

Actuarial Society of South Africa

EXAMINATION

27 April 2009

**Subject SA2RSA — Life Insurance
Specialist Applications**

EXAMINERS REPORT

Question 1

(a)

COMMENTS

This was a reasonably well answered question. Although the question itself appeared quite complicated on the first read, once the candidates understood the question, they were able to get a fair number of marks. A small number of candidates did not read the question carefully and assumed that annuity payments would reduce the notional unit account. This was not what the question said and would have meant that the hybrid annuity was, in essence, not a hybrid annuity, but rather a unit linked annuity.

Advantages from client perspective:

Unlike a non-profit annuity, it provides access to asset classes that may be expected to outperform bonds. Some of these asset classes, such as equity and property, may provide a closer link to inflation in the annuity increases over the long term.

The design will enable clients to switch between investment choices, providing flexibility.

Compared to a living annuity, there is less risk of capital erosion. It is therefore a more appropriate choice if the annuity is the client's only source of income.

Annuities which insure longevity risk should be attractive to more affluent socio-economic groups, given their lower expected mortality.

It is a better match to client needs than a traditional living annuity, in that the entire investment amount is used to provide an income for life.

In some ways it can be more flexible than a living annuity, because it can allow for joint lives, guaranteed terms.

Disadvantages from client perspective:

Some may dislike the loss of capital upon death, as with non-profit annuities, given a desire to leave a bequest.

It does not have the flexibility afforded by choice of drawdown rate. There is therefore less scope to smooth the annuity stream.

The annuity may decrease if returns are poor. This would be problematic if it is the individuals only source of income.

Most importantly, it will provide a very low initial income compared to other annuities.

The concept of a nominal investment value may be difficult to understand. (The flip-side of this is that the insurer may find it difficult to market.)

PLEASE TURN OVER

Assuming that the insurer does not provide improved terms for substandard risks, the hybrid annuity will be less appropriate than a living annuity for those retiring due to ill health. Given the nature of the product, it may be more difficult (or there may be a more significant charge) to switch between providers than is the case for living annuities.

Having to make an investment choice (or deal with switching) may not be something a pensioner wishes to do.

Advantages from insurer perspective:

Unlike with non-profit annuities, the insurer does not need to take on credit risk in the underlying investments.

A related issue is that the insurer is not required to perform the asset matching required with non-profit annuities.

There is less risk of reputational damage caused by capital erosion (compared to living annuities).

The pricing basis should be simpler than for non profit annuities, because the terms are not affected by interest rates.

While there is greater mortality risk than for a living annuity, or even a non-profit annuity, this may be a source of profit in the pricing basis.

The insurance of longevity risk also implies that the product cannot be offered by non-insurers.

An original product concept may improve the overall marketability of the product line.

An advantage over non-profit annuities is that the profit margins in the fund charges may reduce the reserving strain.

The hybrid may be attractive to intermediaries, compared to non-profit annuities, as there may be the need for ongoing investment advice, with associated fees.

Disadvantages from insurer perspective:

The insurer is exposed to greater longevity risk than for non-profit annuities, due to the high (and variable) nature of the expected increases. It may therefore be capital intensive.

Where clients choose the hybrid annuity in preference to a living annuity, there may be a select effect due to those in good health choosing a product which rewards longevity. This would have to be allowed for in mortality assumptions.

The longevity risk will be affected by the choice of underlying investments. The longevity risk is greater for those assets providing high, volatile expected returns.

PLEASE TURN OVER

The insurer is exposed to extra uncertainty in the mortality risk, as the target market may be different to its existing book (non-profit annuities). It may not have good quality mortality data on living annuities, which would be more representative of the expected risk.

There is no simple fund value upon which to base trail fees.

Fund fees will be depressed when market values are low.

There is a mismatching risk that the mortality experience will not be uniform across all investment choices, i.e. due to random variation, those invested in better performing investments may live longer. The greater the investment choice, the more the actual unit linked liability may differ from the reserves held.

The insurer may be exposed to reputational risk.

(b)

COMMENTS

This question was also relatively easy drawing on techniques learned in earlier subjects. However, the question was disappointingly answered with very few candidates getting the key points and outlining the formula to be used. Alternative to a simple formulaic approach (e.g. cashflow and stochastic approaches) also gained marks.

Initial annuity = fixed % * (lump sum – upfront charges) =
(lump sum – up front charges) / annuity factor – regular charges

Note: award the marks for similar, sensible formulae.

The up front charges will allow for commission and sales-related expenses, as well as issuing costs. The charges may also allow for an explicit profit margin.

The regular charges are to allow for maintenance expenses, including the expenses incurred in making annuity payments.

Given the nature of the expenses which the regular charges are designed to cover, the charges will likely not be dependent on policy size.

The formula above allows for increases in the regular charges at the same rate as the annuity, but the pricing basis could alternatively allow for increases at a fixed rate, or inflation-related increases.

The annuity factor is the sum of {probability of payment [(x,y), t]} for all times t. (Note: also award the mark to candidates describing the annuity factor as the life expectancy of the annuitant/s.)

PLEASE TURN OVER

The probability of payment will be calculated using the mortality assumptions of the annuitant(s) (x and y), the length of the guaranteed term, and the provisions of any dependents' annuities.

The mortality assumptions will depend on the age and sex (and possibly health status) of the lives insured.

Mortality assumptions should include appropriate allowance for mortality improvements, given high likely increases and therefore significance of longer-dated cashflows.

The mortality assumptions will be based on mortality experience for existing non-profit annuities, adjusted for target market.

If available, the insurer may rely significantly on the experience of living annuities.

The pricing basis does not need to allow for fund charges or interest rates (unless the regular charges do not increase at the same rate as the annuity, in which case an interest rate assumption would be needed to discount the regular charges.)

(c)

COMMENTS

Most candidates came up with some viable alternatives. Some of those were quite interesting! The model solution is merely one alternative.

The greatest need is to increase the initial pension, which will reduce the increases. This will likely improve the marketability, and reduce the insurer's longevity risk.

Any method used to accomplish this must not be overly complex, as that will worsen the marketing difficulty, mis-selling risk, and risk of later client dissatisfaction should the product not react as anticipated by clients.

Example method: the fixed percentage of nominal investment amount, or the nominal investment amount itself, may be multiplied by a fixed percentage (less than 100%) every year / month. (This is akin to a bonus loading in a with-profit annuity.)

PLEASE TURN OVER

Question 2(i)

COMMENTS

Both parts of question 2 tested the student's ability to look at a real life situation and apply some basic actuarial concepts to it. The first part of the question was disappointingly answered given that the theory was fairly straight forward.

The primary alternatives available to the company are:

- Increase premiums to a level suitable to be able to provide cover for a further guarantee period, or for life. This will allow for the increase in risk premiums as policyholders age.
- Allow the policies to continue without increasing premiums (subsidization).
- Migrate the policies to the new product range.

Increase premiums:

There is potential reputational risk involved in increasing premiums. It may (even if unreasonably) influence the market's view of the likelihood of premium increases under the company's new generation products, where premium increases are not expected unless experience deteriorates. This would affect new business sales.

A primary indicator of the acceptability of increasing premiums would be the approach adopted by competitors to the same issue.

The insurer must compare the increased premium to those under the new generation risk product and to competitors' premiums. Policyholders in good health may surrender their policies in favour of cheaper alternatives.

This leads to anti-selection as the remaining policyholders will experience heavier mortality.

The company would have to assess the increases necessary, and whether these should be calculated accurately (on an individual policy basis) or whether broad brush / approximate increases should be used.

Approximate increases would be more acceptable if there was an element of subsidy (i.e. the increases were on average lower than they would be if calculated individually).

When deciding on an approach, the company would have to consider the administrative implications (especially since the UL business may well be on a legacy system.)

As an alternative to increasing premiums, the company may offer policyholders the option of decreasing cover.

PLEASE TURN OVER

Do not increase premiums:

If premiums are kept unchanged, the policies are even more unlikely to provide surrender values.

The insurer would have to assess:

- The cost of following this approach
- Whether future (optional annual) premium and cover growth should be cancelled, to reduce the cost
- Whether future alterations should be allowed, and if so, on what terms

If premiums are not increased, policies will become assets in the hands of policyholders (i.e. the PV of expected claims will exceed the PV of expected premiums). This will create the potential for a second hand market (i.e. a life settlements industry).

The company would have to reassess its reinsurance. If the company has original terms reinsurance in place, it would be unable to follow the approach of not increasing premiums. If, as is more likely, the company has risk premium reinsurance in place, it may nevertheless have to gain reinsurer consent to change the policy terms.

Migrate the policies to the new product range:

This could, over time, result in savings as a result of simplified administration.

However, the policies would again no longer provide surrender values, and the benefits on the new product range may not be an exact replica of those on the UL business.

The company may need to offer an incentive to retain business.

General considerations

Any changes would have to be consistent with policyholder reasonable benefit expectations.

In particular, those expectations would be created by the contract terms, marketing material, and competitor behaviour. The disclosure under older policies may well have been less transparent that would be expected currently.

Similarly, the insurer would need to consider the effect its chosen route will have in terms of new expectations created.

PLEASE TURN OVER

Several practical issues would have to be considered:

- Will policies be adjusted at the end of the guaranteed period, or only once the investment portfolio is extinguished
- It will be important to communicate clearly with clients
- The effect on valuation and embedded value assumptions, and the resulting impact on profits and embedded value, will have to be assessed. In particular, the approach taken may have an influence on surrender / lapse assumptions.
- Admin systems will have to be adjusted to identify the policies affected.
- Care will be needed to ensure that admin systems deal properly with any 'negative units' that may arise.

(ii)

COMMENTS

The second part of question 2 was answered much better than the first part with most candidates scoring well in this part of the question. This part of the question also (in the examiners view) demanded more insight.

The insurer will need to research which direct marketing methods will be most successful in this market segment – advertisements, direct mail shots, or telesales.

The clients to be targeted will need to be identified. These may include:

- Specific market segments, targeted via choice of media
- Marketing to the insurer's existing clients.
- Purchasing a list of leads from a direct marketing organisation.

The more that is known about the targeted clients, the more an offer may be personalised.

The company needs to be aware of the potential for channel conflict.

It will be reluctant to alienate brokers (and also agents, to a lesser extent) by marketing to existing clients.

However, the company may nevertheless have a large number of orphan clients (clients no longer represented by an intermediary) to approach.

PLEASE TURN OVER

Product design

To be successful, a direct marketing offer needs to be simple and easy to explain.

This is necessary not only to achieve sales success, but to reflect the lack of advice that would normally be provided by an intermediary.

The company will therefore have to consider several methods of simplifying the product design:

- Reducing the number of product options available, in particular such areas as the choice of benefits available, and choice of premium growth patterns.
- Simplifying contract terms, such as exclusions applicable.

Initial underwriting will also need to be considered:

Simplified underwriting, to reduce the effort required from the client, may enhance sales. This may include greater reliance on medical questionnaires rather than tests.

However, the company would expect to see the effect of reduced underwriting in higher claim rates.

The company may investigate alternative underwriting techniques, such as:

- Using pre-existing condition exclusion clauses, and waiting periods for claims due to natural causes.
- Removing the need for a cotinine test by using a single premium rate for smokers and non-smokers.

The company will need to be aware of the risk of anti-selection as a consequence of any simplification

PLEASE TURN OVER

Product pricing

Direct marketing tends to be less sensitive to pricing.

In determining premium rates, the insurer will need to consider:

- Its profit target, and whether this will differ from existing risk business.
- The effect on expected claims rates of changes to underwriting.
- The cost of the channel compared to existing channels: for example the cost of advertising compared to the commission paid on other channels.
- An important assumption in calculating the cost of the channel, is the response rate expected. The insurer may use response rates from prior (savings) campaigns in arriving at its assumptions.
- The assumptions regarding mix of business will be important. In an attempt to simplify the offering, the insurer may concentrate on 'core' benefits such as death cover, which may in general be less profitable than rider benefits.
- Policy size is typically smaller than for business sold through intermediaries.
- The admin expenses may differ from the existing risk product, due to simplified issuing and underwriting. However, the costs of adjusting admin systems to accommodate an adjusted product for direct marketing will have to be incorporated into the pricing.
- The company may approach a reinsurer to assist with expertise and experience related to direct marketing of risk products.
- Judgement will be required in determining the persistency assumptions. Direct business is characterised by higher lapses. The experience of the company's savings business sold via direct marketing may be useful, by comparison to the savings business sold through intermediaries.

PLEASE TURN OVER

Question 3

(i)

COMMENTS

Question 3, as a whole, was relatively well answered. This question also did a good job of separating out those who understood Embedded Value principles from those who did not. Part (i) was the easiest part of the question and was well answered by the majority of candidates.

Reasons for the results

Expected return on covered business

This is the unwinding of risk discount rate.

Expected return on ANW

This is the expected return on the adjusted net worth (ANW)

Value of new business

This represents the expected profit in respect of the new business written during the year (on the EV basis). It follows a similar pattern to the volume of new premiums written.

The change over time may also reflect changes in the mix of new business between endowment and term assurances, or changes in charges or premium rates.

Investment return variance

This represents the change in the embedded value arising from actual investment performance differing from that assumed. Unlikely that much of this comes from unit-linked, because most of this investment risk lies with the policyholder.

Arises partly from the return on shareholders' funds, but mostly from mismatching.

The term assurances appear to have been backed with volatile assets.

PLEASE TURN OVER

Expense variance

This represents the change in the embedded value due to actual expenses differing from that assumed in the previous calculation. Experience appears to be consistently worse than expected, and deteriorating. May be that

- Inflation assumption is unreasonably low
- Year X-3 figures were untypically low
- New business volumes are lower in X - 1 and X than in X - 2

Lapse variance

This represents the change in the embedded value from the actual lapses and surrenders differing from those assumed. It could be that

- Lapse assumption is unreasonably low
- Year X-3 figures were untypically low

Mortality variance

The mortality variance is as a result of actual mortality experience differing from that assumed. Positive variance may be due to deliberate prudence in EV basis or to favourable experience better than a realistic estimate

Transfer to/from parent company

Transfer from parent funds in X - 2 — required to preserve minimum solvency margin after mismatching losses and new business strain.

Dividends accrued or paid

These are probably normal dividend payments.

PLEASE TURN OVER

(ii)

COMMENTS

This part of the question was not as well answered as part (i), however, it was still reasonably well answered. Most candidates got the main points, but missed out on the more detailed interpretation.

Changes in basis / investigations

According to PGN107 the assumptions should be actively reviewed. This may be a reason why the directors are considering changing to an active basis.

Investment/economic assumptions

No clear evidence that these should be changed.

Also the company appears to be taking a completely passive approach to the assumption. If this is to be continued then, by definition, the assumption will not change.

RDR

This seems similarly passive, and so the risk discount rate would not be changed. If the company decides on a more active approach it may wish to consider whether the difference between the investment return and the RDR is still appropriate.

Expenses

Evidence suggests that this assumption may need to be increased, particularly if we should prefer to see some positives coming through in the published figures, rather than negatives.

Depending on the information already available, may need to investigate recent expense experience. Any past one-off expenses should be eliminated to analyse the actual underlying experience. But account should be taken of any expected future expenditure relating to in-force business.

If the investment assumption is left unchanged, it is likely that the inflation assumption will also be left unchanged, in order to maintain consistency

This will also depend on expected volumes

Lapse/surrender

May be understated but X - 2 and X - 1 could be an exceptional period of heavy lapse rates.

A further investigation is required before a new assumption is selected. It is difficult to identify which of the lines of business is responsible for the poor experience unless the investigations are performed separately. It may be advisable to split the investigations due to this

If current assumptions are on a whole portfolio basis, this could mask differences between the two product types.

Mortality

Could be lightened to take account of recent experience, but could consider to leave unchanged as a small measure of prudence. The company is small, so mortality experience could be expected to be more volatile. Also the company may wish to make an allowance for the uncertainty with respect to future AIDS claims

Need to check for any changes in underwriting conditions and experience in recent years. Also need to take into account the mix of business between high and low HIV infections populations

The company could also seek advice from reinsurers

(iii)

COMMENT

This part of the question was disappointingly answered. Many candidates identified that the change in basis would probably occur at the end of the year (as it should if the calculation is to be PGN107 compliant). However, many of the same candidates still seemed to expect operating experience variances to change for the year in question. Clearly if the basis change happens at the end of the year, this will not be the case. This part of the question, in many cases, separated candidates who passed from candidates who failed.

Effects of changes

The items relating to the risk discount rate and investment returns are unlikely to change, so no effect from these

However, if the rest of the basis is altered to reflect more closely recent experience, the items relating to expenses and lapses/surrenders, then the EV at the end of year X would be lower than if the basis were left unchanged.

This effect would be reduced, but not eliminated if the mortality assumption were weakened.

In addition, the value of new business will fall. The overall effect will be to reduce the embedded value.

PLEASE TURN OVER

As per PGN107, basis changes relating to experience should not be made at the start of the year. Since all of these changes relate to experience variances, they should be performed at the end of the year.

The change of basis should be performed on the figures as at the end of year X. In this case, the variance items for expenses, lapses and deaths would be as in Table 1, and the change of basis item would not be quite as big a negative, because it would reflect the effect after year X, but not including year X.

An indication of the effect of the changed assumptions can be obtained by multiplying the year X variances by an annuity factor for the average outstanding term, the risk discount rate, inflation, investment returns and the lapse/surrender decrement.

This is sufficiently material to require separate identification in the group accounts.

(iv)

COMMENT

This part of the question was reasonably well answered with some candidates describing market consistent embedded values and taking an approach that differed from the model solution but still obtaining reasonable marks.

Change to an active basis

In a passive basis the assumptions are usually based on long-term expected experience, and are changed only infrequently.

In an active basis the assumptions are set broadly in line with current conditions and recent experience, and in general are changed each year.

Although the active basis involves more work and complexity, it has the merit of more obvious consistency with the present and recent past.

Advantages of passive

Practically, using passive assumptions are a little easier to perform

Can give more stable results over time (provided a stable value of assets is used)

No need to explain and interpret change of basis item

Advantages of active

Reflect the current best view

Therefore easier to justify and explain

Consistent with the market value of assets

More in line with current market practice, the life company will experience significant pressure from analysts to use an active basis.

Setting the active assumptions

Additional work is required each year to determine the new assumptions, consistent with conditions at that year end.

For the financial and economic assumptions, the rates of return on the various asset types are used to decide future assumed inflation and investment return parameters. Alternatively, the risk free rate could be used as the basis for setting the assumptions.

For experience assumptions such as mortality, lapses and expenses, the most recent experience is used to determine appropriate assumptions.

Reconciling to the previous year

In analysing the change in the embedded value, an additional step is required to reconcile the new assumptions with those used at the previous year end.

This reconciliation can be done as the first stage in the analysis, or as the last stage, or as part of the intermediate steps. If the changes in assumptions are taken as the first stage, the previous year's embedded value must be recalculated on the new assumptions.

All the subsequent calculations are then carried out on the new assumptions. This has the advantage of less complexity, and a reduced scope for error.

Similarly, if the changes in assumptions are taken as the last stage, then all the other calculations are carried out on the previous year's assumptions. If the changes are taken as intermediate steps in the analysis, extra care is needed to use the correct combination of old and new assumptions at each step.

Disclosing the effect of the changes

If the changes in assumptions produce a material difference in embedded value, this will have to be disclosed in the published results.

PLEASE TURN OVER

In theory this could be done by restating the previous year's published results on the new assumptions. However this is not usual practice, because of the substantial additional work involved and the potential difficulty in recapturing the previous year's data and methods. In practice disclosure is usually made by showing the effect of changes in assumptions as an item in the analysis.

The first year of the active approach

The effect of changing from the passive to an active basis could be particularly significant in the first year. This is because the current passive basis uses experience assumptions that are based on out-of-date experience.

The new basis will probably use experience from years $x - 2$ to x . Given the variances from the current basis that have occurred, the new basis is likely to be quite different.

The financial and economic assumptions in the current basis may not change much, depending on conditions at the end of the year.

Because the effect of the change may be significant, the directors may wish to consider restating the latest year's results on the new active basis, notwithstanding the additional work involved. Otherwise the movement in the embedded value over the year may be distorted by the change of basis

(v)

COMMENTS

Like part (i) of this question, this part of the question was reasonably well answered by the majority of students.

Simplified underwriting

The time and cost of obtaining doctor's reports would no longer be incurred.

All else being equal, this would mean lower underwriting expenses

As well as faster underwriting decisions

However the underwriting decisions would be based on a smaller amount of information

This increases the chance of failing to assess the risk correctly and hence of mispricing it.

This increases the scope by policyholders for anti-selection

Which could have a negative effect on mortality experience

PLEASE TURN OVER

The fact that the company has less information on which to base its decisions may result in a larger number of proposals being declined

Which could be unpopular amongst clients

Alternatively the company could consider expanding the proposal form to obtain additional information

But this could prove unpopular

Underwriting based solely on the contents of the proposal form may require more experienced underwriters, which could offset the savings by not obtaining doctor's reports

The change in underwriting procedure may have an impact on the mortality assumptions used, which could negatively affect the premium rates

The acceptability of less stringent underwriting to the company's reinsurers would have to be reviewed

And this may have an effect on any existing reinsurance treaties

The level of underwriting of competitors should be compared to that of the company.

There could be an impact on claims underwriting.

END OF EXAMINERS REPORT