Actuarial Society of South Africa

May 2019

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

Examiner's comments:

This question was quite an easy question. It was a short bookwork question so students should have scored quite highly. Students, however, did not focus on items that needed to be disclosed to members, as requested in the question. Many students listed points that would apply to other stakeholders e.g. trustees or regulators.

i.

Benefit entitlements
Contribution obligations
Expense charges
Investment strategy
Investment returns
Risks involved
What happens in event of insolvency (or underfunding)

ii.

On entry
At regular intervals e.g. annually
Once a payment commences
On request by a member

QUESTION 2

Examiner's comments:

Overall students performed reasonably well, with top students being distinguished by their answers to part (ii). Some students appeared to have run out of time and not been able to get an answer down for the question or they just didn't learn this section in the notes.

i.

Students scored most of their marks with part (i). Those that were able to state and apply their points specifically to bonds were awarded credit. Students who performed badly were not able to generate demand-specific points and/or were not able to apply their points and instead produced a generic list. Most students included points around inflation and the impact on the demand for index-linked bonds as well as spoke about increased income and how this may drive an increased demand for savings through bonds. There were also a large number who spoke about the impact of the exchange rate on the demand for local bonds from foreign investors. Any response that addressed the questions and was well justified would have been awarded marks. Marks for discussing supply factors were not awarded as this is for part (ii).

ii

Few students were able to perform well on this question. Stronger candidates were able to discuss how bonds can be used to fund the government's fiscal deficit as well as corporates using bonds, when cheaper than raising equity, to fund growth/expansion. Some students were able to indicate that increased supply leads to lower bond prices but failed to discuss where the increase in supply comes from.

i.

The following factors could have resulted in the change in demand for bond-type assets:

- a change in their liabilities that is better matched by bonds
- a change in the regulatory regime that either force higher allocation to bonds, or that encourages higher allocation to bonds
- a change tax regime that incentivises bond investments, or discourage other asset classes
- uncertainty in the political climate that require investment in more guaranteed/certain pay-off profiles
- sentiment altering the demand for bonds, sometimes for no discernible reason
- marketing of bond-issuers that improves the awareness of bonds
- investor education undertaken by the suppliers of a particular asset class
- relative attractiveness of bonds has changed due to difference in returns or volatility as compared to other asset classes

ii.

- In government bond markets the supply is largely controlled by the government's fiscal deficit and its strategy for financing the deficit.
- The total supply of bonds will also be influenced by the redemption of existing government bonds.
- Therefore, if government issues more bonds (increased supply) to fund a deficit, then prices will reduce, and hence yields will improve. This should improve the relative attractiveness of bonds.
- Non-government borrowers will prefer to issue debt when the bond market is performing well, and so borrowing is effectively cheaper.

In particular, when prices are high and yields are low, they will be able to raise more money for a given level of interest payment and consequently the ongoing costs of servicing the debt will be lower.

QUESTION 3

Examiner's comments:

This question was generally answered quite well, with majority of candidates scoring near-full marks for part i. Many candidates failed to provide a decent example for part ii – either not providing an example or providing very general comments that does not illustrate a clear example.

i.

- Treasury bills
- Local authority bills
- Bills of exchange
- Certificates of deposit (CDs)
- Commercial paper
- Term deposits
- Call deposits

ii.

Liquidity - Known short-term commitments

The pension fund might hold money market instruments to allow for ongoing expenses like administration, trustee fees, etc.

Liquidity - Uncertain outgo

Although DB pension fund outflows are fairly predictable, there might be some uncertain aspects such as large risk benefit payments (life cover).

Liquidity – Recent cashflow

There might have been a consolidation/transfer-in of another scheme, and this might have resulted in a large cash inflow. The pension fund might use money markets to host these monies until the longer-term investment strategy is implemented.

Liquidity - Preservation of nominal value of capital and risk aversion

A mature closed pension scheme might not have longer-term liabilities anymore, and therefore might have a need to preserve the capital or might have a low risk aversion to ensure the remaining liabilities can be met.

Economic circumstances in which cash is attractive

These include rising interest rates, start of a recession or depreciation of domestic currency. A pension fund might therefore park excess or new cash inflow in money markets while the asset class is attractive relative to other asset classes.

QUESTION 4

Examiner's comments:

Most students demonstrated a reasonable understanding of the question. However, the majority of students struggled to generate sufficient points for an 8 mark question. The level of detail necessary was generally lacking. Many students did not explain reserving well enough.

QuickLife will be required to spend money before even selling a single policy. Development expenses will include:

- Obtaining a license to do business
- cost of initial staff…
- …and/or consultants.
- setting up an administration system to administer the policies
- renting a place of business to operate from
- setting up and/or training brokers to sell the product
- potentially buying/renting the necessary medical equipment e.g. for gathering the blood samples
- marketing/advertising the new product to potential customers
- setting up an investment function to invest the premiums and/or other assets of the company…
- …which may be done in-house or outsourced.

When a policy is sold there is a further need for capital because a lot of cash outflows exist, before sufficient premiums are received:

- The underwriting expense will be incurred upfront
- Brokers tend to get commission on sales upfront…
- …which is more substantial in this case, given the long-term nature of the business.
- There will also be a requirement to set up a reserve on day one of this policy…
- …which the regulator may/will require to be set using assumptions that are more prudent than the best estimate (or pricing) assumptions.
- In addition, one can expect that there will also be a solvency margin over and above the statutory/regulatory reserves.
- It is also likely that a minimum capital requirement amount will exist, regardless of the number of policies sold.
- Once policies are sold, running costs will be incurred, e.g call centre staff, renewal costs etc
- While volumes are low, one or more claims could result in a need for capital or liquidity

QUESTION 5

Examiner's comments:

In spite of this being an application of bookwork, the question was not well-handled by a majority of candidates. Most candidates focused on items which were not required in the question; for example, issues to consider when setting up a company in a new country (capital requirements, language barriers, exchange rates, etc.), contrasting potential differences between the two countries and defining the two products.

Clients' capacity to pay / afford the product

- What is the disposable income like in the target country?
- Data around employment/unemployment figures can be helpful to gauge the potential size of the market.
- Is there any potential for offering the products on a group life basis…
- …perhaps with employers contributing to paying the premiums

Risks to be covered

- What are the major diseases and/or drivers of disability claims in the local market?
- For what risks would potentially policyholders appreciate cover?
- Will the life office be able to handle the administration of the risks required to be insured…
- …e.g. sales, marketing, distribution, underwriting, claims, compliance
- Are there any regulations prescribing compulsory cover?
- Which industries or types of jobs would we be comfortable providing disability cover for…
- …and what is the potential size of this subset of the market?

Benefits needed

- Critical illness benefits are typically lump sum unrelated to the actual losses suffered.
- Would the market be satisfied with lump sum disability benefits or do they prefer indemnity type covers for CI?
- Will they be requiring lump sum disability benefits…
- …or income replacement type structures?
- Is the target market satisfied to buy these standalone, or are they used to providers offering them as riders?
- What types of benefits for disability/CI are already provided by the state…
- …and how advanced/comprehensive is the public healthcare system?

Clients' attitude to risk (or financial sophistication)

- How do they currently make allowance for these contingent events…
- …and are these solutions any good?
- How do clients prefer buying insurance products…
- …and do we have any expertise in these channels?

Existing products / competitors

- Are there any existing players in the market and have they had any success?
- How do their product design(s) compare to the ones we have in mind?

QUESTION 6

Examiner's comments:

i.

- *This was a bookwork question, yet candidates performed poorly, failing to provide the required points for the definition*
- *Many candidates described the components of underwriting mentioning lifestyle, medical and financial underwriting which was not required.*
- *Many candidates provided reasons and usages of underwriting, which was not required.*

ii.

- *Candidates performed generally better for this question*
- *Credit was given for usages and examples of underwriting such as the use in claims underwriting to reduce fraud, and to use for reinsurance purposes to be able to write larger risks. Credit was given where the explanation was made in a clear manner.*
- *Credit was given for a maximum of 5 reasons or examples.*
- *A substantial number of candidates explained and described the usages and examples in an unnecessarily lengthy manner.*

i.

The process of consideration of an insurance risk. This includes assessing whether the risk is acceptable and, if so, the appropriate premium, together with terms and conditions of the cover. It may also include assessing the risk in the context of the other risks in the portfolio.

ii.

It is used as a risk management tool as it:

1. Protects the insurer from anti-selection, e.g. in life insurance you will decline people in very poor health
2. Enables the insurer to identify risks for which special terms need to be quoted, e.g. offering a loading to someone with a specific medical condition that affects their mortality/morbidity
3. Helps identify for substandard risks the most suitable approach to follow, e.g. load the premium, apply an exclusion, defer making a decision
4. Enables the insurer to appropriately classify a risk, e.g. to ensure risks of similar nature are charged similar premiums

5. Helps ensure that the claims experience does not depart too much from the expected experience, e.g. by ensuring newly accepted risks are not fundamentally different to the existing portfolio
6. Reduces the risk from overinsurance, e.g. making sure that there is an insurable interest so that a policyholder doesn't get disability cover more than their current earnings

QUESTION 7

Examiner's comments:

This was a straight bookwork question which was remarkably poorly answered. Very few candidates were able to properly define corporate governance (a contract between shareholders and the board of directors), with the majority of candidates confusing it with management structures. The second part was reasonably well handled, but the third part was extremely poor, mostly because many students did not know that the King Code is an example of self-regulation.

i.

The system whereby boards of directors are responsible for the governance of their companies upon appointment by shareholders who ensure that an appropriate governance structure is in place.

ii.

1. Meeting legislative requirements for the management of the business
2. Investing and managing the assets of the company
3. Managing the insurance liabilities of the company
4. Determining the levels of provision to hold to meet future liabilities
5. Setting premium rates
6. Ensuring the policy proceeds are paid (is the company sufficiently liquid to ensure policy proceeds are paid)
7. Meeting policyholders' reasonable expectations
8. Meeting the demands of shareholders
9. Good corporate governance
10. Obtaining appropriate and adequate reinsurance to protect the business
11. Advising on actuarial aspects of capital and regulatory solvency requirements
12. Advising on actuarial aspects of policy changes or changes in regulations.
13. Advising the board on bonus rates
14. Advising the board on dividend affordability

iii.

Self-regulation as it is not legislated

Advantages of self-regulation:

1. It is not mandatory so a company can apply the aspects that are sensible for that company
2. It is designed by people involved in that industry (or industries) and therefore tends to set standards which are achievable and, if followed, should result in a well-run company

3. It can be changed relatively quickly to allow for changing needs
4. It is generally easier to persuade companies and individuals to co-operate with self-regulation

Disadvantages of self-regulation:

1. Public confidence might be lacking in self-regulation
2. The penalties that might apply for legislated regulation might not apply or might not be enforceable
3. It may inhibit new entrants into a market to make it more competitive

QUESTION 8

Examiner's comments:

Overall, this question was very poorly answered, and most students struggled to provide sufficient points to pass the question.

i.

This question was poorly articulated by many students. Many students missed the point that the premium is set for the average policyholder. Most students however did well to point out that the premium is equal to expected claim cost plus a margin.

ii.

This was an easy book work question. Most students scored well on this question. It was surprising that there were not many students who managed to score full marks with most students only giving 3 valid points.

iii) This question was the worst answered question of the. It was disappointing to notice the number of students that did not provide examples in their answers when this was explicitly asked for. Many students did not answer the question asked and went into detail about the advantages of a model - no marks were awarded for this. A surprising large number of students did not pick up that the question was specifically asking about the Risk Cost model and provided answers in terms of reserving or suggested it could be used for pricing.

i.

- It is correct that your premiums will generally be in line with the expected claim cost as well as margin.
- An *average* person is hence paying out more than he/she received back from the company.
- This however ignores the volatility risk posed to a *single individual*:
  - Claims might be incurred before enough money is saved (timing risk)
  - Claims might be much higher than average, incurring a loss, regardless of saving (size of claim risk)
  - Third party claims might be low frequency/high severity, but if that were to happen to you, chances are you would not be able to save enough money for it.
- This also ignores the benefit of having an insurance company acting on your behalf, e.g.

  - Negotiating/arranging for the repair of your vehicle by a suitable repairer
  - Legal assistance in the case of third parties suing you
- There is also the issue of expertise/time/effort required in your personal capacity to manage the pool of savings that you accumulate.

ii.

- Accidental damage
- Damage to glass
- Theft and/or hijack
- Fire
- Third party claims

iii.

- The drivers of frequency and/or severity are different for different perils.
- For example, age of driver might affect the risk of an accident much more significantly than the risk of theft.
- Hence rating factors can be better understood…
- …and the premium can be more customized to the specific client
- The statistical distributions of different perils might be different,
- For example, liability claims distributions can be expected to have more weight for extremely high claims than say accident or glass.
- Assumptions around run-off patterns/allowances will be different for different perils…
- For example, accident/glass claims will generally be settled much quicker than third party liability claims that might be lingering in a legal process.
- If a feature of the risk environment changes and impacts only some of the perils…
- …the company only has to change rating pertaining to that peril(s) and not change the whole rating chart.
- For example, a change in excess/deductible payable on one of the perils.

QUESTION 9

Examiner's comments:

Part (i) was very well answered. Part (ii) was reasonably well answered, but many candidates failed to make more practical application to the situation at hand. Many candidates spent a lot of time elaborating on how this investment compares to other investment classes (equity, bonds etc.), but the question did not require such a discussion. Better candidates focussed on elaborating on how the specific features of this investment affect risk and return instead of commenting on generic issues of less importance, e.g. tax treatment of this investment.

i.

Property that is most attractive to investors is called “prime”. Prime property would score highly on all of the following factors:

- location
- age and condition
- quality of tenant
- the number of comparable properties available to determine the rent at rent review and for valuation purposes
- lease structure
- size.

ii.

Nature of return

Generally speaking, property is a real asset and would therefore be expected to provide a hedge against unanticipated inflation. However, given the unique characteristics this might not always hold, and is discussed below.

Cashflow pattern

Essentially there will be two main types of ongoing inflows for this investment: rental income from tenants and parking fees paid by clients.

Leases are for fixed terms with relatively infrequent rent reviews, with a 5 year term for this specific property. These may be “upward only”. The income stream might therefore increase in steps every 5 years. However, for a property that is rented at a level above current market rents, the income stream may be fixed for many years.

If the mall is well established, then the parking fees should be fairly predictable and should be mimicking an annuity income. However, given that this is guaranteed to never increase, it will not track inflation.

Given that the mall is situated near middle income, and affluent families, the mall’s revenue will therefore be exposed to both of these segments’ spending habits. One can argue that middle income families will be more susceptible to the economic environment and this might bring in some volatility in income – both for parking fees (number of clients visiting the mall) as well as potential rental income (if tenants are struggling to pay rent during economic downturns).

Ongoing outflows will include regular maintenance, property tax and utility bills, salaries for mall management, etc.

Security

The security of income depends on the quality of the tenants in the mall – given the target market, one would expect reasonably well-known brands. Furthermore, the number of "voids" will also affect the overall stability and security of the income. No mention is made of the age of the building, and the risk of obsolescence should therefore also be considered in this context.

Yield – real vs nominal and running yields

Property is usually a real asset. However, given the unique features, it is likely that rental income will only broadly follow inflation as it can only be reviewed once every 5 years. Furthermore, the guarantee of no increase in parking fees negates this, and this income stream will therefore be guaranteed to not provide a real cashflow pattern. Overall, it is therefore reasonable to expect that the yield will not meet inflation over time.

The running yield (rental yield) will depend on the unique aspects (parking fee guarantee) of the property. Given the slightly higher risk involved due to unique aspects one might expect a slightly higher running yield as opposed to other similar properties.

Spread

Capital values of buildings can be volatile over the longer term, although infrequent valuations and stable valuation methods reduce short-term volatility. The unique features of this specific property will also affect the valuation. As land is indestructible, a good site is always likely to have some value – this can be beneficial for this specific property given the nearby location of affluent families.

Marketability

Generally speaking, property is very unmarketable. It can take a long time to buy or sell and dealing costs are high. This will also hold for large properties (like shopping malls) that will also have fairly unique characteristics. The implicit guarantee offered on parking fees might also reduce the marketability of the mall (from investment perspective).

QUESTION 10

Examiner's comments:

Part (i) was well answered with many candidates listing eight to ten factors to consider. There are still a surprising number of candidates who treat questions like these as "discuss" type questions and then elaborate on each point, wasting valuable time.

Part (ii) was also answered satisfactorily by most candidates. A common issue encountered was that many treated the debtors book as a liability (instead of an asset) from Clothes-R-Us perspective. In this context DebtCo is not really a reinsurer so comments along these lines scored poorly.

Part (iii) required the candidate to discuss why (or why not) the existing model can be appropriate for calculating the default risk of the book in question. Many candidates gave a generic discussion on the requirements for good models, with no application to the situation at hand. Better candidates realised that the data and parameters may or may not be appropriate for the target market and built a good answer around that.

Part (iv) was answered poorly. Many candidates failed to take a moment to try and see what is actually asked here. The question clearly indicated that a decision was made that the existing model is appropriate to use for the deal. This model would have already addressed the majority of the stochastic elements required for the cashflow projection, namely the probabilities of payments at various durations, so the question really boiled down to setting up a cashflow model and simulating cashflows, using the probabilities as provided by the existing credit model.

i.

- Whether it is a new or existing client
- How long the client has been with Clothes-R-Us
- Past credit history with the company
- Income of client
- Occupation of client
- Age of client
- Gender of client (if allowed)
- Education level of client
- Credit limit of client's card
- How much they spend with Clothes-R-Us
- Their credit history from credit agencies

ii.

For Clothes-R-Us

- They may be worried about the credit risk posed by the block of business…
- …and would prefer to exchange the uncertain future credit risk for a certain current amount.
- They may be in need of liquidity, which a transaction like this will provide

For DebtCo

- They stand to make a profit over time…
- …if they pay less for this block of business than the present value of the future repayments.
- They also potentially improve the diversification of their existing business…
- …and/or improve the economies of scale in their existing business.

iii.

Would need to consider whether the model is able to predict the expected experience of Clothes-R-Us clients accurately

- One way would be to request historic data from Clothes-R-Us…
- …and doing actual vs. expected defaults investigation.
- The same will apply for early debt settlements
- One would also need to know if the in-house model can allow for any missing data…
- …e.g. a field in the model that is not in the Clothes-R-Us data.

The data used to build the model can also be investigated:

- Is the in-house data comparable to Clothes-R-Us in terms of socio-economic sections represented?
- What types of industries are represented in the experience?
- Does the model explicitly allow different dynamics between clothing and the other industries?
- What sort credit checks/scoring was done by the other blocks of debt in the experience compared to Clothes-R-Us?
- If the credit was extended more easily then the experience might be worse than that of Clothes-R-Us.
- The same principle applies in considering how diligently outstanding debt payments are followed up by the client.
- What were the average credit amounts and repayment terms and duration compared to the Clothes-R-Us book?
- How accurate is the data recording from the other companies compared to Clothes-R-Us…
- …fewer/more historical errors lead to more/less reliable modelling.
- Are there any features and/or trends in the in-house data that are perhaps not expected to be present in the near future?
    - These may include things like an economic recession,
    - …or periods of high interest rates and/or inflation

iv.

- We will collect, group and modify the data from Clothes-R-Us…
- …in such a way to allow us to apply our in-house credit model…
- …which may include the need to make some assumptions for missing input values.
- For each debtor we will project a cashflow for each future period of time…
- …which is likely to be monthly.
- The monthly amount due is deterministic and typically known…
- …or it can be calculated since that past payments (or lack thereof) influence future payments due.
- Using the probabilities generated by the in-house credit model…
- …we can simulate the amount that the client pays (including zero in the case of a default).
- It may be necessary to specify some correlations between repayments…
- …for example, if a client defaulted already, he may be at higher risk of defaulting again.
- We can then discount the payments to the present…
- …and aggregate to come up with a lump sum representing the present value of future payments for that iteration of the simulation.

- We then simulate thousands of times…
- …to derive a distribution of the present value of future debt repayments on this block.
- The discount rate may be set using our required rate of return on the amount invested.
- Using the results (or summary thereof) we can choose a lump sum representing the percentile (or level of confidence) at which we are comfortable to take over this book.
- We can also perform sensitivity and scenario checks by
    - moving the required rate of return up or down
    - Loading/discounting the amounts paid by the client in each iteration
    - Tweaking parameters in the credit model