4

Examiner's comments:

i. This was a bookwork question which was answered reasonably well by most candidates

ii. Most candidates struggled to contrast the merits of each proposal

i.

Advantages:

- Should lower your price thereby making you more competitive
- It should remove the administration hassle of small claims (because policyholders don't think it is worth submitting small claims)
- NCD tends to influence policyholder behaviour in that they don't submit claims for fear of losing their NCD
- Automatically rewards policyholders with lower claims (or no claims), it is therefore an automatic risk pricing adjustment mechanism
- Improves loyalty of the policyholders

Disadvantages:

- It is an additional rating factor and your systems need to be able to keep track of the NCD
- If a policyholder loses their NCD entirely, it makes it much easier for them to move at that point as there is no longer any benefit keeping them with your company
- Can actually negatively affect a policyholder's attitude to your company if (for example) they feel they have lost their NCD not due to their behaviour/driving (e.g. accident was caused by someone else)
- It could result in increased administration and therefore increased costs

ii.

- He is correct in that it could be more attractive to policyholders to get cash back rather than a discount on the following years premium
- Paying a cash bonus probably does not help improve the loyalty of policyholders as they could get the cash bonus and move to another company
- Whether he is right or wrong will also depend on what other companies do in the market. If everyone else has a cash bonus and you don't it could actually be damaging your market position. Similarly, it could actually be beneficial to you to do something different from rest of the market.
- Might also depend on your systems which may be able to handle the one method and not the other
- Unclear whether the cash-back bonus or the NCD will be better for experience

QUESTION 5

Examiner's comments:

i. *This question was generally well answered. A large number of candidates indicated that the assets need to match the liabilities (implying perfect matching) while the assets only need be appropriate (or approximately matched) to the liabilities.*

ii. *This question was poorly answered in general. The question required discussion of why particular assets were suitable and not just a list of suitable assets which many candidates supplied. In addition, many candidates did not state the link between the nature of the liability payment and what makes an asset suitable for that liability. The focus of the question was on Asset-Liability matching while many candidates instead provided a general discussion of suitable assets.*

iii. *This question was generally well answered. A majority of candidates missed the relationship between efficient markets and passive investing.*

i.

1. A provider should select investments that are appropriate to the:
   - nature
   - term
   - currency, and
   - uncertainty

   of the liabilities, and the provider's appetite for risk.

2. Subject to 1. the investments should also be selected so as to maximise the overall return on the assets, where overall return includes both income and capital.

ii.

The type of assets will depend on the nature, term, currency and uncertainty of the liabilities.

<u>Guaranteed in money terms</u>

The without-profit pure endowments are likely to be fixed in monetary terms, and hence will be guaranteed (dependent on survival). In this scenario, pure matching is the most likely approach, and therefore bonds or zero coupon bonds are most likely utilised. Note that approximate matching or immunisation can also be utilised if pure matching assets are not available.

<u>Guaranteed in terms of index</u>

The index-linked life annuities will be guaranteed in terms of some pre-determined index (likely CPI), and hence the investments should ideally be purely or approximately matched using the same underlying index. In the absence of the ability to invest in the index, one can consider assets that provide a real return.

The company's expense profile is also expected to be real in nature, and can therefore be considered guaranteed in terms of a CPI index.

Discretionary benefits

The with-profit life annuities will have discretionary benefits, and the recipients of the discretionary benefits will usually expect the proceeds of their contracts to maintain their value in real terms. The provider will therefore need to maximise these benefits (within a risk framework) and hence the investment strategy should therefore also aim to do that. There will be some portion of the life annuity that is already guaranteed in nature (vested benefits), and these will likely be purely or approximately matched. However, the remainder of the assets – those that will fund the discretionary benefits – will be exposed to growth/real assets**.**

Other aspects

- It will be assumed that all liabilities are South African, and therefore all assets are expected to be invested in the local currency. If there are liabilities in other currency, then these should be matched so as to reduce any currency risk.
- Any regulatory prescriptions or limits should also be taken into account when appropriate assets are chosen.
- You can award to candidates who discuss how the free assets of the company could be invested

iii.

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

In an efficient investment market it should be impossible to generate excess risk-adjusted returns by pursuing an active investment approach. Thus, a passive approach might be more suitable, particularly if it is less expensive to adopt than an active strategy which is likely to incur much greater dealing and research costs.

Passive investment is not entirely risk-free as the index may perform badly or there may be tracking errors.

QUESTION 6

Examiner's comments:

i. *While most students had some vague idea of the terms they had to define, very few could clearly define each term and many students mixed them up. Given this is straight bookwork and a fundamental actuarial concept it shows how poorly candidates have prepared for this exam.*

ii. *This question was answered poorly despite the many possible marks that were available. Most students did not have a clear structure to evaluate these rating factors and missed out on easy marks. Students also didn't write enough for 8 marks.*

i.

Rating Basis
The collection of assumptions used to associate the risk premium with the characteristics of the risk being insured.

Risk Factor
A factor that is expected, possibly with the support of statistical evidence, to have an influence on the intensity of risk in an insurance contract.

Rating factor
A factor that is used in the pricing of an insurance contract √ that either exactly represents a risk factor or is a proxy for a risk factor.

ii.

a.

- It is verifiable and objective
- Question is the value of a rating factor as it needs to be tied to a representation of the risk characteristics
- Could only possibly be tied to lapse risk
- Unlikely to be statistics available around which banks present better risks
- Policyholders might also change banks if they worked out it was used as a rating factor or might change at a later stage and it would then be impractical to change rates

b.

- Verifiable and objective (but could also be argued that it wasn't … important thing is to state why you believe what you believe)
- In SA race used to be used as proxy for socio-economic class in determining mortality & morbidity risk
- It would be politically, socially & legally unacceptable to use race as a rating factor anywhere in the world today
- It is doubtful that race would be a proxy for socio-economic class in many places in the world (could also be argued that it is a good proxy and marks were awarded for this so long as there was a reasoned argument)
- Statistics are no longer available (or kept) on risks by racial classification

c.

- Verifiable and objective
- There are statistics available to show how gender affects mortality and morbidity risk
- Widely used as a rating factor
- Some places in the world (e.g. Europe) it is socially, politically and legally unacceptable to use gender as a rating factor

d.

- Verifiable and objective
- Salary is unlikely to be a risk factor itself. It is a good proxy for socio-economic status which does affect mortality and morbidity risk
- Widely used as a rating factor

e.

- Verifiable and objective
- Some risk that the policyholder could change province after buying the policy
- There is statistical evidence that geographic region of residence does affect mortality and morbidity risk
- Some (small) risk that a potential policyholder misrepresents where they live in order to get cheaper rates (e.g. by using their parent's home address or something like that)
- Generally used as a rating factor

QUESTION 7

Examiner's comments:

This question scored the highest marks on average by students on this paper.

i. *This part was a bookwork question and it was generally well answered. There were a few candidates that didn't know their bookwork and lost unnecessary marks.*

ii. *This question was not well answered, but many candidates still generated some marks by stating their generic data knowledge. The concept of data items seems to have been confusing for some candidates as they focused on discussing data sources.*

iii. *Many candidates had a good idea of how to approach this question, but many failed to generate enough distinct points on how to deal with the lack of credibility in the data. Candidates tended to focus on only one point and delve deeper into it.*

i.

- update assumptions as to future experience;
- monitor any adverse trends in experience so as to take corrective actions;
- provide management information.

ii.

The data required will include claims per member with the following indicators:

- Age of member
- Gender
- Whether claimant is main member or dependent
- Scheme package/option (if more than one option is available)
- Size of the claim
- Amount of the claim that was covered by the scheme

- Illness or cause of claim
- Type of specialist that diagnosed the illness
- Duration of illness (if claim amount is duration-dependent)
- Hospital network or category
- Split of claim amount between hospital cost, specialist cost, medicine cost, or other categories that are relevant.

In addition to the claims data above, the same level of detail of data is required for all members in order to calculate the 'exposed to risk'.

iii.

It is likely that insufficient volumes of data are available to complete a monitoring exercise, or that the results obtained are not credible. If this is the case, then the following actions might be necessary:

- One might conclude that a monitoring exercise will not produce useful results, and therefore need to obtain independent or 3rd party data.
- One can continue with the little data available, and use the results with caution.
- The level of detail used for classification (described in b) might be reduced in order to have fairly homogenous groups with credible data and results.

QUESTION 8

Examiner's comments:

Overall the responses for this question was not on standard. Part (i) was answered fairly well, with stronger candidates scoring full marks. Most common mistake was assuming that the question only referred to financial metrics as criteria, and hence only discussing NPV, IRR and DPP. Part (ii) was answered particularly poor. Most candidates failed to provide the <u>major</u> risks, and hence focussed on any risk that could potentially arise. Most notable, the majority of responses were more appropriate for a question asking "list the major factors that needs to be considered" – these candidates hence provided a range of factors, issues and logistical constraints, rather than focussing on the "risks that this joint-venture initiative might face". Part (iii) was answered to a reasonable degree, with stronger candidates again scoring full marks.

i.

The criteria will typically be expressed in terms of the financial results expected and the risk that these results may not be achieved**.** It may also include.

- achieving synergy or compatibility with other projects undertaken by the sponsor
- satisfying "political constraints", both within and without the sponsoring organisation
- having sufficient upside potential
- using scarce investment funds or management resources in the best way

These criteria often cannot be factored into a financial model and a subjective assessment will have to be made of their impact once the financial results are available.

ii.

Not clearly understanding the clients' needs

OR Not providing relevant solutions

This will essentially be a new target market for ABC Life, and they are unlikely to have insights into the Indian market. The JV partner might have insights, but it is unclear from the information provided whether this will be the case.

NPV allowance: This can't be explicitly modelled in the projections, but some allowance can be made for different sales/take-up rates. This can indicate the potential impact if the needs are not properly understood and solved for.

Indian partner company not delivering on their responsibilities

In any joint-venture it would be expected that the parties involved will each have certain roles and responsibilities. Since ABC Life only has RSA exposure to date, it is reasonable to expect that many of the responsibilities of the Indian partner will be to provide insight, operational support, distribution network, etc. in India. If they do not deliver on their responsibilities, then it will have a material impact on the project.

NPV allowance: This is unlikely to be allowed for in the NPV projections or assumptions. One might implicitly allow for this risk by assuming a higher risk discount rate.

Pricing risk

Since this is a new market, there is the risk that pricing levels might be inappropriate as data might be difficult to obtain or does not exist. Therefore, the benefits provided might be more/less than what is priced for.

NPV allowance: This can be allowed for in the NPV modelling by varying the pricing levels/premium income relative to the benefit payments/outgo.

Poor distribution

OR Poor brand or marketing presence

Given that this will be a new territory, it is possible that the competitor landscape in India might be difficult to enter with an International brand. No information is provided on the brand strength of the India partner – one should therefore assess this risk with additional information.

NPV allowance: One can again allow for this by assuming different levels of new business and take-up rates to assess the impact if this risk materialises.

Operational risk/Implementation risk

ABC Life has no operational capability in India, and a new operating model will therefore be required or considered for this initiative. The cross-country/cross-continent aspect of this project might introduce operational risk, especially during the initial development/launch phase of the project.

NPV allowance: The expense assumptions/projections in the NPV calculations need to allow for the potential to incur additional expenses or losses if this risk materialises. One can also investigate the impact if the launch is delayed due to operational risk or concerns.

Currency risk for financials

To date, ABC Life only has South African liabilities. This initiative will introduce non-ZAR earnings, and this will introduce currency risk for shareholders in future.

NPV allowance: one can include this in the NPV projections by investigating a number of scenarios with different exchange rate assumptions.

iii.

Although it is true that a single number of NPV might mask many of the risks, one can still successfully utilise the NPV measure to illustrate the impact if risks materialise. Such techniques include:

- Scenario analysis: construct a series of future scenarios, each representing a combination of possible outcomes for the major risk events and each having its own probability of occurrence
- Stress testing: risks that are incurred by extreme events can be identified and investigated by the process of financial stress testing

Stochastic modelling: The other main method is to build a stochastic model of the various risks and then run a series of simulations in order to get a probability distribution of the NPVs

You could also use another financial metrics such as IRR; payback period and/or discounted payback period.

QUESTION 9

Examiner's comments:

This question was extremely poorly answered by almost all students. It staggered the examiners that many students did not even know the stages of the Actuarial Control Cycle. This was the worst answered question on the exam paper.

Common mistakes included:

- *Presuming that there was a payment from RSA Re to ZenSure, rather than the other way around as clearly stated in the question*

- *Almost no students understood that the payment to RSA Re was to cover the reserve requirements for a block of 20 year old whole life policies. Many students thought that the payment represented upfront profits for RSA Re*
- *A failure to understand how reserves build up over time*
- *Assuming that ZenSure was a poorly run company, even though there was no evidence to this in the question. This led to students wasting valuable time discussing the various problems that ZenSure might have*
- *Putting in all the theory that they had learned about the ACC without being able to select those elements relevant to the transaction in question*
- *Focussing on the risks faced by the parties without explaining what they thought the transaction entailed*
- *Not understanding that good or poor experience will lead directly to improved profits or an impairment of profits*
- *Assuming that RSA Re would be directly responsible for premium collection from and claim payment to policyholders, even though the question made it clear that ZenSure would continue to administer the business.*

However, the fundamental mistake made by almost all students was to fail to specify the problem as " RSA Re wants to take on the business such that the runoff will provide a specified profit over time" and then work from there.

i.

- Zensure may which to release some reserves pertaining to this business.
- The reserves released may well be more than the amount that needs to be paid…
- …especially if the reserves were held on a very prudent basis.
- Zensure may want to remove the uncertainty surrounding development of the older policies.
- RSA Re may have significant expertise in writing mortality risk
- They may feel that they expect the business to run off profitably over time…
- …especially if they can achieve a good price for taking over the risk.
- They may have existing longevity exposure and this will add to the diversification of the book

ii

Specifying the problem

- RSA Re wants to take on the block of business in such a way that the run-off will provide a required profit over time.

- Given the nature of the product (level premium, whole life), we can assume that an upfront payment from ZenSure will be required…
- …to make up the shortfall between future premiums and claims on the book.
- A key part of the solution at the outset will be for RSA Life to have an informed view of what this amount should be.

Developing a solution

- A model of the expected future cashflows will be required.
- This will require the current set of active policies as well as…

- …assumptions around:
    - Mortality rates
    - Lapse rates
    - Assumed rates of return on reserves / investments
- One can expect that RSA Re would require some margins for uncertainty to be included in some of these assumptions.
- RSA Re may ask for the actual experience on the book to date…
- …and then combine it with any in-house information/experience it might have on similar policies.
- After agreeing on this amount, treaty/contract details regarding the future administration must be agreed
- These may include:
  - Future claims settlement processes
  - When and how premiums / claims are settled
  - Dispute resolution etc.
- RSA Re would also need to consider and calculate the capital they require to take on this block of business…
- …especially since the supervisory reserves may well be more than the payment from ZenSure.

Monitoring the experience

- Over time the actual mortality would need to be compared to the expected mortality when the deal was set up.
- If the surplus arising is consistently positive, then we can consider adjusting the basis on which this business is provisioned for…
- ….and release some capital.
- However, if it becomes clear that the business is running worse than expected…
- …we may need to raise additional provisions, possibly by strengthening the basis of the models used when developing a solution.

General commercial and economic environment

- Of course, RSA Re will have shareholders and their profit expectations need to be taken into account when setting up the terms for the deal.
- The local regulator will also have requirements as to the basis on which this block must be valued for the purposes of demonstrating solvency.
- The actual outcome of the deal may be affected negatively if actual lapses are not in line with what was expected.
- In this regard, the economic market conditions may have an impact…
- …since we can expect increased lapses in tough economic times (will this be a bad thing?)
- And low lapses in easier times.
- There is also the risk of increased lapses if another product provider provides a product attractive enough to cause policyholders to cancel their Zensure policy

Professionalism

- The actuary would need to ensure that all work relating to this deal is done taking into account professional guidance/standards applicable to the local market.
- The actuary may need to look out for issues of public interest…
- …especially making sure that this deal does not do any harm to existing policyholders.
- It is likely that the actuary at RSA Re will also have a counterpart at ZenSure…

- …and the actuary would need to be professional in his engagement with this person…
- …including dealing with potentially conflicting, but valid views.
- A large amount of sensitive data would need to be shared between the two parties and the actuary would need to give due care to protecting this information as may be required by regulation.
- At all times the actuary would need to give objective advice to her/his management…
- …that will require significant diligence from the actuary
- …especially given that a large potential liability is taken on.