

Actuarial Society of South Africa

EXAMINATION

1 November 2011 (am)

Subject F201 — Health and Care

Specialist Applications

EXAMINER'S REPORT

Question 1

This question is based on bookwork and was well answered.

Proportional reinsurance

Quota share

Surplus

Will assist by reducing uncertainty

Will only address VuvuMed's needs to a limited extent, as the scheme appears to be more concerned about single catastrophic events

Non-proportional reinsurance

Risk excess of loss

Could be aggregate XOL or individual XOL

Likely to be the most suitable form of reinsurance for the need expressed by VuvuMed

Catastrophe excess of loss

Could also be considered by VuvuMed, as a catastrophe will not necessarily translate into a single large hospital event but could also emerge from an accumulation

Especially given the fact that restricted schemes like VuvuMed are often geographically concentrated

Stop loss

A stop loss with an attachment above a 100% loss ratio is unlikely to address VuvuMed's immediate needs, as the scheme needs to make surpluses.

Generally expensive and not readily available in local markets

(ii)

This question was based on bookwork and was relatively well answered.

The Medical Schemes Act requires that all reinsurance agreements be approved by the Registrar of Medical Schemes

Trustees are required to obtain a number of proposals

And have these reviewed by a suitably qualified professional

Which could be an actuary

And should have no direct or indirect interest in the reinsurance contract

(NOTE: credit also given to the view reflected in the Core Reading, that a conflict of interest should be disclosed)

Trustees have to provide the Registrar with a copy of the proposed reinsurance contract as well as the independent evaluation

Registrar will consider the contract and evaluation and assess whether

The contract is in the best interest of members

Due consideration has been given to the need for reinsurance, based on an assessment of the financial risks to which the scheme is exposed.

There are any conflicts of interests between the parties involved

Any issues raised by the Registrar have to be addressed by the Board before the contract will be in force.

(iii)

The type of reinsurance contemplated in this question (i.e. extremely high-cost hospital cases) cannot reasonably be priced through conventional a 'burning cost' approach. It was disappointing to note that most candidates reverted to rote-learned medical scheme pricing considerations without applying their actuarial expertise to the features of the question. Very few candidates suggested the modelling of frequency and severity of high-cost cases through the use of appropriate probability distributions. Even though credit was awarded for a large number of valid points, candidates did not perform well in this question,

Factors to consider

How is cost per case defined?

For example, is it based only on the hospital bill, or is it inclusive of professional fees in hospital as well?

What would the appropriate XOL attachment point be? (e.g. R2 million)

Should the reinsurer apply an overall limit, either per member or in aggregate?

Should the treaty be based on individual or aggregate XOL?

Reinstatement provisions.

Will the premium include one or more reinstatements, or will an additional premium be charged for each reinstatement?

How will reinstatement provisions apply to claims burning only partially through the excess layer?

How much broker commission is payable?

Should a premium discount or commission or profit share be offered to the medical scheme?

Time period of cover

Registrar does not allow reinsurance contracts to be retrospectively signed

And 2011 is almost over, so most likely apply to 2012 January to December

Should the contract be of a multi-year nature?

How should annual renewal terms be agreed? For example, does Zela Re retain the right to adjust premiums annually based on claims experience?

Affordability – the scheme is required to build reserves and is unlikely to opt for a contract with expensive premiums

As the premiums may be experienced to be a direct additional expense, especially in years where no claims are submitted

Exclusions to be applied by the reinsurer

Data to request

Need to determine the cost per case for every hospital case over the past few years

Which can be derived from full claims data in a format that allows cost per case to be calculated for all past hospital admissions?

Claim data fields should include benefit amount, treatment date, paid date, discipline code, supplier number, tariff code, in-hospital indicator

As well as clinical headers (or auth records) of hospital cases (*e.g.* ICD10, DRG)

The time period of data should be considered, weighing the credibility of a longer investigation period against the relevance of older experience

Clinical details of the recent high-cost hospital case

Could there be a related readmission in the near future? (if the patient survived)

Does the scheme have exposure to other members with similar conditions?

Is the high cost of treatment in any way related to the environment of the restricted scheme in question? Or the environment in which patients are treated (*e.g.* if the scheme uses own facilities)

Demographic details of the scheme

These would include age, gender, area, employment division, income, active/pensioner etc

Should preferably also obtain detailed chronic registration data such as CDL registrations

As some types of high-cost hospital cases could be linked to specific conditions

Recent hospital authorisations and/or case manager reports. Are there any large hospital cases presently in hospital, not yet visible in the claims data?

Hospital tariff increases negotiated for the 2012 benefit year, if available – alternatively the assumptions used in the 2012 budget

What are the scheme's underwriting policy for new applications, and could this change in the near future?

Pricing of risk premium

An experience-based or burning cost approach to the pricing is probably undesirable, as the number of historic severe high-cost cases is likely to be so small as to render unreliable results

A more appropriate approach could be to consider probability distributions for frequency and severity

From which a compound loss distribution could be derived,

Either algebraically or, more likely, through Monte Carlo simulation

Based on the relevant excess attachment points

Given the low occurrence of high-cost hospital cases, the data of VuvuMed alone (as described above) is unlikely to provide a credible basis for the estimation of the frequency and severity of such cases

So try to supplement with additional data sources, perhaps from internal experience on similar contracts, or industry data, or appropriate benchmarks or publications

Should be careful to fit an appropriate severity distribution, especially considering the tail? Polynomial distributions (such as Pareto) have thicker tails (and yield more conservative risk premiums) than exponential distributions (such as lognormal). Given the scant data for these cases, the choice of distribution may well depend on Zela Re's general risk appetite

Frequency distribution could typically be modelled using Poisson

Expected cost of claims can be derived from the resultant compound distribution, based on the probabilities acceptable to Zela Re

Should also analyse demographic and claims trends in VuvuMed and project these forward

The number of members appears consistent over time, but is the demographic profile changing?

Should investigate whether high-cost cases can specifically be attributed to sub-groups in the demographic profile

Should investigate whether the prevalence of high-cost cases is generally increasing, although this may be difficult to assess from claims data alone

Should also compare to the market and competitors (if applicable)

Adjust for inflation

Which consists partly of negotiated hospital tariff increases and partly of the increases in professional fees?

Premium could be expressed as per member per month or per life per month, or as an aggregate monthly or annual amount

(iv)

This question was poorly answered, even though the evaluation of reinsurance contracts had been a topical issue in South Africa. Most candidates offered superficial comments on ideas such as the desirability of lower volatility and the need to build reserves, but failed to suggest a scientific actuarial approach to evaluating the value for money of reinsurance (e.g. by considering its cost compared to demonstrably reduced variation in projected results). It is disappointing that most candidates failed to point out that it would be unreasonable to require a reinsurer to price for an expected loss.

The main question from a Trustee's perspective is to determine whether entering into the contract is in the best interest of members

The interpretation that this requires VuvuMed to yield an expected surplus under the contract does not make sense, as doing so would mean that reinsurers are expected to price for losses

Whereas it is reasonable to expect that reinsurers need to make a profit over the longer term

The "value for money" purchased through a reinsurance contract should be evaluated with reference to the reduction in variability of projected future results rather than the absolute levels of expected financial results

This can be demonstrated by modelling an aggregate loss distribution, or even a probability of ruin, for VuvuMed with and without reinsurance

With reinsurance, the distribution is likely to have a smaller variance, even though the net expected expenditure to the scheme will be higher than without reinsurance

So the probability that the scheme will fail to meet statutory solvency targets without reinsurance should be demonstrably higher than with reinsurance.

A quantification of these probabilities should be useful in assisting with the evaluation of the reinsurance contract

VuvuMed will have to price to recover the *expected* cost of reinsurance from its contribution income

And this may be seen as an onerous requirement, given that the scheme already had high contribution increases into 2010 and 2011 (16% and 11% respectively)

But this cost should be weighed against the certainty that it will be able to comply with the regulatory targets

In addition, VuvuMed should consider whether these risks can be self-insured through the scheme's reserves

Given the scheme's low levels of reserves (with a recent hospital case equating almost 50% of the scheme's reserves during 2010), self-insurance is not advisable

(v)

This question was based on bookwork and well answered by most candidates. Some candidates spent unnecessary time reproducing the entire Annexure B of Regulation 30 whereas the question wording and point allocation clearly required only a "brief" outline of "main" categories.

Bills and bonds – maximum 100%

Property – maximum 10%

Preference and ordinary shares – maximum 40%

Insurance policies – maximum 90%

Other asset classes – maximum 2.5%

(vi)

Although candidates offered some theoretically valid points in their solutions, few (if any) pointed out the practical insignificance of investment return given the scheme's low reserve levels. Many candidates focused entirely on matching principles without giving due regard to the pay-as-you-go nature of monthly medical scheme cash flows, or the timing of reinsurance recovery cash flows.

It is generally true that a scheme could pursue a more aggressive investment strategy if it is exposed to less uncertainty

But

VuvuMed has low levels of absolute reserves, making a split of the portfolio into several subcomponents less efficient

And the marginal additional expected return in absolute rand-terms is therefore most likely insignificant within the context of the scheme's projected financial results

For example, consider that every 1% additional return only provides the scheme with approximately R200000 per year in 2010 money terms

Which begs the question as to whether it is worthwhile exposing the scheme's low reserve levels to additional risk?

Costs associated with obtaining investment advice and placing investments

VuvuMed also requires cash flow protection, which may not be adequately provided by reinsurance. A large claim may need to be settled before the recovery from the reinsurer is concluded.

Strongly recommend that the scheme remains invested in cash

And revisit the investment strategy only when higher reserves have been accumulated in the future

Question 2

i)

This question specifically referenced PGN303 and its requirements with regard to utilisation. Whereas the examiners expected candidates to be well acquainted with the contents of the guidance note, the solutions offered by candidates pointed to a poor familiarity with the structure of PGN303 (which has a sub-section devoted to this topic). Note that demographic changes are dealt with in a separate section of the guidance note and were not awarded credit given the very specific wording of the question.

The actuary should consider changes in utilisation as a result of factors such as:

Benefit changes

-any changes in benefits will affect the claiming patterns of beneficiaries

Technology changes

- the introduction of new technologies will introduce new types of claims which will not be present in historical data

Changes in medical practices

-an allowance needs to be made for how claims might have increased/decreased as a result of any changes (e.g. an increasing trend to use cardiac stents as opposed to heart bypass surgery)

Extensions of existing trends

-some trends seen in claims data are expected to continue (e.g. increasing trends seen in cataract surgery)

Changes in medical tariff structures

-a change in tariff structures might result in a change in behavior by providers which will have to be allowed for

Selective effects

-if an opportunity for anti-selection exists (e.g. the introduction of an underwriting free policy), then allowance for increased utilisation needs to be allowed for

Medical management and managed care arrangements

-managed care arrangements might be made more restrictive (or less so) which will impact on the expected claims

Regulatory changes such as prescribed minimum benefits

-if the scope of PMBs is increased, then an allowance for an increase in expected claims costs needs to be allowed for.

Impact of HIV/AIDS and other industry-wide diseases

-as the burden of disease increases, so would the related claims costs

Changes in disease profile

-as certain diseases become more prevalent within the population, so the expected claims costs are likely to change

ii)

This question is derived from a topical issue in the South African medical schemes industry during 2010 and 2011. Given that we expected candidates to be familiar with the basic tenets of the question, it was disappointing in the extreme that very few candidates commented on the fact that a sub-population could not be expected behave similar to the entire population.

Comments made are with respect to the whole population, not a sub-population (as in a medical scheme)

For a sub-population, stability in age profile is not certain

Future changes in disease burden are not easy to predict

Past trends indicate a worsening trend in disease burden within the SA population

But will depend on the expected change for this scheme (and not the industry)

In a multi-option scheme, it is necessary to allow for possible buy-downs which will affect the utilisation assumptions for each of the options.

Other factors regarding utilisation changes, such as changes in technology, also play a part and are not reflected in the statement

It is very possible to have an utilisation assumption greater than 0%

A relatively stable population could be expected to age year-on-year, resulting in commensurate utilisation increases

iii)

Although this is a relatively easy question dealing with a rather common phenomenon in the medical schemes industry, many candidates failed to answer the question properly and launched into discussions on pricing techniques or legislative requirements rather than dealing with the design features and considerations that were asked.

One would need to consider what level to set the new benefits at

Apple members will probably not want to have their benefits reduced

However, retaining Apple's level of benefits will increase the cost of providing benefits to the ex-Orange members, which would result in higher average contributions being required.

Orange members may wish to have greater benefits, but will not necessarily be willing to pay a higher contribution

If the benefits are set at Orange's level, then the benefit levels may not be sufficient for some of the ex-Apple members if they had chosen the higher option for the extra benefits available.

Some compromise might be required, with benefit levels being set in between

Might have to consider a different benefit design (e.g. introduction of a pooled risk benefit).

One would also need to merge the two option's income band based contribution tables

It will be necessary to determine the best fit for new income band levels. There would hopefully be a good match of the income bands across the two options. If not, the merge of the contribution tables may have widely different impacts for different members.

Could also consider removing the income cross-subsidy and have a single contribution table for all members.

The employer's subsidy policy may also be affected, especially if different subsidies were given to the two options in the past. A decision will need to be made on how to handle this for the merged option.

However, whatever options are considered, it will be necessary to perform a member level impact assessment, as individual impacts may vary widely.

It will be most prudent to select a solution that minimizes the no. of members that have a "large" impact to required contributions.

iv)

Several candidates focussed on the consequences of merging the pooled benefit (e.g. how it would be received, or how it would affect costs) rather than the considerations of how the pooling should be structured. Such candidates fail to appreciate that consequences are a function of design considerations, and that the latter should form the subject matter the discussion. For example, whereas most candidates simply stated that claims costs would be adversely affected by a pooled design, the reality is that claims could increase or decrease depending on how the pooled benefit is structured. Overall, the question was poorly answered.

One would need to define which of the day-to-day benefits to include within the pooled risk benefit

One may also need to give advice on potential sub-limits within the pooled risk benefit.

For example, having no sub-limit on optical benefits or advanced dentistry (if these benefits are included) might result in the pooled risk benefit becoming depleted very quickly.

One must also decide whether the benefit should be on a family or beneficiary level,

If on a family level, whether it should be differentiated by family size (M, M+1, M+2 etc) or by family structure (Principal Member, Adult Dependant, Child Dependant).

In performing the pricing exercise, one would need to model anticipated utilisation of the various benefits covered on a beneficiary/member level

The pooled limit would likely be larger than any one of the current individual limits, giving rise to potential increases in utilisation. This would need to be allowed for.

It would be best to use the scheme's historical data, but adjustments would be required should the previous benefit limits for specific benefits be lower than that would now be available in the pooled risk benefit (especially for the ex-Orange members).

Any historical data would need to be adjusted for inflation.

It is possible to set the benefit levels so that the cost of providing the pooled risk benefit can be reduced from the current cost for the equivalent day-to-day benefits so as to reduce the financial impact of the merger.

v)

Most candidates offered generic ideas on pricing and low-income members without considering the details of the situation at hand. For example, very few candidates considered the timing of the transfer and the practicalities of pricing for a potential mid-year change of this nature. Perhaps surprisingly, some candidates provided a comprehensive discussion of a potential introduction of a new low-cost option whereas the flow of the question clearly aimed towards a single-option scheme. Although credit was given for several valid points raised by candidates, overall performance on this question was unsatisfactory.

Decision needs to be made when to allow for the possible impact on the scheme of this new group joining

Could assume they will join and make allowance for contribution rates from 1 Jan 2012

Or have a contribution adjustment in Jul 2012 (or whenever they join).

This allows for the possibility of the group not joining

Or could wait until 2013 to make any necessary adjustment.

The group will have an impact on the scheme when they join. In order to estimate the impact, need to consider:

How large the group is relative to the current size of FruitMed

-The larger the group, the larger the possible impact

The likely claims profile of the new group of labourers vs the current claims profile of the FruitMed members

-If the new group are low claimers, then may improve the overall profile (and vice versa)

The income band distribution of the new group relative to the current income band distribution on FruitMed

-As they are all low income earners, then the income cross-subsidy balance will most likely be affected

Need to assess the expected claims loss ratios for each income band (i.e. extent of cross-subsidy) based on the scenario that the large group joins.

A multiple year modeling exercise would be useful to ensure that the scheme is able to maintain a stable financial position.

Increasing membership is likely to lead to a reduction in solvency. This will have to be taken into account when pricing.

When modeling the cashflows, need to take into account that the group is only likely to be on the scheme for half of 2012.

vi)

This question was poorly answered. As is the case for several of the subsections in question 2, this question dealt with a fairly common phenomenon in medical schemes above minimum statutory solvency requirements. Solutions presented by the majority of candidates addressed only superficial points and failed to consider longer term or second-order effects. A disappointingly small proportion of candidates pointed out that a higher contribution increase would be required to bring the scheme back to a surplus-making trajectory in the future. Many candidates failed to discuss the purpose of reserves or the fact that RBC-principles could be considered.

Reserves are required to protect the scheme from adverse claims experience and other risks.

Although the reserve level may be higher than required by legislation, it may be in line with what would be required based on a Risk Based Capital exercise

Investment income earned on the reserves helps to subsidise the scheme's contribution rates (i.e. allowing an underwriting loss to some extent if an overall break even position is reached).

A contribution to reserves is required every year in order to maintain the current level of reserves.

If a lower contribution increase than is required to break even is chosen, then a deficit will result which will reduce the absolute level of the reserves.

Thus the reserve level will reduce significantly (the absolute level of reserves has fallen, and the contributions received have increased, resulting in a double impact).

In future years, in addition to any inflationary and other increases that need to be allowed for, an allowance for the recovery of this shortfall will be required in order to stabilize the funding position of the scheme.

Therefore the contribution increase at that time is likely to be significantly higher than normal.

This will not be acceptable to members, CMS and probably the employer

Increasing membership will lead to lower solvency.

vii)

This is a higher order question, and successful candidates were able to distinguish themselves by presenting clearly structured solutions. It was disappointing to note that several candidates failed to appreciate the difference between a vaccine and a treatment.

Need to establish the actual cost of the vaccine for an individual

Need to establish who in the scheme would benefit from receiving it in the immediate future.

And who would need to receive it in future years (might depend on the age at which one must receive the vaccine for it to be effective)

Would also need to consider whether a “booster” vaccine would be required at some stage in the future for each individual, and if so, how often it is required

Need to establish what other related costs there may be in providing the vaccine

For example, a special consultation benefit may need to be provided

Need to consider likely takeup of vaccine within the “target” group

From this, one could estimate the likely cost to the scheme of providing the vaccine

Need to establish the effectiveness of the vaccine by assessing the results of clinical trials

From that one could establish what the likely reduction in the incidence of the disease may be.

Would possibly need to adapt the results of the clinical trials to the specific demographics of FruitMed

Would then need to investigate what the current incidence and prevalence rates are for FruitMed

From this, one could estimate what the impact on the incidence of the disease will be for FruitMed

Need to determine what the treatment costs are for this disease (in all claims categories), and what costs are likely to be saved for every individual that does not contract the disease as a result of the vaccine

Would use past claims data to do this

Adjusted by relevant inflation factors to current year terms, and for any other relevant factor

From this, one could establish what the potential claims cost savings there may be for the scheme from a reduction in the incidence of the cancer

A Cost/Benefit analysis would need to be performed by assessing the cashflows over a time period (possibly of several years)

If an overall cost saving is established (based on the cost/benefit analysis), then it is easy to motivate for it

However, if this results in an additional cost to the scheme, then a decision needs to be made regarding funding priorities (i.e. there may be other possible interventions that could be implemented for other diseases by the scheme e.g. an HIV VCT campaign)

Or may need to consider the ability and desire of the scheme to pay for the extra cost in higher contributions based on the probable benefits to members

FruitInc. might want to consider other potential factors such as reduction in absenteeism and lost productivity etc.

There might also be an impact on the reputation of the scheme, should it not be funded (especially if other schemes fund it).