

Actuarial Society of South Africa

May 2016

Subject A301 — 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.

GENERAL COMMENTS

Candidates did worse on Paper 2 though the examiner believes that it wasn't really different in standard from Paper 1.

QUESTION 1

Examiner's comments:

This question was straight book-work and it was clear that majority of students did not know their bookwork well enough. There were very few students who managed to get full marks for this question. It was in fact the poorest answered question on either of the two papers with candidates on average scoring less than 20%. It demonstrates that students throw away easy marks simply because they do not know their bookwork.

Matters are material if they could, individually or collectively, influence the decisions to be taken by users of the related actuarial information.

In order to determine whether something is material, reasonable judgment needs to be applied taking into account the users and the context in which the work is performed or reported.

QUESTION 2

Examiner's comments:

Candidates could have handled this question better. Most candidates focused on listing the details that would be collected at underwriting stage rather than the type of underwriting that would be carried out. In addition, a lot of candidates failed to state the reasons for requiring each type of underwriting. The question clearly said 'State with reasons'. It seems candidates do not read the question properly before answering.

(i)

Purchased through a supermarket and likely small sum assured therefore no underwriting but maybe allow for a pre-existing exclusion or waiting period before cover commences.

(ii)

Hard to underwrite for accidental death but could consider where the person lives, involvement in hazardous pursuits and/or how much time person is on the road driving.

Likely though to have no underwriting as it is predominantly a savings policy and therefore underwriting is not needed.

Probably also wouldn't make cost sense to underwrite

(iii)

As it is a large life insurance policy you will want to do full underwriting \checkmark to limit any anti-selection risk. This will include medical underwriting (to ensure the person is in good health); lifestyle underwriting (to ensure that the premium charged matches the risk you're taking on) and financial

underwriting (to ensure the policyholder is able to afford the cover and worth the level of requested cover).

QUESTION 3

Examiner's comments:

This was another straightforward bookmark question. Most (if not all) the answers come directly from the core reading yet students answered the question poorly and therefore scored poorly.

Most students struggled to differentiate between points from the core reading that applied to insurance and those that applied to a pension fund setting. Many students actually received negative marks for putting in points that were not applicable to pensions. In fact, there were probably those that could have had even more negative marks if we had marked a bit more strictly. However, the examiner did not anticipate all of the very poor answers that would be given and so negative marks were only given for the specific points mentioned below.

Many students also tried to put in points from the core reading but put down incomplete points that often missed the crux of the point or put in a very garbled version of the point that displayed a lack of understanding.

There were also some time management issues which were displayed by writing more for a 2 mark question than a 5 mark question.

(i)

Show the financial effect of differences between actual and expected

To determine what are the main reasons/contributors of surplus

To help to adjust the expected experience and feedback into the actuarial control cycle

Provide a check on the valuation basis (so long as it is independently carried out)

Help with decisions on distribution of surplus

Help with decisions on pensions increases and increases to other benefits

To fulfill a statutory requirement

[Note: ½ mark was deducted if the candidate writes anything to do with setting management bonuses or determining the financial effect of writing new business]

(ii)

Mortality

Morbidity

Early withdrawal

Investment income

Expenses

Salary growth

Inflation

Taxation

Contributions made

Level of pensions increase awarded

[1/4 mark each; max 2]

(iii)

Mortality & Mobidity

Underwrite members before they are allowed to join the fund
Reinsure to remove volatility and/or protect against large claims

Expenses

Review expenses regularly
Manage expenses to ensure the fund is only paying what is necessary

Inflation

While trustees cannot control inflation, they can influence how it impacts the fund for example by setting up expense agreements which limit the inflationary increases

Investment income

Regularly review to ensure that the investment strategy is appropriate for size and nature of the fund
Regularly review the asset managers' performance against industry benchmarks

Contributions made

Get the contributors (employers and employees) to provide greater funding than needed to meet the benefits (unlikely to happen though)

Pensions increases

Trustees can control what increases are awarded to pensioners (within the constraints of the pensioner increase policy)

[max of 5 marks]

QUESTION 4

Examiner's comments:

Overall the question was fairly well answered. In part (i), weaker candidates focused on the difficulties of entering the new market as opposed to the difficulties with designing and pricing the product using existing data. Weaker candidates also focused too narrowly on why the claims may be different between the two territories. Some marks were available for this but there were also many marks available for other factors that impact the relevance of the data to the new territory, e.g. expenses, distribution channels, the economic environment, demographics, etc. Better candidates realised that not all of the 30 years' data the insurer has available may be usable or that there may have been changes over time to systems and/or products.

Part (ii) was generally well answered.

(i)

[1/2 each, max 7, with 1/2 mark for stating an opinion on the statement made. A total of 8 marks is given below with room for other valid comments as well.]

Care needs to be taken when using the local data built up to date because:

- The new country may have different demographic and socio-economic characteristics...
- ...which are likely to result in a need for a product different to what the company currently has on offer.
- Car insurance requires claim frequency and severity rates...
- ...which may be significantly different in the new market when compared to existing experience.
- ...in particular the market for vehicle repairs may be less developed, which may give rise to higher cost due to the lack of competition.
- The new market's economic environment, such as competition etc. is likely to be different and this will need to be taken into account with the product design.
- New market may have a totally different regulatory environment that may put limitations on product design features such as:
 - Rating factors
 - Compulsory benefits
 - Exclusions
- There may be significant differences in the sales channels between the two countries...
- ...which may lead to a different profile of policyholder/mix of business than in the current data.
- This may also lead to substantially different acquisition costs.
- The nature and size of expenses in the new market may be significantly different to what they have recorded and experienced in the existing market.

- Even if there are no differences between the two countries, it is unlikely that all 30 years' worth of data would still be relevant to use for future pricing...
- ...due to changes in the product design and environment of the local business over the years.
- Depending on the detail of the data, the company may or may not be able to adjust the data to account for some of these differences.
- Hence, the employee's statement is not necessarily true, since the data may not be relevant to new market, and/or it may not be easy to use at all to price the new product.

(ii)

- Local industry data
- Data from reinsurers
- Information from neighbouring/similar countries
- Looking at design and rates of products already in the market
- Any academic papers/journals on vehicle insurance in the local market
- Paying a consultancy to perform research on the market.

QUESTION 5

Examiner's comments:

For part (i), the majority of candidates were able to list the key stakeholders but most were unable to provide concise reasons why they need to be considered. Most candidates did not identify the tax authority as a key stakeholder and many did not identify the link from reserves to solvency to profits to dividends when providing reasons.

In part (ii), the majority of candidates identified the conflict of interest but a significant number did not state that the Actuary is determining his own bonus. A minority of candidates did not identify that the Actuary is an employee of the insurer.

Part (iii) was generally poorly answered. A number of candidates described with-profits bonus distribution and many others regurgitated general risk mitigation techniques. Many candidates focussed on suggestions affecting all employees and not just the Actuary's bonus.

Parts (iv) and (v) were generally well answered.

(i)

Policyholders – because they are interested in the long term solvency of the insurer so that their policies pay out when they ought to

Shareholders – the setting of reserves directly influences the profitability of the insurer and this will impact the dividend payable

Regulator – they are interested in the long term solvency of the insurer

Tax authority – they want their tax revenue sooner rather than later and setting reserves too high will delay paying tax

Employees – the long term solvency is important for their jobs but they may also be incentivized on short term profitability

Board of directors – to ensure the long term solvency of the insurer and to help with decisions of a strategic nature

(ii)

This is a clear conflict of interest as you will set the reserves which fundamentally determines the profitability of the business. Your bonus is therefore entirely in your control.

(iii)

You could:

Ask to be excluded from the bonus (unlikely!) or ask that your bonus is not linked to the profitability of the business but rather to other goals.

A third party (eg. another external actuary) could review the appropriateness of your reserves

The auditors are already reviewing the results as an external, independent party and they could express an opinion directly on the appropriateness of the reserves.

{Maximum of 2 marks}

(iv)

Reason for the valuation

Needs of the client you are completing it for eg. Shareholders, policyholders, regulator

Legislative or regulatory requirements

(v)

To determine the reserves for the published accounts

To calculate solvency for regulatory purposes (eg. SAM)

To determine the reserves for management accounts (if different from 1)

In case of merger or acquisition to place a value on the reserves

To determine if discretionary benefit payments could be made

To calculate surrender or discontinuance benefits

To feed into the investment strategy of the company

{maximum 3 marks}

[Note: If the candidates said to set future contributions or value benefit improvements for a benefit scheme then a ½ mark was deducted as the question specifically asked about a life statutory actuary.]

QUESTION 6

Examiner's comments:

For part (i), students scored fairly well. Students who were able to list a wide variety of reasons scored well with the stronger students able to substantiate their answers and relate this back to the large, multinational nature of insurer.

The need for capital is unlikely to be a motivating reason for the insurer due to its size so financial reinsurance was not taken as a valid reason for reinsurance, unless a solid reason was given. Many students made the point about allowing the insurer to take on larger risks but failed to give a simple example to score full marks.

For part (ii), students also scored fairly well although the cost of reinsurance is an element many didn't consider.

Part (iii) caused many students to struggle as it was clear they did not understand what facultative reinsurance was. Some students didn't even consider facultative reinsurance to be a type of reinsurance. Quite a few students believed it to be a form of financial reinsurance (which it isn't!).

Part (iv) was also generally well handled by students. Stronger students gave reasons why the chosen structure was applicable to the scenario. Many students scored full marks on this part.

(i)

Reinsurance reduces volatility and even a large insurer (especially if they are listed) might want to reduce volatility of profits.

It might enable even a large insurer to take on larger risks than it could on its own (eg. A very large building or manufacturing plant).

It could be capital efficient for the insurer – releasing capital to be used on other projects or in other ways.

Even though the insurer is large, it may lack expertise in certain specialist lines of business that it might need to rely on a reinsurer for.

It must be cost effective to reinsure i.e. the insurer might believe that the price offered by a reinsurer is below the risk cost.

It lowers or removes parameter risk for the product being reinsured and lower risk might mean in a better return for the insurer.

{max 5 marks}

(ii)

Downsides of reinsuring:

There is a cost as the reinsurer needs to make a profit in the long run.

It decreases your flexibility as you cannot take on any risk – you need to consider whether it is allowed in terms of the reinsurance agreement

It introduces counterparty risk as the reinsurer could default on its obligations
Administration increases

It introduces legal risk as there is a risk that you have contractual disagreements with the reinsurer
You lose full control of your business

{3 marks max}

(iii)

Advantages:

Gives greater flexibility to insurer

You can submit the risks you're concerned about and retain the risks you're not concerned about

You can accept or decline risks yourself without having any restrictions placed on you by a reinsurer

Disadvantages:

It is time consuming to organize

It is administratively intensive

There is a risk that you cannot find reinsurance when you need it

You are likely to pay more for facultative cover versus having a treaty in place

It might restrict you on the type of risks you take on if you don't have reinsurance automatically in place

(iv)

(a)

No reinsurance is probably necessary as the company is large and the maximum claim size can only be R500 000.

If available, you might consider aggregate excess of loss cover to prevent losses accumulating and damaging your financial performance. (bonus mark)

(b)

Excess of loss as the company will only want to cover up to a certain Rand limit and thereafter they will want a reinsurer to be covering the risk. This will almost certainly be done on a facultative basis.

(c)

It would be done through a treaty arrangement on either a surplus or excess of loss basis. This is because you don't want to arrange cover for each property separately but you would only want to retain a certain amount of cover and cede the balance to the reinsurer.

QUESTION 7

Examiner's comments:

This question was generally poorly handled by the students. The purpose of the question was to test whether students could list the 9 requirements for an insurable risk and demonstrate an ability to apply them in the context described in the question.

Most of the students were able to list most of the requirements, but the application was extremely poor. A particular error that stood out related to a lack of understanding of the concept of insurable interest, with far too many students suggesting that this referred to whether there was a market for insurance.

In addition, the majority of students did not appreciate that the insurance is intended to cover the direct and consequential losses as a result of machinery breakdown, covering both the repair cost and the loss of profits as a result of downtime. Very few students attempted to explain in any detail how to quantify the losses, where a lot of marks resided.

Many students spoke at some length about the cost and probability of machine replacement, which was not the purpose of the question. A surprising number of students suggested there was a high probability of claim, suggesting that most manufacturers are permanently in a situation of machinery downtime, which is improbable at best.

A number of students wasted time and effort on trying to provide a complete business case for this cover, even though the question referred specifically to the question of whether the risk was insurable.

[Approximately 16 marks available but only 13 required for full marks. A total of 4.5 marks relate to the basic requirements and 8.5 points available for discussions thereof. Each point in italics had to be mentioned to get full marks.]

*We are interested in whether the risk meets the **requirements for an insurable risk***

The policyholder must have an interest in the risk being insured, as to distinguish between insurance and wager

- It is clear that any machinery breakdown, will lead to direct consequences for the manufacturing company.

The risk must be of a financial and reasonable quantifiable nature

- A machinery breakdown will likely lead to an interruption of production, which may lead to a reduction in turnover (which is quantifiable)...
- ...with the resultant loss of profits (which is quantifiable)
- ...as well as potential fines and penalties for not delivering to buyers on time.
- There may also be expensive repairs or temporary hiring of replacement equipment incurred if a machine breaks down.

The amount payable by the insurance company in the event of a claim must bear some relationship to the financial loss incurred

- The insured amount can easily be set with reference to any of the amounts involved under the second points above.
- Where something is not necessarily known upfront (e.g. repair cost) the amount can be limited upfront.

Individual risk events should be independent of each other

- Machinery breakdown in one factory is unlikely to cause a breakdown in another factory
- There is perhaps possibility that in a production line, one failure may cause another machine to fail, production is likely interrupted in either scenario

The probability of the event should be relatively small ✓

- In the normal run of business, one would not expect a machine to break all the time.
- Care needs to be taken here as some machines break down more often than others...
- ...in some cases cover may be declined and some underwriting will be required
- ...or a minimum breakdown period required to exclude "minor" breakdowns

Large numbers should be pooled in order to reduce variance

- Given that the company is large, it is foreseeable that they can sell a lot of these ✓ policies and achieve some certainty.

Ultimate limit on the liability undertaken by insured

- The nature of the loss is such that the insured can impose limits such as maximum amount of turnover covered...
- ...or a time limit on the duration that a machine can be broken down and covered

Moral hazards should be eliminated as far as possible

- This is a potential risk, as the factory may stage a breakdown in order to be compensated for turnover they may not have been able to generate
- This can be mitigated by adding to the burden of proof for loss income in the event of a breakdown...
- ...or by introducing excesses and/or limiting cover only to a % of lost income

Sufficient existing data to estimate the extent of the risk

- This might be difficult, given the diverse nature of the machinery to insure
- Information might be available on the failure rates from manufacturer data and/or similar products sold elsewhere in the world
- Reinsurer's may be able to assist.

QUESTION 8

Examiner's comments:

Answers to this question were disappointing. In part (i) many candidates misinterpreted the question and framed their solution in terms of the various forms of regulation rather than regulation in general. In part (ii) students identified the main differences, but solutions were vague and students failed to generate enough points to score highly. Many students also stated, incorrectly in this scenario, that implementing statutory regulation will result in cost savings.

(i)

[max 5 marks]

- The regulation may serve to **protect the policyholders**...
- ...especially since we are dealing with the lower end of the market, where financial education may be limited...
- ...so that that the product should function as expected by the policyholders, who may not be able to afford a funeral otherwise
- It is in the interest of everyone to **maintain the confidence** in the funeral parlour system...
- ...especially given the fact that it has been so popular over the years
- Given the fact that the market is large, there is a need to have **the market behave in an orderly way**...
- ...and there is an incentive to make sure it is as **efficient** as possible.
- Given the simple nature of the product and likely low levels of underwriting involved...
- ...there is the potential for fraud (fake deaths etc.) to become a problem and appropriate regulation or industry cooperation may help to **address the incidence of crime**.
- There exists the potential for **an information asymmetry** between the provider and the policyholder...
- ...which could be corrected by appropriate regulation.

(ii)

[max 6 marks]

- Self-regulation implies that the individuals who understand the industry best, also implement the regulation...
 - ...and may have the greatest incentive to achieve the best outcomes at the lowest cost...
 - ...and implement changes in the fastest time.
 - Although the closeness of the regulator to the industry being regulated, may undermine consumer confidence and positive outcomes
- Statutory regulation on the other hand is policed by the government who also sets the rules.
 - This may lead to increased confidence in the regulation, since the regulator is seen to be independent of the industry...
 - ...and hence the rules are less open to abuse...
- But the government may be perceived to be too far removed from the realities of the funeral parlours...
 - ...and impose rules that are more relevant to complex, expensive life products than the simple funeral products
 - ...and possibly more inflexible than the current self-regulation.
 - This is especially true since the target market for funeral cover is probably very different from the current regulated middle- to upper-income market.

- Statutory regulation is likely to be more expensive than the self-regulation
 - There is significant differences between the dynamics of a funeral insurance policy and a traditional underwritten life product...
 - ...most notably, will be the fact that the premiums (and benefit levels) are generally quite low for funeral business...
 - ...which means that enforcing the statutory regulation on the parlours may cost the consumer relatively more than the current self-regulation.

- Given the fact that the industry has been running for decades, one would need a good reason to justify a radical change to the way it is being regulated.

QUESTION 9

Examiner's comments:

Part (i) and (ii) were answered reasonably well with majority of candidates scoring well in these questions. Stronger candidates realised that the main concern in (i) is the fact that liabilities are not taken into account. The immunisation question was generally well answered as it was mainly a theory question.

Part (iii) was at times not answered well, although the majority of candidates managed to address some of the issues that should have been raised. However, a lack of detail was the main reason for scoring poorly – most candidates only briefly touched on the important points without properly unpacking the factors or aspects that needs to be considered. Candidates who used the ACC as a framework for their response generally also scored better than those that ignored this instruction.

(i)

Although the approach to maximise the overall return (income and capital) is not flawed, the absence of the requirement to meet its liabilities is a concern.

A provider should select investments that are appropriate to the nature, term and currency of its liabilities, and should also take the uncertainty of its liabilities into account.

The current approach therefore do not provide any link between the assets and liabilities, and one can therefore not be sure of the extent that the insurer will be able to meet its liabilities.

As an example, a sudden change in interest rates might have a material impact on the liabilities of the provider. However, the impact on the assets might not be similar, and this might result in solvency issues for the insurer.

(ii)

Immunisation is the investment of the assets in such a way that the present value of the assets less the present value of the liabilities is immune to a general small change In the rate of interest. It requires the exact match of the discounted mean term or duration as well as the volatility of the asset and

liability profile. It also requires that the convexity of the assets should be strictly more than the liabilities’.

It has a number of simplifying assumptions, which mostly leads to the following shortcomings:

- In this context, it is quite limiting as it only immunize the portfolio against interest rate changes. It therefore does not solve for any other risks (inflation, market, currency, etc)
- It assumes a flat yield curve and requires the same change at all terms.
- It relies on ‘small’ changes, and fund will therefore not be protected against large losses.
- Requires regular rebalance to maintain immunized position – might be costly to maintain.
- Assets with suitable long duration might not exist.
- Better suited to fixed and fairly predictable liability patterns – where the cash flows are unknown, it is less relevant.
- Immunisation removes (reduces) the chances of losses, but also removes the chances of outperformance.

[Max 3 marks for shortcomings]

(iii)

Define the problem

A new investment strategy has been developed: by using Immunisation will also take into account the nature of the liabilities. An asset-liability model now needs to be developed in order to test the appropriateness and effectiveness of this new investment approach.

Develop a solution

An investor’s objectives will normally be stated with reference to both assets and liabilities. In setting an investment strategy to control the risk of failing to meet the objectives - a method that takes into account the variation in the assets simultaneously with the variation in the liabilities is required. This can be done by constructing an appropriate model to project asset proceeds and liability outgo into the future.

An asset model and a liability model needs to be developed such that both behave in a consistent manner. This means that, for example, a change in interest rates should affect both the assets and the liabilities in a consistent manner.

An advantage of this approach is that it encourages investors to formulate explicit objectives. The objectives should be a quantifiable and measurable performance target, defined performance horizons and quantified confidence levels for achieving the target.

These models can either follow a deterministic approach, or a stochastic approach. Although a deterministic approach can be useful if a number of scenarios are considered, it can be argued that a stochastic approach will be better as the uncertainty and volatility can be investigated and the impact thereof analysed.

The outcome of a particular investment strategy is examined with the model and compared with the investment objectives. The investment strategy is adjusted in the light of the results obtained and the process repeated until the optimum strategy is reached.

External and professional factors

During the above process, it is likely that external and professional factors might need to be considered:

- There might be prescribed, legislative or regulatory requirements of investments held by the insurer.
- Examples of these are regulations around permissible asset classes (Reg 28), impact on capital requirements, etc.
- Restrictions on the amount of any particular asset that can be held.
- Requirements to hold a mismatching reserve.
- From a professional perspective, one should ensure that you have the competency to build this model,
- Or alternatively seek the relevant expertise.

[Max 2 marks]

Monitor results

Since all models require the setting of assumptions, it is possible that the ‘optimum strategy’ concluded above might not continue to be optimal once reality is observed over time.

It is therefore important that the models’ assumptions should be monitored and compared to reality, and the impact of this should be analysed and investigated.

This might result in adjustments to the models, and hence a potential impact on the investment strategies that are followed. The feedback process back into the “Develop the solution” process is therefore critical, given the dynamic features of the investments market.

*[Reference to the Actuarial Control Cycle (ACC) was awarded a full mark if appropriately used]
[Final mark allocation: ACC – 1 mark, Discussion on ALM – max 11 marks]*