Subject ST2 — Life Insurance
Specialist Technical

EXAMINERS' REPORT

April 2009

Introduction

The attached subject report has been written by the Principal Examiner with the aim of helping candidates. The questions and comments are based around Core Reading as the interpretation of the syllabus to which the examiners are working. They have however given credit for any alternative approach or interpretation which they consider to be reasonable.

R D Muckart
Chairman of the Board of Examiners

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Comments

Comments for individual questions are given in the solutions that follow.

1 Formula:

$$(V0 + P)(i'' - i)$$
$$+ (q - q'')(S - V1)$$
$$+ [E(1 + i) - E''(1 + i'')]$$

Define:

$V0$ = Reserves at the beginning of the year = 20000
$V1$ = Reserves at the end of the year = 22000
P = annual premium = 1000
S = sum assured = 50000
i = valuation interest rate = 0.05
i'' = actual interest rate = $0.05 \times 1.1 = 0.055$
q = valuation mortality rate = 0.002
q'' = actual mortality rate = $0.002 \times 0.9 = 0.0018$
E = valuation expenses = 100
E''= actual expenses = $100 \times 1.10 = 110$

Definitions should be stated in solution.

Giving a dividend of:

$[20000 + 1000][0.055 - 0.05]$
$+ [0.002 - 0.0018][50000 - 22000]$
$+ [100 \times 1.05 - 110 \times 1.055]$
Dividend = $105 + 5.6 - 11.05 = 99.55$

Note from examiners:

This was a standard bookwork question that was generally well answered.

2 Asset share is accumulation of premiums less the deductions associated with the contract accumulated at rate of return earned on investments. It may not be possible to calculate the rate of return earned on investments accurately, so may use the return on a benchmark index/indices instead. An allowance for profits on without profits business may be included, if relevant and an allowance for surrender profits from other with profits business, if any, may also be included.

Deductions include:

- Commissions paid
- Direct expenses incurred (net of tax)
- Cost of benefits (e.g. life cover)
- Cost of any options and guarantees
- (May be on smoothed basis)
- Tax on investment income
- Transfers of profit to shareholders

- Costs of capital to support contract in early years (could also be a positive contribution for provision of capital support in later years to other contracts)
- Contribution to free assets (could also be a positive contribution from free assets in some circumstances rather than a deduction)

Asset share is calculated recursively on a year on year basis. All premium and deductions have to be recorded for each period. Asset share calculations can be done on an individual policy basis or on group of contracts.

Note from examiners:

This was a standard bookwork question that was generally well answered.

3 (i) An insurer would usually offer policyholders the option to make their policy paid-up in order to stop the policyholder from surrendering their policy altogether, and taking a surrender value.

Providing a paid-up option may enable the insurer to differentiate the product from similar products offered by their competitors – making the policy attractive to potential policyholders by offering the option to make a policy paid-up.

Conversely it may be necessary to provide the paid-up option to make the product competitive. Not including a paid-up option is likely, in many markets, to make a product uncompetitive and hence unattractive to many potential policyholders. In some cases it may be necessary to offer a paid-up option in response to a move by competitors to introduce a paid-up option on similar products.

Pressure from sales channels/sales force may force life insurer into adding a paid-up option.

There are many reasons why a policyholder may choose to make a policy paid-up, which the policyholder could not have foreseen at the outset of the policy:

- They may no longer be able to afford to pay the premiums.
- e.g. due to a life changing event such as an income drop due to one of a dual income couple giving up work to stay at home to care for children, or due to e.g. downsizing and taking a less demanding job on a lower income as the policyholder has got older. *Any sensible example*.
- Making the policy paid-up in this circumstance, enables the policyholder to continue to have some life insurance cover (which may be welcome in the event of the arrival of children), without the need to surrender the policy altogether.

From the company's perspective, allowing the policyholder to make their policy paid-up in these circumstances means that the company prevents the policy from being surrendered (the company may make a loss on surrender, especially early surrenders), which may be the policyholder's only other viable option and by keeping the policy in-force, albeit in a lower sum assured, the insurer can offer the policyholder the opportunity to restart premium payments whenever they can afford to. This option would not be available if the policy had been surrendered.

The policy may no longer meet the needs of the policyholder and hence there is no need to continue paying the premiums, but equally the policy benefits are not immediately needed by the policyholder and so the option to surrender the policy is not so attractive.

E.g. the policyholder may have taken out the traditional endowment assurance contract when purchasing a property many years ago. The policyholder may have since paid off the value of their mortgage and hence has no need for the death or maturity benefit offered by the policy, but equally has no immediate need for the surrender value. *(Marks given for any sensible example.)*

It is possible to make an endowment policy paid-up due to the accumulation of an asset share during the term (unlike e.g. a term policy).

The insurer will benefit from retaining the funds under management and changing the policy status to paid-up than the policyholder taking a surrender value, if the profits expected to be made on altering the policy to paid-up status are at least equal to those that would be made on surrender.

There is also the added advantage for the insurance company of maintaining a relationship with an existing customer – and whilst the existing policy may not meet their needs, it will be relatively easy and cheap to market other products to them.

A policy that offers better value for money e.g. lower premiums for the same benefits – may have been launched in the market, making continuation of the payment of premiums on this policy unattractive.

Traditional without profits endowment assurances are fairly old fashioned – there may be many more different products on the market e.g. unit-linked variants and unitised with profits contracts that may more closely meet the policyholders needs or desire to participate directly in stock market returns. In these circumstances, it is likely to be more beneficial from the insurer's perspective for the policy to become paid-up rather than surrendered altogether.

Other reasons why the insurer may offer the option to move to paid-up status include:

- It may be required by local regulations that a paid-up value is offered.
- It may be beneficial from a tax perspective for the policyholder to make a policy paid-up rather than surrendering the policy, in which case the insurer will be keen to offer such a paid-up option to make their product more attractive.
- PRE – The policyholder may expect there to be a paid-up option.
- Prevents the need to pay cash out now – beneficial if there is a cashflow problem.

(ii) The paid-up sum assured should be supported by the earned asset share at the date of conversion to paid-up status, on the basis of the expected future experience.

From a profit perspective, the profit expected from the policy after its conversion to paid-up status should be the same as prior to the policy conversion or the same as the expected amount had the policy originally been written on its altered terms.

At later durations, the paid-up sum assured should be consistent with the projected maturity value, allowing for the premiums not received between the date of conversion to paid-up status and the end of the policy term.

The paid-up sum assured should be consistent with surrender values, such that the surrender value offered before and after the conversion to paid-up status are broadly equal.

The conversion to paid-up status can be viewed as the limiting case of a reduction in the sum assured. Hence, apart from any differences in expenses to be incurred, the premium after alteration should approach zero as the sum assured approaches the paid-up sum assured.

The costs of carrying out the alteration should be recovered.

From a practical perspective, the calculations should be straightforward enough that the administration systems can cope and do the calculations automatically.

The methodology used to calculate paid-up sums assured should not change arbitrarily and the paid-up sum assured should not be subject to discontinuities from year to year (e.g. a sudden jump in the paid-up sum assured due to the switch from calculating the paid up sum assured on a retrospective basis to a prospective basis).

The methodology to be used to calculate paid-up sums assured may be specified in regulations or by the local insurance regulator.

The insurer should take into account policyholders' expectations, in the interests of treating customers fairly – the paid-up sum assured should be able to be explainable to the policyholder.

The method used to calculate the paid up sum assured must be capable of being documented clearly.

It is likely that the insurer will take into account competitors' paid-up benefit approach.

If any paid-up terms were included in the original policy these should be taken into account when calculating the paid-up sum assured.

Note from examiners:

Part (i) was generally quite poorly answered with candidates not considering the benefits to the company of the client keeping the policy in force (maintain the relationship, funds under management remaining, cross-selling of other products etc. Part (ii) was generally answered better than part (i) although many candidates missed standard bookwork points.

4 (i) Selling the policy on the secondhand market is an alternative to surrendering the policy to the insurance company. A policyholder is likely to consider doing this if the payment received for the policy on the secondhand market is greater than the surrender value payable by the insurance company (which could encourage lapse and re-entry though the difference in value is unlikely to be sufficiently significant), or if the original policy did not have a surrender value.

The (enhanced) payment is receivable upfront rather than on death and could be used to pay medical bills if ill or pay off any loans, such as a mortgage. By receiving the secondhand market value now the policyholder has reduced the uncertainty over timing and possibly amount of payment.

By selling the policy on the second hand market, the policyholder receives the benefit of the policy rather than his/her beneficiaries. The policyholder may no longer have any beneficiaries so would rather receive the lump sum.
By selling the policy, no future premiums need to be paid by the policyholder, which may be beneficial if the policyholder can no longer afford the premiums.

The policyholder may no longer require the policy due to a change in circumstances.

The entrepreneur may be prepared to pay an enhanced surrender value if the policyholder can provide evidence of ill-health.

(ii) Profitability

- Profitability is dependent on the lump sum paid to the policyholder being lower than the expected present value of the death benefit received less premiums paid and expenses incurred.

- The lump sum should include allowance for a sufficient profit margin given the risks the entrepreneur is willing to take.

- The entrepreneur should take into account the sensitivity of profit to variations in the key risk factors.

- Setting the assumptions to measure the likely profitability of this business will be difficult.

Marketability

- The lump sum paid to the original policyholder to be in line with those offered by the competition i.e. other 2nd hand policy traders.

- The lump sum also has to be competitive when compared to the surrender value that the life insurance company is willing to offer.

Financing Requirements

- There is an issue due to timing differences of income and outgo for the entrepreneur.

- The lump sum payment is paid out to the policyholder on day one, premiums and expenses are then incurred for a period and then the death benefit is received later.

- Cost of financing – the entrepreneur will have to finance the lump sum payment and there will be a cost associated with that use of capital.

- The entrepreneur will need to consider what volume of business he can afford to write – this initial outlay needs to be allowed for in the business plans.

Risk Characteristics

- The primary risk is the mortality of the life assured being lighter than expected.

- Hence underwriting of the life insured is important before determining the size of the lump sum payment.

- Additionally there is a risk that the dependents of the life assured do not inform the entrepreneur of the death of the assured as there may be no

incentive to do so and so the death benefit is received even later than it potentially could be received.

- This could result in the entrepreneur not having sufficient cash flow to pay ongoing premiums and expenses.

- There is also a risk of random fluctuations i.e. death benefits expected to be received from life insurers being lower than expected, due to fewer deaths than expected, simply due to small volumes and random fluctuations in the results.

Systems

- An administration system will have to be set up to pay premiums to the various life insurance companies.

- A system could be built linking to a national database of deaths to ensure the entrepreneur is aware in a timely manner of deaths. [Marks awarded for any sensible suggestion regarding the need for a death recording system.]

Other

- Terms and conditions of the policies purchased could vary between the insurance companies, resulting in potential mis-understanding of policy benefits.

- Any regulatory requirements e.g. an insurable interest in a life insurance policy may be required which the entrepreneur doesn't have.

- The entrepreneur is exposed to the risk of default of the life insurance company.

- The entrepreneur needs to consider the tax implications of setting up this business.

Target Market

- Firstly the entrepreneur need to consider whether there is a big enough target market.

- Then he/she needs to consider who to target, for example could target those in ill health, in need of the income, or alternatively those in good health who wish to cash in their policy.

- The entrepreneur will need to decide how to advertise and market the service to the target market.

Mix of business

- Ideally the entrepreneur will probably want a mix of ages with the aim of having death benefit payments spread. The entrepreneur also needs to consider, if possible, the extent to which insurance companies cross subsidise e.g. by age, policy size etc., since all policies may not be equally profitable from an insurance company perspective, which may impact the payout offered by entrepreneur.

Alternative investments

- The entrepreneur will consider the return available on alternative investments.

- The entrepreneur will also consider the possible strategies for exiting this market e.g. the number of other player and whether likely that would be able to sell the business in a number of years to a competitor.

Note from examiners:

This question was generally poorly answered with many candidates mis-understanding the information provided in the question. Stronger candidates were able to apply bookwork knowledge and thought widely. In part (ii) many candidates did not discuss profitability and how the entrepreneur would make profits, and some failed to describe the mismatch in cashflows that the entrepreneur would experience.

5 (i) Select investments appropriate to the nature, term and currency of its liabilities.

Select investments so as to maximise the overall return on the assets, where overall return includes investment income and capital gains.

The extent to which appropriate investments are departed from in order to maximise the overall return depends on the extent of the company's free assets.

These investment principles can be expressed also as:

The company should invest so as to maximise the overall return on the assets, subject to the risk being taken on being within the financial resources available to it.

(ii) The company will wish to invest in assets that match the nature, term and currency of the liabilities.

The policyholder benefits can be sub-divided into:

- Investment-linked: This consists of the benefits under the unit-linked contract purchased by premiums paid to date (less charges), the amount of which is determined directly by the value of the investments underlying the contracts

  - All death, retirement and withdrawal benefits are defined in terms of the unit fund.

- Guaranteed in terms of an index: Usually include expenses which tend to increase and can be treated as being linked to an index for investment purposes.

Matching investments could be as follows:

Investment-linked

- Invest in assets which are the same or similar to those assets used to determine the benefits.

- If not possible then invest in assets linked to a index which closely matches the performance.

Guaranteed in terms of an index – Expenses

- As the contract is unit-linked a non-unit reserve will be set up for the expected difference between future expenses and future charges received.

- Expenses are likely to increase related to the salary information of the country if they are linked to staff costs, or inflation if they are non-staff costs.

- Charges received will be fund related charges and as such will be dependent on the fund performance.

- Try to match expenses less charges cash flow will be difficult in practice since there are two elements varying at different rates.

- In practice likely to invest in index-linked securities but in their absence assets which provide a "real" return could be purchased.

Annuity in payment – this only becomes a liability at the vesting date if the policyholder doesn't take the open market option.

- If annuity payments are fixed guaranteed amounts, then they will be best matched by fixed interest securities.

- If annuity payments are index linked, then will be best matched by index linked securities.

- The bonds should be of appropriate term and should be in the same currency as the annuity payments.

- There may be practical difficulties, such as difficulties in finding bonds of sufficient duration or lack of availability of index linked bonds.

(iii) Adding the guarantee exposes the company to the risk of adverse movements in interest rates between now at the date the policyholder retires.

If interest rates at the time of retirement are lower than the guaranteed rate then the guaranteed annuity rate may be higher than the prevailing market rate.

A key risk is that the company doesn't charge adequately for the guarantee provided and the risk associated with the provision of the guarantee.

If the charges for the guarantee are specified as a percentage of the fund value, then the company is also introducing a market risk that it is now exposed to.

The guarantee will be attractive to policyholders, and could lead to higher volumes of business and higher volumes could lead to a higher capital strain that the company cannot afford.

The company should review the guaranteed minimum interest rate periodically.

If they don't then there is a risk that customers will select the policy when the guarantee looks attractive (depending on their view of how interest rates may change).

Including a guarantee introduces a competition risk, since there will be a need for the guarantee offered to be at least in line with the guarantees offered by other providers in the market. Failure to do this may lead to a credibility issue for the insurer in this market.

In addition, there is a risk that the charge for the guarantee may make the product uncompetitive which may have a knock-on impact on new business levels.

The onerousness of the guarantee may be increased if policyholders are allowed to pay in additional future premiums into their unit-linked fund that receive the same guarantee.

Onerousness of the guarantee is also increased if fund performance is good since good fund performance will produce a higher unit linked fund with which to buy the annuity, which will lead to larger guaranteed payments.

There is a risk that the company fails to train admin and sales staff regarding the guarantee and also a risk that the admin systems cannot cope with the guarantee.

There is a reputational risk since only the interest rate is guaranteed – the mortality assumption that will be used at the vesting date is not guaranteed. Hence the company could use a very light mortality assumption in determining the annuity amount at the vesting date, leading to the policyholder getting a far lower annuity amount than anticipated, which would lead to poor perceptions about the guarantee and the value for money provided.

Also, although mortality is not guaranteed, improved longevity over time will also increase the onerousness of the guarantee as the annuity payment will be paid for a longer period.

(iv) Now have an additional non-unit liability that has to be matched.

It is not possible to alter the investment strategy during the accumulation period since this is a unit linked contract and the assets should be held that exactly match the unit fund liabilities. The insurer needs to find assets which remove the risk of the guaranteed interest rate between now and the vesting date.

Interest rate derivatives could be purchased which provide a guarantee to the interest rate in the future. [Marks awarded for any other alternative sensible example e.g. swaptions].

There would be a need to keep rebalancing the derivative position over time as interest rates moved. Also need to keep rebalancing as the expected take-up rate at vesting will alter over time as will the expected funds under management at the time of vesting.

There would be a need to charge for the cost of using a derivative programme to meet the interest rate guarantee.

Note from the examiners:

Part (i) was standard bookwork and was answered well.

Part (ii) was mixed with poorer candidates not understanding how unit linked policies work and not able to describe the mismatch between expenses and charges.

Part (iii) was answered poorly with many candidates not stating that the company was exposed to interest rate risk between now and retirement. Stronger candidates considered the risks related to the charge for the guarantee and how this taken. Many candidates did not recognise that the guarantee was a guaranteed interest rate at retirement, rather than a guaranteed monetary amount.

Part (iv) was generally poorly answered. Weaker candidates implied that matching the guarantee with fixed interest assets would be sufficient. A large number of candidates recognised that derivatives would be appropriate. Only a few candidates acknowledged that it was likely that there would be an

additional charge for this matching or that there would be a need to continually rebalance the derivative cover.

6 (i) The risks the company is exposed to are:

Longevity risk

- When pricing the contract the life insurance company will have made an assumption regarding the expected mortality of the annuitants.
- The annuity portfolio may suffer generally lighter mortality than allowed for when the product was priced meaning that the annuitants live for longer and receive more annuity payments than was expected at the outset of the contract.
- In particular underestimating the rate of improvement of life expectancy over time is a significant risk.

Mix of business (mortality risk)

- We are not told whether the company offers unisex annuity rates or different rates for males and females. If the company offers unisex rates, then it is exposed to the risk of the ratio of male to female lives being different to that assumed when setting the annuity rates.
- Generally females tend to live for longer, hence if the life insurance company writes more business for female lives than the proportion assumed when the annuity rates were being set then on average, the annuitants will live for longer than allowed for in the pricing basis.
- We are also not told whether the company offers different annuity rates for smokers and non-smokers. Non-smokers usually exhibit lighter mortality i.e. they live longer, than smokers.
- If the life insurer offers a single set of rates that does not differentiate between smokers and non-smokers and the company sells annuities to a greater proportion of non-smoker's than allowed for in the pricing basis, then the insurer will make a loss on this portfolio.
- This can be exacerbated by anti-selection risk.
- The company may also have allowed for a mix of business by target market / source of business / geographical location, in pricing which it may have mis-estimated.

Expense risk

- The insurer is exposed to the risk of underestimating the general level of expenses that it will incur to administer this business.

- The insurer is also exposed to the risk that it has underestimated the expense inflation that it will suffer from during the life time of the annuitants.

- It is likely that there will be cross-subsidies between large and small policies, and that if the average case size is smaller than assumed during pricing then the life insurer may not be able to recoup all of the expenses related to writing this business.

Volume risk

- The life insurer is exposed to the risk of writing too little business, which may result in any development and marketing costs not being recouped through the expense loadings in the annuities sold.

- The life insurer is also at risk from writing too much business, in which case it may not be able to provide good service to its annuitants e.g. policies may take too long to set up, payments may be made late and so on.

- This would damage the insurer's reputation and may lead to a loss of new business in future years.

- Higher than expected volumes can also cause capital strain, depending on the onerousness of the regulatory regime.

Mismatch risk

- The insurer provides a guaranteed income for life for each annuitant. If the life insurance company chooses to invest the initial premiums received in such a way that there is a mismatch between the assets and liabilities for this contract (e.g. by expected term, nature or currency) or if it is not possible for the life insurer to invest in assets that match the liabilities (e.g. because the outstanding duration of the liabilities is too long and assets of corresponding during are not available) then the insurer is taking an additional mismatch risk for this block of business.

- And there is extra risk if annuity rates are not changed frequently enough in line with movements in the yields of the matching assets that will be purchased.

- There will be extra risk if use corporate bonds due to default risk.

Marketing and competition risk

- Immediate annuities are generally very price sensitive, with a high degree of competition between insurers to gain market share.

- There is a risk that the company may be unable or unwilling to match the premium rates offered by other insurers in the market or that it does not monitor market premium rates pro-actively enough, and hence loses the market share that it has managed to build up over the last 5 years.

- There is also a risk of management pressure leading to the company offering annuity rates that are too high.

- In order to be competitive and maintain market share life insurers may try to offer additional features, such as the guaranteed income of 5% of the initial single premium, for life, included in this product and so in this respect the insurer is aiming to market an attractive product.

- However, if the insurer has marketed the same immediate annuity product for the last 5 years, then its competitors are likely to have copied this feature by now and may be offering more innovative features, making this life insurers product look outdated.

Other risks

- Data problems – in particular, the insurer has only 5 years worth of data which is too short for identifying trends, including delays in notification of death.

- Fraud – deaths not notified by family or fraudulent behaviour by insurers own staff.

- Regulatory change e.g. discrimination legislation could mean having to re-price everything and also could exacerbate anti-selection risk.

- Tax changes – may affect the relative attractiveness of the product.

(ii) Mortality is the most significant assumption – require a prudent valuation and hence not a best estimate assumption, but one that incorporates margins for adverse deviations. Need a prudent estimate of the base mortality plus a prudent estimate of the assumed future mortality improvement rates.

In this case, prudent means a lower percentage of a mortality table for the base table assumption and prudent means a faster rate of improvement in mortality (i.e. lower, slower deaths).

Consider the mix of business – the insurer shouldn't assume that the population all comes from areas with heavier mortality.

The principles also state that the reserves should not be subject to discontinuities arising from arbitrary changes to the valuation basis.

In this case, the life insurer has been writing this business for the last five years and is likely to have set supervisory reserves for this product in previous years. Hence the starting point for setting the mortality assumption should be the assumption made the previous time that supervisory reserves were calculated.

The insurer will look at any mortality experience studies that it has carried out since it last set the supervisory reserve mortality assumption to determine whether the experience suggests that the assumption should be tightened i.e. lighter mortality should be assumed, or whether the mortality assumption can be weakened, by assuming heavier mortality than was assumed previously.

The company has only been writing this business for the last 5 years and hence it has a relatively immature portfolio on which to carry out a mortality experience analysis.

It is also likely that the company wrote a limited amount of business in the first couple of years of writing this business, with its market share gradually increasing. Hence the company is most likely to leave the mortality assumption unchanged from the previous period when it last set the supervisory reserves, unless the limited experience investigations show that mortality has been significantly worse than anticipated for the business on the books.

The insurer will also take into account the extent to which there is a statutory guidance that has to be followed in setting the mortality assumption e.g. regulations may specify the annuitant mortality assumption to be used.

For future mortality improvements, the company is likely to look at external data sources, such as the latest trends shown in academic studies, data from consultancies.

The company may also consult the latest pricing work recently carried out to get the company's latest view on mortality trends.

(iii) A surrender value is not usually offered on annuity contracts due to the significant anti-selection risk that would exist if an insurer were to offer a surrender value.

The most likely policyholders that would contemplate surrendering an annuity product are those who believe that the surrender value they will receive is more than the value of the regular annuity payments they will receive throughout the rest of their lifetime. Such policyholders are likely to be those who e.g. have been diagnosed with a terminal illness, and do not expect to survive for long to continue receiving the annuity payment. This will result in those who are left having a longer life expectancy on average.

In addition, at the outset of the contract, when the insurer receives the single premium payment for the annuity, the insurer will invest all of the single premiums received for a cohort of business, in such a way that it best matches the liability of the regular annuity payments. If the insurer were to allow surrenders, then the pattern of surrenders would be difficult to predict and cashflow matching would be more difficult. In addition, the company may also have to sell assets at a time when asset values are depressed (when it was not expecting to sell assets) in order to pay the surrender values. Hence by not allowing surrenders, the insurance company is limiting the investment risk is would otherwise be exposed to in respect of surrenders.

By not offering a surrender value, the insurance company removes this risk of surrender and re-entry and the customer dissatisfaction that would be likely to occur if it allowed surrenders in this circumstance.

Regulators/the State may want to discourage surrender values from being offered since they may want the annuities to remain in payment.

The life insurer would require underwriting evidence if someone wanted a surrender value – either the policyholder would have to provide documentary evidence of ill-health or the insurer would have to arrange for medical exams etc. – likely to lead to customer dissatisfaction.

Note from the examiners:

Part (i) was generally well answered. Stronger candidates considered the impact of mix of business, whilst weaker candidates suggested that surrenders and withdrawals were a risk on annuity business.

Part (ii) was poorly answered with many candidates stating standard bookwork on mortality investigations which wasn't what the question had asked for. Only a few candidates recognised that a mortality assumption would already exist for this business and that reference should be made to the previous statutory valuation.

Part (iii) was generally poorly answered with many candidates not considering investment issues or adequately explaining the anti-selection risk.

7 (i) Possible reasons why the business levels may have been declining include:

There may have been a number of new entrants entering the market offering aggressive rates in order to obtain market share. Existing competitors may have decided that immediate annuities is a business line of core importance to their strategy and they may have increased the competitiveness of their rates.

All serious players in the annuity market are likely to frequently re-price their annuities and hence the life insurance company in question may be uncompetitive because they have been too slow to react to their competitors' active re-pricing strategies.

There may be increased availability of alternative types of annuities, such as impaired life annuities, offering differentiated rates for smokers etc., which will provide better rates to smokers than a single set of annuity rates based on the total population.

There may also be increased availability of more sophisticated products such as drawdown products that allow the annuity to be drawn down in tranches, rather than locking into a fixed rate on a retirement date.

Competitors may also have launched with profits annuities, resulting in declining sales for traditional immediate annuities.

Company performance on unit-linked/with profits annuities could have been poor, which could lead to potential customers going elsewhere.

There may have been legislative changes meaning that e.g. immediate annuities no longer have to be compulsorily bought at retirement.

There may have been fiscal changes resulting in immediate annuities no longer being attractive from a tax perspective.

The company may be perceived to be financially weak, which especially in the current stock market conditions, may impact business volumes.

The company may have a poor reputation for reliable payment systems or poor customer service, which has impacted on its sales volumes.

The company may generally have been poor at marketing/have spent little on brand awareness, which may have resulted in declining sales.

Competitors may offer better commission levels.

Economic downturn – policyholders may put off retiring, leading to lower volumes.

Economic downturn – volumes may remain the same but fund values have fallen, hence the average case size is now lower, leading to lower overall volumes in production terms.

(ii) A cashflow approach would be preferred as it has the following desirable features:

It enables the company to measure the expected return that the providers of capital will receive.

The sensitivity of the profit to variations in experience can be investigated so that appropriate margins can be determined for the parameter values.

Explicit allowance can be made for the need to set up reserves and meet solvency requirements.

The cashflows can be used to assess the financing requirements for a new annuity contract, by using them to build a model of the expected new business.

By incorporating them into a model of the existing business, the impact of the financing requirement on the company as a whole can be investigated.

Two-dimensional annuity tables can be dealt with when using a cashflow approach, allowing for % of the base table varying by age, and levels of mortality improvements varying by age.

A cashflow approach can more easily cope with complex benefit structures, in particular where benefits depend on future assumptions. This could be useful e.g. if the company was considering introducing with profits annuities.

It is easier to incorporate assumptions that vary over time, including stochastic assumptions, for example, investment return or expense.

The risk discount rate can take account of the term structure of interest rates. Tax can be allowed for more appropriately.

Using the formula approach may be considered too simplistic for a price sensitive product.

(iii) A model can be used to determine immediate annuity rates that will meet the company's profit requirement. A number of model points will be chosen to represent the expected new business under the product. The model points should cover the full range of chosen rating factors for the annuities, e.g. age and sex. Since this is an existing product, the profile of the existing business, modified to allow for any expected changes in the future, can be used to obtain the model points.

For each model point, cashflows would be projected. These would be annuity payments, expenses, investment earnings and allowing for reserves and solvency margin requirements, on the basis of a set of base values for the parameters in the model, e.g. best estimate.

The projected cashflows will then be discounted at a rate of interest, the risk discount rate that allows for the return required by the company, and the level of statistical risk attaching to the cashflows under the product. In theory, a separate risk discount rate should be applied to each separate component of the cashflows, as the statistical risk associated with each component will be different.

The annuity rate for the model point can then be set so as to produce the profit required by the company. The annuity rate produced needs to be considered for marketability. This may lead to reconsideration of e.g. the product design, the distribution channel used, to improve profitability. There will be an iterative process, with the models being rerun once the design of the product and the distribution channels etc. have been reconsidered.

The cashflows in respect of the model points, appropriately scaled up for the expected new business under the product, will be incorporated into a model of the business of the whole company in order to look at the impact on profitability and solvency of selling the product. If capital is a problem then the impact of writing the product will be assessed by looking at the timing and the amount of the cashflows. It is possible for the desired level of profitability to be reached in aggregate, without requiring every individual model point to be profitable in its own right. If certain model points are unprofitable then the aggregate profitability of the business is then exposed to changes in the mix and volume of the product sold.

Once acceptable annuity rates have been determined for the model points, annuity rates for all contract variations can be determined.

The company would carry out sensitivity runs to test the sensitivity of the profits to changes in the main assumptions.

(iv) Rather than re-price the annuity, the company could look at other alternatives to increase new business volumes. These could be:

(a) Alternative distribution channels, where a change in the sales distribution channel may result in a change to the targeted market, or a change to the number of potential customers that are introduced to the product.

(b) Alternative product design e.g. add in capital repayment guarantees or offer impaired life annuities if not already offered or other variations such as unit-linked or with profits annuities.

(c) Alternative products where the company looks at selling alternative products to the immediate annuity. These products might be more attractive than the immediate annuity to the target market.

(d) A targeted marketing campaign where specific groups of individuals are specifically targeted to increase the take up rate of the product.

(e) Promotions, e.g. increased advertising. In particular this could be to counter e.g. any recent adverse publicity due to share price falls or due to perceived financial weakness.

The company could also look to promote its improved customer services with some of its sales channels if it has had a poor reputation for customer service in the past or via "free gifts" or incentives or sponsorship to generate increased brand awareness.

Marketing could be increased on the product to raise awareness in the target market or in the distribution channel used to sell the product.

The insurer could directly target employers with pension schemes.

(f) Lobbying of Government / regulator

If the market as a whole is not very active, then it may be possible for the company to lobby the Government or regulator to change the regulations to improve the competitive nature of the product, by changing the tax rules applying to the benefit received, or premium paid.

(g) Consider using reinsurance (if not using already), or changing existing reinsurance arrangements to improve terms.

Note from examiners:

This question was generally well answered, with parts (ii) and (iii) being standard bookwork questions. Part (i) was generally well answered although many candidates did not fully consider the impact of other annuity products being available in the market.

END OF EXAMINERS' REPORT