Actuarial Society of South Africa

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Subject A311 — Actuarial Risk Management

PAPER ONE

EXAMINERS' REPORT

This subject report has been written with the aim of helping candidates. This report summarises the main points that the examiners were looking for and some common problems encountered.

QUESTION 1

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

Many candidates gave examples of the kinds of regulations in South Africa and the UK, the purpose of which it is to monitor solvency. They also identified the levels of capital for different interventions and therefore the need to report to the regulators. The weaker candidates did not mention that the purpose is to monitor solvency levels and to determine appropriate course of action. Some of the candidates listed points from the notes without sufficient explanations.

i.

Insurance companies are normally subject to some form of state regulation and they are usually required to maintain a certain level of solvency capital. There are also regular reporting requirements that enable the regulator to monitor the financial position of companies. These are designed to enable the regulator to intervene in the running of a company before it reaches the position of being unable to meet its liabilities.

ii.

If the required level of solvency capital is breached, the regulator intervenes to protect the interests of existing or prospective policyholders. If the insurer's financial position is serious, then the regulator may require it to close to new business, so that new policyholders are not entering into a legal agreement where the product/benefit provider's solvency may be in doubt. In most cases, the company will be required to establish a recovery plan, and this will be monitored closely by the regulator.

Closure to new business is normally a last resort, because it is unlikely that the insurance company will be able to re-open. The exception would be if there are large front-end expense charges in the business recently written, when capital can be rebuilt quickly as the new business strain is released.

In normal circumstances, a regulator is unlikely to permit re-opening to new business until the company has substantially more than the minimum capital requirements built up.

If a company maintains the infrastructure (staff, premises, systems) to enable it to re-open, these costs will be a further drain on capital while no business is being written.

If a provider closes to new business, it will still have outstanding liabilities from the business written that will need to be met. However, in these circumstances it should be possible to make significant cost savings. These, coupled with the release of capital previously tied up in financing the new business strain of the business on the books, should enable the company to meet these liabilities in the short term.

In the longer term, diseconomies of scale will bite and further actions will be needed.

The insurer may be sold to or merged with another provider who takes on the liabilities.

QUESTION 2

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

Some candidates did not have a good idea what Big Data is all about and lost marks for failing to define this. Many failed to identify the sources of big data and merely listed the sources of normal data and continued to explain how that data can be used. In some instances, even though listed sources were not unique to big data, the explanation given for the uses earned some marks. The students did not do well in this question because they failed to apply to list the sources of big data and to explain how these would be used.

- The increasing *use of technology* have now made it possible to
- …*collect and analyse*…
- …very *large data sets*…
- …often brought together *from different sources*…
- …and which can be *analysed very quickly* – sometimes even in real time.

Magna Life may obtain data from:

- Application forms of current and new clients
- Underwriting tests / records / data
- Social media accounts
- Medical history records
- Credit history/scores
- Banking / transaction information
- Shopping history
- Browser information
- Travel information

Magna Life may use this data to:

- Analyse/enrich historic in-house experience…
- …with a view on refined pricing.
- Target specific individuals with new business (or upselling) marketing campaigns
- Underwrite cover for prospective clients.
- Investigate claims.
- Create superior individualised client experiences…
- …e.g. loyalty/reward programmes…
- …with tailor made rewards and/or recognition.
- Throughout Magna Life would need to comply with all relevant data privacy and security regulations.

QUESTION 3

Examiner's comments:

Part i: Candidates generally performed well for the defined contribution part and satisfactorily for the defined benefit part. Candidates generally performed poorly for the government sponsored schemes, with most candidates failing to note that the tax-payers bear the ultimate risk, but rather stating that the government had borne the risk. Weaker candidates also failed to coherently structure their response, or laying out response in a readable manner.

Part ii: Candidates performed satisfactorily for this question. Some candidates mentioned more than 6 points; only the first 6 points were considered.

Part iii: Generally, candidates performed poorly for this question. Poor knowledge displayed of regulatory measures, with many candidates mentioning that government can directly influence the level of premiums and benefits provided, which does not apply to RSA. Weaker candidates often included repetition of points e.g. many candidates mentioned governments can encourage individuals, encourage public/private entities, compel individuals, compel public/entities as separate points.

i.

a.

Longevity -employer/sponsor; Investment – employer/sponsor; Expense – employer/sponsor
Since employees pay a set contribution for a promised benefit all the risks lie with the employer
However, employees are at risk if their employer is unable to meet the required contribution

b.

Longevity - member; Investment - member; Expense - member
Longevity risk might be passed to an annuity provider
Expense risk might also lie with employer if costs are charged to the employer and not to the fund
Poor investment returns result in a lower benefit to members

Note: This question can also be answered as e.g. longevity – annuity provider as long as student notes that it lies with member if no annuity provider has been appointed; expense – employer as long as student notes that it lies with member if costs are charged to the fund

c.

Longevity - taxpayer; Investment - taxpayer; Expense – taxpayer
Since the government raises taxes to inter alia meet the costs of the scheme, adverse experience is a charge against taxes

ii.

Provide benefits to some or all of the population
Sponsor the provision of such benefits
Provide financial incentives

Educate about providing for the future
Regulate to encourage or compel benefit provision
Regulate bodies providing benefits and with custody of funds

iii.

Restricting distribution channels and commission scales
Regulating independent Ombud schemes
Regulating information provided to policyholder on sale
Restricting which investments are held
Requiring life insurers to prove solvency regularly
Preventing monopolies and encouraging competition
Requiring that sales staff be ‘fit and proper’
Taxing benefits
Regulation of microinsurance and funeral insurance limiting the sum insured

QUESTION 4

Examiner's comments:

This question was largely a bookwork question, with most students scoring well. Some students struggled with part (i) and getting all the aspects of the definition. Those who performed poorly tended to struggle with applying their mind to part (ii) and thus not able to list enough relevant points. Most students were able to score well on part (iii). Overall, this question was able to distinguish those who knew their bookwork very well and those who didn't.

i.

- Capital management involves ensuring that a provider has sufficient solvency and liquidity 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.

- setting up suitable management systems to administer the liabilities
- collecting premiums / contributions
- paying commission to third parties
- Advertising and Marketing expenses
- investment expenses
- administration expenses.

Until sufficient premiums / contributions have been collected, the provider will need to meet these start-up costs from capital.

iii.

Statutory or solvency requirements
Because of the uncertainties generated by the long-term nature of financial products, most developed countries require financial product providers to hold a minimum level of capital in excess of the best-estimate value of the future outgo. This minimum capital requirement is normally defined in legislation or regulation, and there may also be rules on the required backing assets.

Investment freedom
Risks can be taken on by product providers by means other than issuing contracts. For example, if a provider makes a decision not to hold a portfolio of assets that replicates its liabilities, its capital requirements will increase. This is because there is a danger that movements in investment markets and particularly in interest rates may result in the liabilities increasing by more than the assets. Capital will provide a cushion to absorb any deficits arising in this way.

Products with guarantees
The extent of guarantees in a product impacts the level of capital needed to cover the risk of the guarantees being in the money at the exercise date.

Financial strength

The financial strength of providers may be significant in determining new business levels. Financial strength may be rated as one of the key determinants used by potential clients and their advisers when deciding whether or not to place business with any particular provider.

Impact on the accounts

Companies can manage their capital to smooth income statements and improve the solvency and matching position of their balance sheet.

Strategic aims

The capital available to a company will have a key role to play in helping the company to achieve its overall strategic direction. As well as being a constraint on the amount of new risks a company can take on in its normal business operations, the level of capital held will impact acquisitions, mergers and new ventures.

QUESTION 5

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

The question was reasonably well answered by most students.

Part i expected students to understand that there were upfront costs to set up the operation and thereafter the normal ongoing cash flows from any health insurance program. Common mistakes that were made included listing data items that may help in determining the cash flows but weren't cash flows in themselves; listing every single possible expense item, when there were only a couple of marks for expenses and listing all the possible claim types that might apply to a health insurer without any justification.

Part ii was covered basic tools to assess the potential viability of an initiative.

Part iii was the hardest part of the question. Most students did not seem to understand that the risk discount rate for a project is different to a risk discount rate that would be used to calculate the enterprise value of the book of business, and therefore returns available on assets matching liabilities was not relevant. In addition, a surprisingly large number of students thought that the regulator might control the level of risk discount rate that the company uses to evaluate the viability of a project, or that the company might have access to risk discount rates used by its competition.

i.

<u>Setup cash flows</u>

Initial costs involved during research phase
Initial costs involved in getting relevant licenses
Capital injections required
Setting up of offices and infrastructure
Attracting necessary staff
Development of product offering

- IT system costs
- Service infrastructure
- Training of staff
- Marketing and distribution costs
-

<u>Product cash flows</u>

Premium income …
…less reinsurance premium
Benefit payments …
…less reinsurance recoveries
Tax
Commission
Ongoing expenses

- Servicing costs
- IT costs
- Finance costs
- License costs
- Marketing costs

Setting up reserves
Emergence of profits

ii.

Net present value
Internal rate of return
Payback period
Discounted payback period

iii.

Choose between a nominal vs real discount rate…
…should be consistent with cashflows (use nominal if cashflows are nominal
If the project has high level of specific/diversifiable risk, do a specific risk analysis
… using scenario analysis and stochastic modelling
For normal levels of systematic risk
Start from current cost of raising incremental capital
Use weighted average cost of capital…
… taking tax effects into account
Cost of debt is cost in real terms of new borrowings
Cost of equity capital is current expected real return on index-linked bonds …
… plus margin to allow for additional return required by equity investors …
to compensate for extra risk

Use a higher discount rate when evaluating projects with higher than usual systematic risk
Common to use very high discount rates to appraise proposed projects…
… particularly those that involve entering new markets
Too high a rate distorts the balance between short-term and long-term cashflows …
… which leads to poor decision-making
Too much precision in selecting the risk discount rate is unnecessary …
… as NPV calculations are not very sensitive to small changes in the discount rate

QUESTION 6

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

Part i: Was reasonable well answered by most candidates as this was bookwork.

Part ii: A bookwork question, however not very well answered. Many provided the wrong classifications which then impacted on their ability to answer part (iii).

Part iii: Candidates recognized some of the main points around reduced demand for commercial office space and changes to appeal of types/locations of residential property. Few described the impact of the pandemic on the economy in any depth and the subsequent impact this had on property sectors. The number of marks allocated to this question should have suggested a more developed discussion of these issues rather than the mere identification of the key issues at a higher level. Candidates did also not discuss immediate impact and longer term impacts separately.

i.

- Direct investmen
- Pooled property fund
- Property company share
- Listed REITs

ii.

<u>Commercial property</u>
Commercial property refers to buildings or land used to conduct business to generate a profit. Commercial property includes office buildings, hotels, malls, retails stores, warehouses, etc.

<u>Residential property</u>
A type of property, typically containing single or multi-family structure, that is available for occupation for non-business purposes.

iii.

Economic influences have an impact on the property market in three main interrelated areas:
- occupation – the demand for property for occupation, e.g. businesses seeking commercial property to rent
- development cycle – the supply of newly completed property development
- investment market – supply and demand for properties as investments.

The first and third bullet is very relevant for this discussion and will be explored further.

<u>Commercial</u>
- Generally speaking, the impact of the lockdown (closure of businesses) will have a negative impact on the economy and economic growth.
- This will certainly be true for the short-term, but can also be true for a longer-term, depending on the duration.
- Tenant demand is closely linked to the buoyancy of trading conditions and GDP.

- Other things being equal, lack of economic growth decreases demand for commercial and industrial premises.
- Depending on the duration of the lockdown, many businesses might not be able to afford their rental expenses, resulting in an increasing number of defaults and as a result increased level of vacancy.
- The property investment market relies on the occupancy market as this provides the investment income and the potential for rental growth.
- All of the above should therefore negatively affect the property market.
- Furthermore, the impact of work-from-home (WFH) trend will also affect the long-term demand for commercial property.
- Many businesses might continue to enable their employees to work from home, which will allow them to reduce their commercial property demand over time.
- On the other hand, social distancing may mean more office space required for those that are open to maintain social distancing – hence partially negating the previous aspects.
- This can potentially result in an over-supply of commercial property in the medium- to long-term, resulting in further negative impact on the commercial property market.
- The WFH-trend won't affect all industries equally – for example, retail businesses is unlikely to be affected by this to the same extent as financial services companies.

Residential

- Given the negative economic impact, it is likely that residential rentals might also experience higher level of defaults.
- Furthermore, it is possible that residential property owners might not be able to service their mortgage payments, and hence might be forced to scale down
- This might therefore affect the demand for residential property (at least the mix thereof)
- On the other hand, there might be some development requirements where WFH-trends require some properties to be slightly adapted to be more suited for a home-office.
- Furthermore, the low interest rates could potentially spark some buoyancy in markets as people might switch from renting to owning, especially where the bond repayment becomes more favourable than the rental payment.
- WFH reduces commuting/office expenses therefore increases disposable income for households which could lead to demand for bigger housing.

QUESTION 7

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

This was very poorly answered by candidates with one or two passes only. One of the worst answered questions I have ever marked. Although this did require some insight into types of insurance business.

Part i: Very few candidates actually knew or understood what risk budgeting even is. Very poor response for a bookwork question.

Part ii: This question challenged candidates to apply the theory of risk budgeting to life office business. Many did not read the question (or did not know how to answer it) and described the investment strategy that should be adopted for each type of business rather than how to handle the conflict described. While the policyholder was recognized as a main stakeholder most candidates did not recognize the shareholder as the other main stakeholder and instead spoke or company management.

Part iii: A large number of candidates did not even attempt part (iii). Of those that did they did not successfully connect the risk budgeting process with the structure of an IPS – further suggesting that understanding of risk budgeting is very poor.

i.

The term risk budgeting refers to the process of establishing how much risk should be taken and where it is most efficient to take the risk in order to maximise return.

The risk budgeting process has two parts:

1. deciding how to allocate the maximum permitted overall risk between total fund active risk and strategic risk;

2. allocating the total fund active risk budget across the component portfolios.

The key focus when setting the strategic asset allocation is the risk tolerance of the stakeholders in the fund.

This is the systematic risk they are prepared to take on in the attempt to enhance long-term returns.

The key question on active risk is whether it is believed that active management generates positive excess returns.

Risk budgeting is, therefore, an investment style where asset allocations are based on an asset's risk contribution to the portfolio as well as on the asset's expected return.

ii.

The two key stakeholders considered in this context is policyholders versus shareholders – other stakeholders are less affected by these two conflicting objectives.

<u>Conventional (non-profit) insurance</u>

- For these policies, the investment risk is fully carried by shareholders.
- Therefore, the balance between taking investment risk versus achieving long-term investment returns should be achieved by taking the risk tolerance of the shareholders into account.
- If the weighting towards high long-term returns is too high, then the volatility of expected returns will increase, which will affect the probability of ruin negatively. This in turn will require higher levels of (regulatory) capital, which will negatively impact the expected shareholder return.
- On the other hand, one also should be taking competitor forces into account – by taking a too conservative view on investment risk, the resultant expected return might result in uncompetitive pricing levels. This will have a negative impact on the organisation (both shareholders and policyholders) in the long run

<u>With-profit insurance</u>

- Typically with-profit insurance products pass (some of) the investment risk onto the policyholder, and is therefore shared between policyholders and shareholders.
- There will typically be some form of underlying guarantee, which will introduce risk to the shareholders. In this case, similar impacts can be considered as for conventional insurance products.

- For the discretionary portion of benefits (future bonus declarations) one should strike a balance between providing maximum bonuses and meeting PRE (which might imply some minimum expected bonus declaration).
- Therefore, by placing too much emphasis on security (low risk) it can potentially provide lower returns than what is expected by policyholders (or implied by similar competitor products).

<u>Key factors that influence the balance of objectives</u>

- The level of free assets that an organisation has will directly affect the level of investment freedom. Therefore, the higher the level of free assets, the more risk can be taken, and hence the higher the weighting towards achieving high long-term investment returns.
- Level of diversification in the wider organisation portfolio will also affect the balance between risk and return. If the wider portfolio has products/solutions that provide diversification benefits, then capital requirements will be affected, which in turn affect the level of investment freedom.

iii.

This will typically involve a two-stage process:

1. Firstly, an appropriate asset mix must be established for the fund – the *strategic benchmark*. This will be set taking into account the nature of the liabilities, and any representations about the structure or asset mix of the fund that have been made to investors.

2. Secondly, the strategy is implemented by the selection of one or more managers, and a decision on the appropriate level of risk that these managers should take relative to the strategic benchmark – the *active risk*. Within their guidelines, the investment managers have freedom over stock selection, and use their skills and research to maximise the return on the funds allocated to them.

QUESTION 8

Examiner's comments:

Part i: Poor students just stated their lists/bookwork without applying the knowledge to the question (i.e. listed all rating factors which only scored them a half mark). It was clear that students were not thinking practically when answering the questions. I.e. not splitting out the dates that were needed and just stating needing duration or stating data was needed on the policyholders who will take out the option which would not be possible as the option has not been launched yet. It was also disappointing to see some students not mention the rental price.

Part ii: It was clear that not many students had a practical idea of how this premium would be modelled. It was very disappointing to see students suggest a deterministic model to be run with two sets of assumptions. Many students struggled to link their bookwork to the question by just stating the list for modelling (which did not earn any marks). Most students missed that it would be the same premium for all and suggested splitting the data into homogeneous groups by rating factors.

Part iii: Well answered by most students. Students were forced to think practically for this question as there was no bookwork/list that could be applied. Although, most students did not provide enough points to get all the marks for this question.

i.

- Recent exposure information of all the vehicles insured.
- Claims information that matches up to exposure above.
- Date of claim events
- Date that the vehicle went in for repairs
- Date that the claim was settled / vehicle was repaired / replaced.
- Type of claim event (e.g. accident, theft, fire etc.)
- Fixed rental price per day (or assumption thereof if not finalised).

ii.

- A stochastic model is required since we need to derive a distribution of costs.
- The basic risk cost of providing this benefit can be calculated as: probability of claim requiring a rental x expected number of days rental x cost per day of rental.
- Using historic data we can derive/estimate distributions and associated parameters of…
- …the frequency of claims…
- …as well as the number of days a rental vehicle will be required in the event of a claim.
- It may be necessary to treat perils separately, e.g. accident that leads to repair will behave differently to say a car that was stolen.
- This may require some dynamic links between distributions of frequency and severity.
- Given that the premium will be the same for all policyholders,…
- …we may choose to simplify the models to not be a function of the individual policyholders' risk profiles,…
- but rather a distribution based on the overall experience.
- After distributions have been fit, you would run goodness of fit tests…
- …perhaps by comparing actual experience of days until repaired/replaced with that predicted by the fitted distributions.
- This, however, implicitly assumes that the future experience will be similar to the experience in the observed data.
- Explicit adjustments however can be made to allow for trends…

- …or for prudence (although practically this is already allowed for in the choice of a higher percentile).
- One would also need to consider whether an adjustment is required to the distributions in lieu of the fact that this is an elective option…
- …and hence there might be some anti-selection, which will require a loading.
- The model will then be run on the exposure thousands of times to simulate claim events…
- …and hence a distribution of the expected claims costs can be derived from the output.
- The simulated claims cost may need to be grossed up for expenses (e.g. commission) as well as profit.
- This will be summarised (e.g. percentiles) and presented for discussion.

iii.

- The fixed per day cost can be renegotiated with the car rental provider.
- The profit margin on the benefit can be reduced.
- A limit can be imposed on the number of days a vehicle will be provided.
- The current benefit refers to mid-range vehicles, perhaps a cheaper class of vehicle can be provided.
- An excess might be introduced for this benefit (probably unpopular).
- Some of the costs might be cross-subsidised by the basic cover’s premium.
- Only provide the cover for repairs and not for theft, fire or write-off events.