Actuarial Society of South Africa

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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.

QUESTION 1

Examiner's comments:
This was a straightforward bookwork question yet few candidates scored well.
A common mistake was that candidates framed their solutions around the definition and mechanics of risk management rather than the benefits thereof. Solutions were also vague and candidates failed to generate enough points to score highly.

Through good risk management a company / provider / organisation is also able to:

- Improve the stability of their business
- Improve the quality of their business
- Improve their growth / returns by exploiting risk opportunities
- Improve their growth / returns by better management and allocation of capital
- Identify opportunities arising from synergies
- Give stakeholders / shareholders in their business confidence that the business is well managed
- Price products in line with their inherent level of risk
- Improve job security for employees
- Detect risks earlier thereby avoiding any surprises…
- …meaning they are cheaper and easier to deal with
- Determine cost effective risk transfer strategies.
- And yes you do want to keep the regulator happy but no it isn't the only reason

QUESTION 2

Examiner's comments:
The majority of candidates managed to identify the economic factors. However, a large proportion could not explain how the economic factor impacted bond yields which resulted in them scoring poorly. Those who tailored their answers to the question being asked generally scored very well.

<u>Inflation</u>

Inflation erodes the real value of income and capital payments on fixed coupon bonds. Expectations of a higher rate of inflation are likely to lead to higher bond yields and vice versa.

<u>Short-term interest rates</u>

The yields on short-term bonds are closely related to returns on money market instruments so a reduction in short-term interest rates will almost certainly boost prices of short bonds.

OR

Investors in long bonds may interpret a cut in interest rates as a sign of monetary easing, with potentially inflationary consequences over the longer term. So the yield on long bonds might decline by a smaller amount, or even rise.

Public sector borrowing – the fiscal deficit

If the government's fiscal deficit is funded by borrowing, the greater supply of bonds is likely to put upward pressure on bond yields, especially at the durations in which the government is concentrating most of its funding.

The exchange rate

A significant part of the demand for government bonds in many markets comes from overseas. Changes in expectations of future movements in the exchange rate will affect the demand from overseas investors. It will also alter the relative attractiveness of domestic and overseas bonds for local investors.

Institutional cashflow

The demand for bonds can be affected by institutional cashflow. If institutions have an inflow of funds because of increased levels of savings they are likely to increase their demand for bonds. Changes in investment philosophy can also affect institutional demand for bonds. Regulatory changes can also be a cause for increased bond demand due to associated capital requirenents.

Returns on alternative investments

The relative attractiveness of alternative investments, both at home and overseas, will influence the demand for bonds, and hence the yields that they offer.

Credit ratings

The underlying credit ratings of the corporates could make a significant difference to the yield. These credit ratings would be driven by the financial strength of the corporate.

Other economic factors

Almost any piece of economic news has implications for inflation and short-term interest rates. The impact of other economic factors can therefore usually be understood in terms of these two quantities.

QUESTION 3

Examiner's comments:

i. This was generally a well answered question. Students who set out their answers carefully with headings and explanations tended to earn more marks.

Some students got confused in part i as they did not read the question carefully and explained how to obtain the money to pay for these liabilities rather than answering the question which was how to finance the liability.

ii. This question was answered less well by the students. Students did not think through all the risks of both the investment and liability. A number of students provided risks of providing the additional benefit rather than providing risks on the financing of the liability.

(i)

Lump sum in advance

- This is unlikely, as the benefit promise is made very long ahead of the first payment being due.
- It is also not desirable to necessarily tie relatively large lump sums up so early as it could be used elsewhere in the business.

Terminal funding

- When the first payment becomes due…
- …a lump sum is set aside in lieu of the expected future commitments that have been triggered

Regular contributions

- Funds are gradually built up to a level to meet the commitment made…
- …over the period between when the promise is made and when the benefits become due.

Pay as you go

(ii)

- Market risk – that assets do not perform in line with expectation and there is not enough to cover the liability
- A risk mismatch between the assets and the liabilities, perhaps by term or nature.
- Longevity risk – the pensioners surviving for longer than expected
- Inflation risk – the cost of health club memberships escalating by more than expected
- Liquidity risk – funds not available as they become due, or at a unsatisfactory cost.
- More people retiring eligible for the benefit than expected
- Counterparty risk – e.g. if the benefit is insured via an annuity purchase by the scheme.

QUESTION 4

Examiner's comments:

i. This question was generally well answered.

ii. The majority of candidates were able to provide examples of the types of credit risk but a significant number could not name the type of risk or mixed up the example with the incorrect type of risk. A minority of candidates did not relate the example to an insurance company.

iii. This question was poorly answered. A significant number of candidates did not apply the theory to the specific situation or made assumptions (eg. CEO must earn multi-million rand bonuses) despite the question stating clearly that you have no further information.

(i) Systematic risk is risk that affects an entire financial market or system.
Diversifiable risk arises from an individual component of a financial market or system.
It is not possible to avoid systematic risk through diversification. It is, however, possible not to take on diversifiable risk as (by definition) you should be able to diversify it away.

(ii) 1. Counterparty risk
2. Asset default
3. Debtors failing to pay

Examples of each:
1. Reinsurance transactions
2. Bond issuers defaulting or a company you're invested in through equity failing
3. Policyholders not paying premiums or brokers not paying over the premiums they have collected from policyholders on your behalf
(or any other acceptable example but it must relate to an insurer)

(iii)

(a) You know the person as they are an employee (that lowers the risk)
R1000 loan to an employee earning R10000 per month is reasonable as the person should be able to repay it
You don't know the purpose of the loan which increases the risk

(b) You know the CEO as they are an employee (that lowers the risk)
While you don't know the CEO's salary, they should be able to afford to make payments on a R2m loan
You know the purpose of the loan which seems reasonable
R2m loan to buy a home for a CEO seems reasonable
You can secure the loan against the asset (house) which considerably lowers the risk
If the CEO doesn't make the repayments, it will reflect negatively on him as the CEO and thus there is an incentive for you to continue paying

(c) No idea of whether they can service R100m in debt (probably won't be able to as they are startup – at least initially)
No idea of who they are and whether they are trustworthy or not or have the necessary skills to be able to justify that sort of size loan
You would need some sort of idea of why they need R100m i.e. what will they use it for
No indication of any form of security against the R100m, so this seems very risk

QUESTION 5

Examiner's comments:
This was an applied bookwork question. Overall the question was reasonably well answered. Candidates that knew the bookwork scored most of the generic points around investment strategy considerations; however, many candidates did not apply this bookwork list to the specific scenario given, i.e. a new health insurance company. Candidates who thought to explain in detail the nature, term, currency and uncertainty of the liabilities plus the likely accrual of these over time, scored very well. Also, important to note was that currently assets, liabilities and free assets are likely to be low, and explain what impact this is likely to have on the investment strategy and risk appetite of the insurer.

The nature, term and currency of the liabilities

Health insurance (income protection, critical illness, long-term care) can have long-term liability profile. Medical expense cover though is typically short-term in nature and hence the liabilities will be short-term. . Benefits should also be real in nature, which might require real assets. *Obviously you would need to invest in the currency that the liabilities have (nothing is mentioned as to whether the company only has local liabilities or foreign liabilities as well)*

Future accrual of liabilities

This will likely play a key role as the company is newly established, and existing assets (and liabilities) might be relatively small. Therefore, the projected volumes, expected premium income (and progression thereof) and the impact of these on the future accrual of liabilities is therefore key to understand. The investment strategy might need to explicitly allow for the (initially) rapidly increasing pattern.

The level of uncertainty of the existing liabilities

Once a sizable book has been built up, then liabilities might become more predictable. However, for now this is not the case as this is a newly established health insurance. Allowance should therefore be made for, which might require a decent portion of liquid and marketable assets. The presence of reinsurance might reduce the extent of this risk. Lack of past experience could also contribute to the uncertainty of the liabilities. .

The size of the assets, both in relation to the liabilities and in absolute terms

Absolute terms might be small, but will gradually grow as the insurance company grows. Free assets might, however, be fairly limited initially until a sizeable base is built up. The extent of shareholder capital might play a significant role here. Furthermore, initially the (small) fund might not be able to invest in a well-diversified portfolio, although this should improve as the company expands.

Statutory, legal or voluntary restrictions on how the fund may invest

It is likely that regulation will exist that governs the investable assets.

Statutory valuation and solvency requirements

Regulators are likely to have specific solvency requirements, and this should be allowed for in setting the investment strategy.

The institution's risk appetite and business objectives

The shareholders risk appetite typically plays a role in the investment strategy articulation. If risk appetite is high, then it is possible that the investment strategy can also follow a more risky approach. The extent of this might, however be restricted by solvency requirements and potential impact on capital requirements.

Tax

Both the tax treatment of different investments and the tax position of the investor need to be considered.

Other issues:

- Availability of assets and the price thereof in the market this insurer operates *[*
- Expected long-term return on various asset classes that are available
- The company may consider matching versus mismatching assets/liabilities depending on many of the factors above and also the availability of their free capital.

QUESTION 6

Examiner's comments:

This question was handled particularly poorly by the students, who generally showed a complete lack of understanding as to the meaning of terms in the income statement and balance sheet and their significance. In addition, many students had no idea how to read financial statements, and confused assets and liabilities, especially mixing up the investment in ordinary shares with the shareholders interest.

A significant number of students did not appreciate that the size of the IBNR and outstanding claim reserves indicated that the insurer was writing long tail business, and most assumed that the product was not viable because earned premiums were less than incurred claims, failing to appreciate that the insurer is expecting to earn investment income to cover the shortfall.

The one aspect that was generally well handled was the significance of the reinsurance premiums being less than recoveries.

This was the poorest answered question across both papers. A student passing this question almost definitely passed the whole exam.

Total claims reserves at the end of the year amounted to R100 + 226 = R326m. If this is compared to the net earned premiums of R90m, it is clear that claims are long tailed.

The large amount of investment income (R80m) is as a result of this long tail and the assets held against this liability.

Invested assets are R360 ++ 56 = R416m and the investment proceeds are R80m giving a rough return of 80/((416 + (416-80))/2) = 21.3%. That is a good investment return earned by the company.

As 82% of the assets are held in equities and dividends yields are generally 3% - 4%, it means that a substantial amount of the investment gain must have come from realised or unrealised capital gains.

The company is taking quite a risk investing so heavily in equities. A 20% fall in the value of the equities would wipe out R72m of capital (65% of the year end capital). A fall in assets of 30.5% or more would make the company insolvent.

The loss ratio is 121.5% (gross) or 111.1% (net). The product though is still viable because if you switched the assets into 100% fixed interest earning (say 8%), you would get investment returns of around R35m which easily compensates for the loss ratio being over 100%.

The reinsurance agreement is a good deal for the company as it is adding R33m profit to the company (or reducing the underwriting loss by R33m). However, this situation is unlikely to possible in the long term as the reinsurer will most likely not renew on the same terms, as the reinsurance loss ratio is 130% whereas the company has a loss ratio of 111%. If the reinsurance deal was operating at the same loss ratio as the insurer (i.e. 111%), it would result in the R21m being totally wiped out and the company would only be breaking even and not making any profit.

Management expenses of R29m against the net earned premium of R90m give an expense ratio of over 30%. That it is very high and seems to/may indicate the company is not being run efficiently.

Commission is 10% of the premium, which seems reasonable for acquisition expenses.

The return after tax to the shareholders is 12% (13 / (40 + ((67+70)/2)) which is not particular good. Given that there is quite a lot of risk with the asset structure of the company (high proportion in equities) and a high dependence on the reinsurance deal, a return of 12% does not seem to sufficiently reward the shareholders.

QUESTION 7

Examiner's comments:
Most candidates could mention the obvious points but often gave too much detail around these points and failed to generate a broader range of ideas.

Part (i) was answered well because there were many possible explanations to offer for 3 marks.

Part (ii) was generally poorly answered. Many candidates made various suggestions of how to re-price the product (review expense assumptions, conduct experience investigations, etc.) while the mark was scored for the suggestion to lower the price. Fewer candidates suggested the marketing, distribution and underwriting improvements that can improve the sales. On the product design most candidates suggested to cover more illnesses but very few could suggest further product design options. Some candidates also suggested ways to improve the profit or claims- and lapse experience while the question was about sales.

Part (iii) was generally answered the best in this question.

(i)

- only covers two conditions which might not have been attractive to potential policyholders
- only covers two conditions, competitor's products might have covered more conditions
- might have been too expensive in comparison to competitors
- might not have been marketed or promoted sufficiently
- distributors might not have earned sufficient commission / remuneration to make it worthwhile for them to sell it
- critical illness might not be a popular product in the market
- underwriting might be too strict
- definitions of coverage might have been very narrow
- pricing might not have been guaranteed and consumers might want guarantees

(ii)

Redesign the product

- cover more illnesses
- revisit the existing definitions (if too strict)
- do market research to see what customers want covered
- consider what options / guarantees you can offer to enhance the product
- move to a tiered benefit structure for the illness covered

Re-price the product

- make the product more competitive by lowering the price
- possibly cross-subsidise the pricing with another product
- could even consider writing the product at a loss if you want to generate more sales for a period of time

Underwriting

- do less medical/financial underwriting which might make it an easier sale

Distribution & sales

- incentivise the intermediaries to sell more by
    - paying larger commissions
    - running a competition with rewards for better sales
- improve the marketing / advertising through focussed campaigns
- Make use of more / different distribution channels

(iii)

Advantages:

1. Might provide technical expertise you don't have
2. They have overall market knowledge & experience which you won't have
3. For pricing they might have a wider range of experience that will help you price more accurately

4. It will reduce volatility (which may or may not be of benefit to you)
5. It should lower your capital requirements (which may or may not be of benefit to you)

Disadvantages:

1. They will want to make a profit on the reinsurance
2. It will decrease your flexibility as they might impose requirements on pricing, underwriting and claims assessment
3. It will increase your administration (as you now have to do reinsurance administration)
4. By reinsuring you introduce counterparty risk which you currently don't have

QUESTION 8

Examiner's comments:
This question was answered quite well. Although part a) was generally answered well, it was noticed that some students did not answer the question, and at times provided responses that were either not relevant or not directly addressing the specific themes that were requested: marketability and return characteristics. The majority of students answered part b) to a reasonable degree – weaker candidates wasted time by describing or discussing some of the points raised, even though the question specifically requested that items should only be listed. This wasted valuable time, and more often than not results in poor marks for this section. Part c) was answered reasonably well with the majority of students commenting on the both the validity of the approach as well as highlighting possible risks or concerns.

(i)

<u>Marketability</u>

- The marketability of equities varies significantly between companies. In general terms, the larger the company, the better the marketability.
- This relationship is not perfect, however. For example, where a few investors hold a large proportion of the shares in a particular company, the marketability could be low.
- The extreme in poor marketability will be shares that are not listed on any recognised stock exchange. Such shares can be sold only if you can find another party who wishes to buy the shares.

<u>Return characteristics</u>

- Historically, equities have provided a real yield over the long term. This is because company profits tend to rise with inflation and economic growth, and hence so do dividends.
- There is, however, no guarantee of inflation protection.
- Equities are perceived to be more risky that bonds and would be expected to give a higher return to compensate.
- Historically, the running yield on equities has been lower than that on bonds as the potential for capital growth is greater than on bonds.
- Both equity prices and dividends can be volatile.

- The price of individual shares is determined by the interaction of supply and demand. Some buy or sell for speculation, whereas others base decisions on an assessment of its value based on the present value of future dividends.

(ii)

- Size of the existing business of TeleCo
- Target market and the penetration thereof
- Success/Track record of entering new African countries
- Other countries to be entered, and the market potential of these countries
- Consumer trends in the affected countries regarding telecommunications
- Competitor trends in existing and new countries
- Quality of TeleCo's Research & Development
- Profit margins:
    - Income margins
    - Expense levels and the managing of these
    - Historical profit margins
- TeleCo's dividend policy
- Historic dividends paid by TeleCo
- Other financial information (P/E ratios, Earnings per share, Debt-to-asset ratio, ROE, Current ratio, etc)
- Legal and regulatory environment and its impact on telecommunication market (in each country)
- Economic climate in the targeted countries
- Political climate in the targeted countries
- Inflation levels and outlook in targeted countries
- Quality of the management of TeleCo
    - Skills, qualifications and experience
    - Executive and non-executive directors
    - Quality of previous management decisions
- Will TeleCo consider diversification strategies, or is the focus only on telecommunication?
- Marketability of the shares
    - Is the company listed on any stock exchanges?
    - Volatility of historic share price

(iii)

Although it is true that correlation of performance between companies in the same industry/sector is high, it is not necessarily appropriate in all scenarios.

Some companies operate across multiple industries, which make comparisons less relevant. For example, DifferentCo might operate in other industries than telecommunication.

Even for companies that only operate within one industry, it is not necessarily a given that the companies are homogenous. For example, DifferentCo might not operate on multi-national basis, or might not have the same extent of exposure to Africa or developing countries.

Even if the companies are affected by similar issues/factors, one should still consider whether the extent of the impact is comparable between the two companies.

QUESTION 9

Examiner's comments:
Well prepared candidates performed well with this question.
A common mistake with part (i) was that students lost marks on discussing the merits of claims underwriting, rather than focusing on inspections at inception or renewal of the policy. Students otherwise didn't generate enough points on this part of the question.
Part (ii) was mostly bookwork and students did well with this part of the question. In part (iii), many students missed marks by providing a detailed explanation of an expense investigation rather than just considering what is an appropriate way to allocate expenses by class of business, initial or renewal expenses. Students that did well with this question gave a logical explanation of how to apply bookwork in this scenario.

(i)

- Undesirable risks can potentially be identified and avoided before ever coming onto the books
- The company will be able to understand the current risks taken on better…
- …perhaps even cancelling existing business if deemed too risky…
- …and hence potentially avoid some large and/or difficult claims from poorly managed businesses.
- Underwriting approaches can be fine-tuned in light of the feedback from the inspections
- Additional required risks management requirements can potentially be identified and incorporated at the client's premises…
- …resulting in an additional potential value added service to the client
- These requirements may also negatively influence the client…
- …especially if other players are not doing it in the local market…
- It may also be advantageous when it comes to purchasing reinsurance as this potentially speaks to good u/w management.
- It could help to identify over or under insurance by the policyholder

(ii)

- Business of a certain nature, e.g. chemical plants
- Business with insured amounts above a certain amount
- Businesses with more than x number of premises
- Businesses that had a claim in the last year
- Businesses that had dramatic increases in cover requested at renewal or between application and their previous insurer.
- Making sure that all sites are visited at least once every n number of years
- Businesses in certain high risk areas e.g. coastal / close to rivers etc.
- Age of business (younger maybe less established, more risky etc.)

- Reason for cancelling previous insurance contract (if the policy was cancelled by previous insurer, why?)
- All new applications for cover
- Buildings of a specific type eg. Thatch roof buildings or ones containing specific issues eg. asbestos exposure

(iii)

Nature of the expense

- This is most likely a variable expense…
- …as it increases/decreases in line with the volumes being inspected.
- It can also be seen as a direct expense…
- …as it relates directly to the property buildings and contents class(es) of business

Allocation of the expense

- The expenses should ideally be recouped from the insurance premiums of the buildings and contents classes of business.
- Since the inspections happen both at proposal and renewal…
- …there is an element of both a new business function expense…
- …and an ongoing maintenance function expense present.

Allowance in the pricing basis

- It is likely that this cost may be allowed for via a combination of fixed amount per contract…
- …and a percentage of the sum insured…
- …as one can expect that the cost / complexity / duration of such an inspection may be more…
- …for bigger risks with bigger insured amounts / more premises etc.
- But at the same time, for a large range of the medium type risks the costs of an inspection is likely to be the same, (hence the fixed component)
- What complicates matters is that not all risks are inspected necessarily…
- …so the company would have to decide whether to only allow for this expense in the pricing of risks likely to be surveyed…
- …or to spread this cost across all contracts.
- You could spread the cost over a few years premium so long as you expect a reasonable renewal rate