

Subject ST2 April 2014 – Questions

Due to syllabus changes, Question 3 part (ii) has been reduced by 5 marks and so the remaining questions in this paper only total 95 marks.

- 1 (i) State the basic equity principle of unit pricing for an internal fund. [1]

A growing life insurance company is actively selling unit-linked products.

- (ii) Explain how such a company would calculate its unit prices. [7]

- (iii) Describe how the company should react if there was a large outflow of money from a particular unit fund. [2]

[Total 10]

- 2 (i) Describe the components of embedded value, and how its calculation may vary for different types of life insurance. [8]

A proprietary life insurance company has written conventional with-profits business within its With-Profits Fund, and has written unit-linked and conventional without-profits business within its Non-Profit Fund. All profits from the Non-Profit Fund are attributed to the shareholder.

Following each annual supervisory valuation, bonuses are declared on the with-profits business and the cost of those bonuses is added to the supervisory reserves. An annual transfer then takes place from the With-Profits Fund to the Non-Profit Fund that is equal to 10% of the supervisory cost of the bonuses declared.

A summary of the annual valuation results is shown below. The assets are shown before any transfers between the Funds have taken place.

Supervisory Reserves (excluding Cost of Bonus)	Conventional With-Profits	40,000
	Conventional Without-Profits	10,000
	Unit-Linked business – unit reserves	30,000
	Unit-Linked business – non-unit reserves	5,000
Cost of Bonus		500
Value of Assets	With-Profits Fund	45,000
	Non-Profit Fund	50,000
Present value of future shareholder profits (after tax)	Conventional With-Profits	1,000
	Conventional Without-Profits	5,000
	Unit-Linked business	15,000

The present value of future shareholder profits for the With-Profits Fund allows for an assumed level of bonus that will gradually distribute the surplus assets in that fund over the lifetime of the policies, but does not include the shareholder transfer due at the valuation date.

The regulatory solvency capital requirement is calculated as 4% of all conventional and non-unit reserves plus 1% of unit reserves.

The market in which the company operates uses two standard metrics when considering life insurance companies:

- the solvency ratio, which is calculated as the supervisory surplus (*ie* net assets) divided by the solvency capital requirement and is presented as a percentage; and
- the embedded value.

(ii) Calculate the two standard metrics as at the valuation date, showing your workings. [6]

The Chief Financial Officer has suggested that the level of prudence in the supervisory reserves could be reduced, given that the solvency requirement means that the company already holds an additional percentage of reserves.

(iii) Discuss this suggestion. [5]

[Total 19]

3 A proprietary life insurance company sells a conventional without-profits endowment assurance product.

When a policy is surrendered, the company pays a surrender value equal to the sum of the premiums paid up to the surrender date.

(i) Explain the extent to which this approach satisfies the general principles for surrender values. [13]

The company also sells a conventional without-profits term assurance product.

A policyholder has held one of these term assurance policies for a number of years and has now requested that it be altered to a conventional without-profits endowment assurance policy for the same outstanding term and the same sum assured. The company has no existing methodology in place for such an alteration.

(ii) Discuss how the company might determine the terms that it could offer for this alteration. [4]

[Total 17]

- 4 (i) State the principles of investment for a life insurance company. [2]
- (ii) Describe, with reasons, an appropriate asset mix for each of the following types of liability:
- Conventional with-profits endowment assurance product, under which profits are distributed using the ‘additions to benefits’ method.
 - Conventional level immediate annuity product for seriously impaired lives. [15]

Extracts from the balance sheets for two life insurance companies A and B are shown in the table below:

Liabilities	Company A	Company B
With-profits liabilities based on net premium valuation	20,000	20,000
Solvency capital requirements	5,000	5,000
Free assets	23,000	2,000
Total liabilities	48,000	27,000
Assets	48,000	27,000
Other information		
Asset shares	30,000	18,000

- (iii) Explain how the investment strategy may differ between the two companies. [6]
[Total 23]

- 5 In a particular country, the market for life insurance products has been contracting over the last few years. The government of the country would like to reverse this trend by encouraging the purchase and sale of life insurance products.

Discuss the potential actions that the government could take in order to do this, including how effective they might be. [26]

END OF PAPER

Subject ST2 April 2014 – Solutions



Overview of the paper

This is an unusual paper in a number of ways. The main one is that it contains only five questions. There has only been one previous paper for this subject with as few questions. A more typical exam paper is made up of six or seven questions.

Perhaps as a result of there being fewer questions, the range of topics examined is not as wide as is often the case. The five questions focus on unit pricing, embedded values, surrender values and alterations, investments and the general business environment.

The first three of these topics are among those that students often find the most difficult. This may make the paper look daunting. However, each of these three questions contains a reasonable proportion of marks for fairly standard bookwork material.

The final question is challenging in a different way, as it is not broken down into parts and is for twenty-six marks. The material in this case is not technically difficult, but this question requires wide-ranging thinking and the generation of lots of ideas in order to score well.

Solution 1



Overview

This question is concerned with unit pricing, which is the subject of Chapter 13. This material was introduced into the syllabus in 2009 and this is the fourth exam question on it.

As a result of the bookwork nature of this question, the potential for ‘additional points’ is likely to be less here than on most other questions.

The Examiners’ Report says that part (i) was answered well by most, but that marks were low in part (iii) as a result of focussing on the cause of the price drop rather than actions or of not relating this to the question of pricing.

(i) **Basic equity principle of unit pricing**

The basic equity principle states that the interests of unit-holders not involved in a unit transaction should be unaffected by that transaction.

(ii) **Calculation of unit prices by a growing company**



As in the first part, good knowledge of the Core Reading will help score all the marks here. Remember the key issues when setting unit prices include:

- *Is the company creating or cancelling units?*
- *Is the unit price calculated on an offer basis or a bid basis? This will determine whether the appropriation or expropriation price should be used.*
- *Whichever pricing basis is being used, both bid and offer prices will be needed.*

As the company is growing and actively selling unit-linked products, it is likely that the company is a net creator of units.

Therefore it should determine unit prices on an offer basis.

An offer basis means that unit prices (both offer and bid) are derived from the appropriation price.

The appropriation price is the amount of money per unit that should be put into the fund for each new unit created, such that the net asset value per unit is the same after as before.

This preserves the interest of the existing unit-holders.

The appropriation price can be calculated as:

- the market offer price value of the assets held by the fund
- plus the expenses that would be incurred in the purchase and any stamp or other duty payable in respect of such a purchase
- plus the value of any current assets, such as cash on deposit or investments sold but not yet settled

- less the value of any current liabilities, such as investments purchased but not yet settled or loans to the fund
- plus any accrued income, such as interest income from fixed-interest securities and deposits, net of any outgo, such as fund charges
- less any allowance for accrued tax, if applicable.

This gives the net asset value of the fund on an 'offer basis'. Dividing by the number of units existing at the valuation date, *ie* before any new units are created, gives the appropriation price.

The appropriation price is the (unrounded) bid price.

An initial charge is added to the appropriation price to give the (unrounded) offer price.

This initial charge may also be referred to as a 'bid / offer spread'.

It is normal to quote bid or offer prices to a certain number of decimal places.

Additional points

The rounding could be done in the company's favour by rounding the offer price up and the bid price down.

However, actual practice varies and there is a trend away from systematic rounding against the customer.

(iii) **Reaction to a large outflow of money from a particular unit fund**



In the previous part we explained offer pricing. This part is essentially asking for a description of bid pricing, but is for far fewer marks. Therefore, good technique will be to focus here on the differences and try not to repeat the details that are the same as in the previous part, eg the full list of adjustments in the calculation of appropriation and expropriation prices.

As the outflow of money is large, it is likely that the company will switch to a position of cancelling units.

Therefore it should determine unit prices on a bid basis.

A bid basis means that unit prices (both offer and bid) are derived from the expropriation price.

The expropriation price can be calculated as:

- the market *bid* price value of the assets held by the fund
- *minus* the expenses that would be incurred in *selling the assets*
- other adjustments similar to the appropriation price.

Additional points

If the outflow of money from the fund was a one-off, the company would then switch back to an offer basis.

Alternatively, the company might use a ‘management box’ (ie create more units in the fund than are needed to meet policyholders’ liabilities) to avoid having to temporarily switch to a bid basis.

The company could consider whether the fund was still large enough to be viable after the large outflow of money.

Solution 2



Overview

This is a long question, mainly about embedded values. Embedded values are quite a tricky concept, especially when they relate to with-profits business, and so this looks like a potentially tricky question. However, on closer inspection:

- *the first part is bookwork, with no application to any question-specifics required*
- *the second part is a calculation that is specified in full in the question*
- *the third part moves away from the topic of embedded values to a more standard question about prudence in supervisory reserves.*

Relevant parts of the course are Chapter 18, Section 2 for parts (i) and (ii), and Chapter 20, Section 3 for part (iii).

(i) **Embedded value (EV) components and calculation**



As this part is bookwork, the answer that follows is very closely related to the Core Reading on this topic. The with-profits aspects of embedded values are probably the toughest. Subject SA2 covers embedded value, and in particular the issues in relation to with-profits business, in greater detail and so students who have studied SA2 may have found this question part slightly easier. However, this additional detail is not required to score full marks here.

It is possible to use of some of the information provided later in the question, describing the numerical embedded value calculation for a particular company, as a prompt for part (i). For example, the mention of ‘present value of future shareholder profits’ later in the question may be a reminder that they are a component of an EV. It may even go further than this and prompt a reminder that the future shareholder profits are determined differently for with-profits business.

Components of EV

Embedded value is the present value of future shareholder profits in respect of the existing business of a company, including the release of shareholder-owned net assets.

It can be calculated as the sum of:

- The shareholder-owned share of net assets, where net assets are defined as the excess of assets held over those required to meet liabilities.

These assets may be valued at market value or may be discounted to reflect 'lock-in', for example if they are required to be retained within the fund to cover solvency capital requirements.

- The present value of future shareholder profits arising on existing business.

The calculation of future profits may differ for different types of business. For example:

- For conventional without-profits business, future profits at each future time are premiums + investment income – claims – expenses + release of solvency reserves.
- For unit-linked business, future profits are charges (including surrender penalties) – expenses – benefits in excess of the unit fund + investment income earned on non-unit reserves + release of non-unit reserves.
- For with-profits business: the future profits are future shareholder transfers, for example as generated by bonus declarations.

Additional points

For conventional without-profits business and unit-linked business, embedded value is effectively the release of any margins within the solvency reserves relative to the assumptions used within the embedded value calculation.

The assumptions used are likely to be prudent for the solvency reserves and realistic for the profit projections.

In the calculation of net assets, it is important that the reserves used are consistent with those used in the determination of the present value of future profits.

This may be different for different types of business. For example:

- For conventional without-profits and unit-linked business, the reserves may be taken to be the solvency reserves
- For conventional with-profits business, the reserves may be taken to be the amount supporting the future bonus declarations. There are different ways in which this can be determined, *eg* based on asset shares or such as to gradually distribute the estate.

The proportion of the net assets which is shareholder-owned is also likely to differ for different types of business.

Tax is allowed for within the calculation as appropriate.

(ii) **Calculation of solvency ratio and embedded value**

The usual advice about exam calculation questions applies here, ie explain the calculation and show the workings. The latter is particularly important in this question given that the examiners explicitly ask for workings to be shown. Even if the final answers are correct, marks could still be lost if workings are not shown, and it will also ensure maximisation of score in the event of any mistakes or numerical slips.

There are no 'Additional points' for this part given that it's a calculation question.

Solvency ratio

$$\text{Solvency ratio} = \frac{\text{net assets}}{\text{solvency capital requirement}}$$



The solvency capital requirement part of this formula is defined in the question.

The term 'net assets' is not explicitly defined, so is open to some interpretation. Calculating net assets as 'assets net of supervisory reserves' is the most likely definition and is the one we have used below (and the one that is used in the Examiners' Report). The question clearly states that the with-profits reserves exclude the cost of bonus, but also that the cost of bonus is then added to the reserve. We therefore need to add it when summing the reserves.

$$\text{Solvency ratio} = \frac{\text{assets} - \text{supervisory reserves}}{\text{regulatory solvency capital requirement}}$$

$$\begin{aligned} \text{Assets} &= \text{Assets in With-Profits Fund} + \text{Assets in Non-Profit Fund} \\ &= 45,000 + 50,000 \\ &= 95,000 \end{aligned}$$

$$\begin{aligned} \text{Supervisory reserves} &= \text{conventional with-profits reserves} + \text{cost of bonus} \\ &\quad + \text{conventional without-profits reserves} \\ &\quad + \text{unit-linked business unit and non-unit reserves} \\ &= 40,000 + 500 + 10,000 + 30,000 + 5,000 \\ &= 85,500 \end{aligned}$$

$$\begin{aligned} \text{Regulatory solvency capital requirement} &= 4\% \text{ of conventional and non-unit reserves} \\ &\quad + 1\% \text{ of unit reserves} \\ &= .04 \times (40,000 + 500 + 10,000 + 5,000) + .01 \times 30,000 \\ &= 2,520 \end{aligned}$$

So:

$$\begin{aligned}\text{Solvency ratio} &= \frac{95,000 - 85,500}{2,520} \\ &= 377\%\end{aligned}$$

Embedded value (EV)

EV = present value of future shareholder profits + shareholder-owned net assets

Present value of future shareholder profits = 1,000 + 5,000 + 15,000 = 21,000

Shareholder transfer due at the valuation date in respect of with-profits business

$$= 50 \text{ (10\% of 500)}$$

Shareholder-owned net assets = Assets in Non-Profit Fund – without-profits reserves
– unit-linked reserves

$$= 50,000 - 10,000 - 30,000 - 5,000 = 5,000$$



The shareholder-owned net assets relate only to the Non-Profit Fund. There are no net assets in the With-Profits Fund in this case because the determination of the future shareholder profits from this fund has assumed that the surplus assets will be distributed as bonus over the lifetime of the policies.

$$\begin{aligned}\text{EV} &= 21,000 + 50 + 5,000 \\ &= 26,050\end{aligned}$$

(iii) **Suggestion to reduce the level of prudence in the supervisory reserves**



The instruction word ‘discuss’ should encourage consideration of both the positive and negative aspects of the suggestion, rather than restricting the answer to entirely agreeing or disagreeing. Consider why both prudent reserves and an additional solvency capital requirement are usually held and the relationship between the two. Also think about any relevant reserving principles and how these could be incorporated into the discussion.

It is usual for regulators to require that a life insurance company maintains at least a specified level of solvency capital.

This solvency capital requirement (SCR) can be seen as providing an additional level of protection to policyholders.

Thus, in considering the adequacy of the reserves that have been set up, it is important to do this within the context of the solvency capital requirements and not in isolation.

So, the Chief Financial Officer (CFO) is correct that the level of prudence in the supervisory reserves and the solvency capital requirement should be considered together.

However, it may not be the case that the level of prudence in the reserves should be reduced.

This would reduce the level of protection for policyholders.

Although it would free up more insurance company capital which would allow, for example, more investment freedom.

The extent to which the prudence in the supervisory reserves may be reduced, depends on how prudent they are to start with:

- If the reserves are already at the minimum level required by the regulator, they cannot be reduced.
- If they contain excessive prudence, then it might be appropriate to reduce them.

Because the SCR is calculated as a percentage of supervisory reserves, reducing the prudence in the reserves will also reduce the size of the SCR.

Generally, lower levels of prudence in supervisory reserves are appropriate when the SCR requirements are relatively onerous and are risk-based, *ie* reflect the particular risks that an individual company faces.

This typically happens when the SCR is determined using risk-based capital techniques, rather than as a simple percentage of the supervisory reserves.

Additional points

In addition to complying with regulatory requirements, the calculation of the reserves should:

- consider any local professional guidance
- avoid arbitrary changes in basis
- ensure that any changes in basis are justified based on analysis.

The following points make use of the specific information provided in this question:

- In this case the solvency capital requirement (SCR) does not necessarily adequately reflect the risks borne by the company for each type of business.
- The 1% of unit reserves part of the SCR will move in line with unit prices, which would not necessarily reflect the risks to the company associated with unit-linked business ...
- ... *eg* at times of low unit prices, the risk of future fund-related charges failing to cover expenses may be high, and yet the SCR will be low.
- The 4% of non-linked liabilities part of the SCR implies the risks for with-profits business are similar to those of the without-profits business. This is not necessarily true ...
- ... *eg* without-profits business risks are largely retained by the company whereas the with-profits business risks are split between the company and the policyholders.
- The figures suggest the company has a healthy capital position and so there is little incentive to reduce prudence to free up available capital.

Solution 3



Overview

This question is about surrender values and alterations.

The first part examines the principles of setting surrender values for conventional without-profits policies and how well a particular method of calculation meets these principles. This type of question has been asked before and so practising past papers would hopefully have been a help here. The relevant part of the course is Chapter 21, Section 2.

The second part is about alteration methods, as described in Chapter 22. There have been shorter questions of a more standard bookwork type on the methods before. This one is a little longer and requires some application to a particular alteration, making it more difficult and probably one of the hardest questions on this particular paper.

The Examiners reported that good marks were often scored in part (i) with highest marks for candidates who logically outlined each principle and commented whether the suggested method met each one. Candidates struggled with part (ii) and apparently few recognised that a term assurance would not generally have a surrender value.

(i) **Principles for determining surrender values**



The answer below takes the approach of stating each of the surrender value principles given in Chapter 21, and then explaining whether or not the approach meets the principle.

Although this may get a little repetitive, this sort of systematic approach is a good one to avoid missing out on easy marks in the exam.

This question also demonstrates that we should state the 'obvious'. For example, having stated that 'capable of being easily documented' is a principle, it might seem obvious that the method meets this principle. However, unless we explicitly write this down, the examiner is unable to give us any credit for thinking it.

Surrender values should:

- take into account policyholders' reasonable expectations (PRE)
- at early durations, not appear too low compared with premiums paid, taking into account any projections given at new business stage
- at later durations, be consistent with projected maturity values.

Paying a surrender value equal to the sum of the premiums paid to date should meet PRE at early durations (provided it is not out of line with previous projections given).

At later durations it is unlikely to be consistent with projected maturity values. Maturity values will typically be higher than total premium paid due to the investment returns earned during the term of the policy (although they will be made by lower by expenses, the cost of cover and the company's profit).

Surrender values should treat both surrendering and continuing policyholders equitably.

This is unlikely to be achieved if late surrenders receive considerably less than those maturing shortly afterwards.

Surrender values should not exceed asset shares, in aggregate, over a reasonable time period.

This surrender value approach will over pay on surrender early in the policy term (due to impact of the initial expenses on asset shares) ...

... and under pay towards the end of the policy term.

The surrender values should produce a fair contribution to company profit.

This objective may be difficult to meet, since profits made may be excessive for surrenders at later periods and losses may be made on surrenders at early periods.



The explanation for this is the same as that for early and late asset shares. There is no need to repeat it here.

Surrender values should take account of surrender values offered by competitors (and possibly also auction values, where available). It is not possible to say whether this principle is met without knowing about surrender values offered in the market.

Auction values are often determined prospectively and so the surrender value may not be consistent with these, especially late in the policy term.

Paying a surrender value equal to the sum of the premiums paid to date will meet the following general principles:

- not subject to frequent change, unless dictated by financial conditions
- not subject to significant discontinuities by duration
- not complicated to calculate
- capable of being documented clearly.

Overall, despite satisfying some of the principles, the approach is unlikely to be a suitable one as it fails to meet some of the most important principles.

Additional points

This approach could give a lapse and re-entry risk at early durations.

Whether it meets the principle that surrender values should not exceed asset shares, in aggregate will:

- depend on lapse rates over time
- be difficult for the company to manage actively ...
- ... particularly since such an approach to surrender values would be more likely to encourage early surrenders and discourage late surrenders.

As this is a without-profits contract, the terms offered to surrendering policyholders do not directly affect the continuing policyholders.

However, the premiums for the product might be greater than they would otherwise have been, to allow for the high cost of early surrenders.

(ii) **How to determine the alteration terms**



This part of the course (on methods of alteration) has altered since 2015, with the effect of removing from the syllabus a number of alternative alteration methods that would have been included in the solution when the exam was originally sat. The solution below has therefore been amended to make it suitable for the current syllabus, and the marks available for the question have also been reduced accordingly.

The main method to include will be the 'equating policy values' method, which should be explained fully.

However, it is important to be aware that term assurances, generally, do not pay surrender values, due to the very small reserves built up. So, if we calculate an alteration by equating policy values, we would be treating the alteration more generously than we probably would do on surrender. So we could discuss alternative terms in which the policyholder obtains similar credit for the existing policy to date as they would for a surrender (ie zero value), which implies that the revised terms would be (in principle) equivalent to the policyholder simply starting a new endowment policy taken out at the alteration date.

General

The costs associated with carrying out the alteration would be allowed for.

Equating policy values

The company could use the method of equating policy values, where the value of the contract before alteration, on a prospective or retrospective basis, can be equated to a prospective value after alteration that takes into account the requested changes to the terms of the contract.

This method recognises some value from the original contract and uses this to reduce the premium that would otherwise be charged for the post-alteration endowment assurance contract.

The method and basis chosen for the before and after alteration values will affect the amount of profit the company takes from the contract at the alteration date and the amount of profit it expects after the alteration date.

Charge usual premium for new contract

The term assurance has a surrender value of zero, so it might be appropriate to assume the existing policy has no current value.

The company could therefore charge the usual premium as for a new endowment contract.

This may be subject to some discounts, eg to reflect the lower costs of altering the policy compared to selling a new policy.

Additional points

The following possible points relate to *equating policy values*:

- The current premium basis could be used to value the policy after alteration. This would incorporate normal profit margins for the 'after alteration' policy (*ie* the endowment assurance).
- A basis that retains the profit accrued to date could be used to value the pre-alteration policy (*ie* the term assurance).
- It may be too harsh to the customer to take both the normal expected profit from the endowment assurance and the total expected profit from the term assurance.

Solution 4



Overview

This question is about investment, as covered in Chapter 28 of the course. Part (i) is very familiar bookwork covering the principles of investment. Part (ii) is an application of these principles to two particular contracts. Part (iii) is another application, this one explaining how investment strategy might differ between two companies with different balance sheets.

Investment is a topic that is regularly examined and questions on this topic are often best tackled using similar techniques, such as adopting a 'nature, term, currency' structure to describing liabilities. It's definitely worth practising investment questions until consistently scoring well on them.

(i) Principles of investment for a life insurance company



Perhaps the most commonly asked short question ever in this subject, so there should be no problems. The principles of investment are stated in two ways in Chapter 28 and either of these statements would get full credit.

In order to minimise risk, a company should select investments that are appropriate to the nature, term and currency of the liabilities.

The investments should also be selected so as to maximise the overall return on the assets, where overall return includes both investment income and capital gains.

The extent to which the appropriate investments referred to above may be departed from in order to maximise the overall return will depend, amongst other things, on the extent of the company's free assets and the company's appetite for risk.



These 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.

Writing the principles in this way is an alternative way to score the 2 marks on offer for this part.

(ii) **Appropriate asset mixes**



Part (i) has reminded us that we should describe matching the liabilities, and also the possibility of mismatching in pursuit of higher returns.

For matching the liabilities, remember from Chapter 28 that benefits can be classified according to type:

- *guaranteed in money terms*
- *guaranteed in terms of an index*
- *discretionary*
- *investment-linked.*

For each type we can then consider the term and currency and suggest suitable matching assets.

Conventional with-profits endowment assurance product

An appropriate asset mix should reflect the nature, term and currency of the liabilities.

The benefit liabilities have a part guaranteed in monetary terms (relating to the sum assured and past reversionary bonuses) ...

... and a discretionary part (relating to future reversionary bonuses and terminal bonus).

The future reversionary bonus in particular is not entirely discretionary as it must comply with PRE.

The benefit liabilities are medium- to long-term and are likely to be in the domestic currency.

A good match for the guaranteed benefits will be fixed-interest bonds of appropriate terms. Government bonds are likely to be the lowest risk, but corporate bonds with an appropriate credit rating may also be used to seek higher returns.

In relation to the discretionary benefits, the main aim of the company will be to maximise the bonuses and hence the investment strategy should therefore also aim to do that. This means investing in assets that will produce the highest expected return.

Although this is broadly true, an important consideration here is the expectations of policyholders and their attitude to risk.

The recipients of the discretionary benefits will usually expect the proceeds of their contracts to maintain their value in real terms. Hence the assets recommended should be those that are expected to provide a real return, for example equities and possibly property.

There is some uncertainty about the timings of the liability outgo, in particular relating to the death and surrender benefits. Therefore, the company may invest a proportion of its assets to provide some liquidity, for example by holding a proportion as cash.

Conventional level immediate annuity product for seriously impaired lives

Under this contract, the benefit outgo is fixed (*ie* guaranteed in monetary terms).

Therefore the majority of the matching assets will be invested in fixed-interest securities.

The fact that the lives involved are seriously impaired means that the liability outgo is likely to have a much shorter term than that for standard annuities.

Therefore, bonds of appropriately short term should be chosen.

The annuities market may be very competitively priced in some markets and so the margins for profitability may be very tight.

Therefore, the insurer may choose to invest in a variety of high quality corporate bonds (*eg* by investing in corporate bonds where the companies are of appropriate credit ratings) as these will have higher yields than government bonds.

Corporate bonds may also be used if government bonds of appropriate term are not available.

The expenses of administering the contract will be real in nature, hence it may be appropriate to invest some assets in index-linked bonds or equities.

Additional points

Additional points that could be made about the with-profits endowment assurance:

- PRE as to an appropriate asset mix will come from what has been described in literature ...
- ... and the company's past practice ...
- ... and the asset mix held by competitors.
- It will also depend on the mix between reversionary and terminal bonus.
- An appropriate mix depends on the relationship between asset shares and guarantees ...
- ... and the extent of any free estate.
- The higher the free estate, the more freedom the company has to mismatch the guarantees ...
- ... and invest more in real assets.
- The asset mix may also include some derivatives to hedge the guarantees.

Additional points that could be made about the impaired lives annuity:

- The term of the liability depends on the degree of impairment.
- Regular income from the chosen assets is required to pay the annuity outgo.
- Corporate bonds have a higher risk of default than government bonds.
- The proportion of corporate bonds will depend on the level of free assets.

Additional points that could be made about either or both products:

- The assets held will be in the same currencies as the liabilities.
- Consider diversification of assets held.
- Consider any regulatory restrictions, eg limits on bonds from the same issuer.

(iii) **Possible investment strategy differences between companies**



This part is about how the investment strategy of two companies may differ. We are given some balance sheet information from the two companies. A logical place to start is to see how the two are similar and where they differ.

The two companies have the same figures for with-profits reserves and solvency capital requirements. The two major differences between the figures for the companies are: Company A has higher assets and higher asset shares. A good answer should comment on both of these aspects.

Companies A and B have the same level of with-profits liabilities and solvency capital requirements.

Assets

Company A has a much higher level of assets and so much higher free assets.

$$\text{SCR coverage of Company A} = \frac{(48,000 - 20,000)}{5,000} = 5.6 \times$$

$$\text{SCR coverage of Company B} = \frac{(27,000 - 20,000)}{5,000} = 1.4 \times$$



An alternative calculation would also score the marks here – the crucial point of exam technique is to make good use of the figures somehow. We chose to calculate a solvency ratio, partly because the examiners had used this measure in an earlier question on this exam paper (Question 2).

An example of a suitable alternative calculation, which was shown in the Examiners' Report, is the free asset ratio:

$$\text{Free asset ratio for Company A} = \frac{23,000}{48,000} = 48\%$$

$$\text{Free asset ratio for Company B} = \frac{2,000}{27,000} = 7\%$$

The existence of free assets in Company A means that it can depart further from matching its liabilities so as to improve the overall return on its assets and thereby benefit its policyholders, through higher bonuses, and its shareholders (if any), through higher dividends.

So Company A may invest more in those assets with the highest expected return (and also the highest variance of return) such as equity or property.

Company A may also have a higher proportion of corporate bonds in its fixed-interest holdings.

With its lower level of free assets, Company B is likely to more closely match its liabilities.

Asset shares

The asset shares of Company A are much higher above the reserves than are those of Company B.

This increases the investment freedom of Company A.

Assuming both companies are targeting a similar percentage of asset shares at payout, this suggests that Company A is paying more terminal bonus than Company B.

This too is likely to mean that the investment strategy of Company A is more heavily weighted towards real assets such as equities and property than is that of Company B.

Additional points

Company A's greater free assets and greater scope to move away from a matched position give it more scope for diversification.

This is with-profits business and so Company B's policyholders may still have an expectation that some of their assets will be invested in equities.

To enable it to gain equity exposure, Company B may therefore use derivatives to hedge the guarantees, *eg* protect against equity falls.

The guarantees of a with-profits policy will be in-the-money when the guaranteed benefits (sum assured plus past reversionary bonuses) are greater than the asset share. Company B's guarantees are likely to be heavily in the money.

Given the high level of guarantees, Company B may also be cashflow matching, which would mean careful monitoring of the asset and liability movements.

In addition, Company B may therefore be holding the fixed-interest assets to maturity whereas Company A may have a more active trading strategy for its fixed-interest portfolio.

Solution 5



Overview

This question is certainly unusual. Whilst the content isn't technically demanding, such a long question, not broken down into smaller parts, is unprecedented in this exam subject. This in itself is likely to have made this a daunting prospect in the exam room.

Added to this, there is very little specific detail given in the question, which is made up of just three sentences. Where there are specific details, these can often be used to generate points for the answer. Obviously, we're going to have to rely on other sources of ideas to generate the marks in this case.

It's worth remembering some general advice on tackling such long, open questions. 26 marks equates to approximately 45 minutes of the three hours of exam time. That's a significant amount and producing a better answer is more likely if some of that time is spent planning before starting to write the answer. Doing some of the planning for this answer during the reading time could also have been a good use of the reading time for this particular paper.

Good actions to take during the planning stage include:

- *idea generating – a wide range of ideas (rather than lots of depth on one or two main ideas) is needed to score well here, so use lots of different idea generating techniques*
- *considering what to write for each idea.*

Idea generation

Possible ways of generating as full a set of ideas as possible for this question include deliberately pausing to consider which material from the course might be relevant. Several parts of the general business environment chapters (Chapters 8 and 9) could give ideas here: eg distribution channels and sales methods, the economic environment, the regulatory environment and the taxation regime. The government can potentially take actions in all of these areas.

The eight common regulatory restrictions in Chapter 9 are particularly useful here:

- *contract types*
- *premium rates or charges*
- *rating factors*
- *terms and conditions*
- *sales channels and processes*
- *underwriting*
- *reserving and solvency capital requirements*
- *investment.*

If this list is difficult to remember, then thinking through the chapter headings more generally and/or going through all the different activities an insurance company undertakes might help. For each one, consider whether the government has any influence and how this could be changed.

Real life experience may also help in generating ideas. For example, consider government actions to increase information to customers, or to restrict the use of certain rating factors.

Thinking practically will also help: why might customers not be buying insurance? It might be lack of information or the high cost, for example. What could the government do about these things?

Writing the answer

Having generated ideas, consider what and how much to write for each potential action. The instruction is to 'discuss ... including how effective they might be', so be absolutely systematic about saying something about the likely effectiveness for every action. It's easy to forget to do this, particularly further into writing the answer, but these are relatively easy marks to pick up, so don't miss out on them.

Tax

The tax regime for life insurance products could be changed. This could be done in two places:

- changing how insurance companies are taxed
- changing how individuals are taxed (eg increasing tax relief on premiums and/or reducing the tax payable on benefits received).

The effectiveness of changing insurance company tax in boosting sales depends on:

- the extent to which the cost of life insurance products was the cause of low sales
- the extent to which companies pass on the advantage to customers *via* lower premiums.

Improving the tax advantages of life insurance products is likely to be effective. Using available tax breaks is often a priority of customers who can afford to use them and the tax breaks may be used in marketing messages of companies and advisers.

This will however depend on the taxation of life insurance compared to similar, competing products, *eg* unit trusts and other savings vehicles.

Compulsion



There may be some real-life experience that could help here, eg the UK government announcing the removal of any compulsion to buy an annuity with pensions savings and the introduction of auto-enrolment into a workplace pension.

The government could introduce elements of compulsion to purchase insurance products, *eg*

- require employers to purchase a pension savings product for each employee
- require an annuity to be purchased with the proceeds of pension savings
- require individuals to take out life cover for any mortgage borrowing.

From a company's point of view, large customer numbers may help with economies of scale (helping to keep costs down) provided the company can achieve sufficient market share.

However, the premiums chargeable are also likely to be low in order to be affordable to the customers compelled to buy the product.

This is likely to be effective for products and circumstances where it is justifiable, but there may only be a limited number of products / circumstances (as a reasonably high proportion of customers may not want or be able to afford the insurance).

A less extreme approach than compulsion would be to rely on customer inertia, *eg* enabling employees to automatically be enrolled to various insurance products unless they took the deliberate step of opting out.

Encourage product innovation and new product designs

The government could remove restrictions on the types of products that could be offered.

This may enable product innovation, *eg* launching products that have been sold successfully in other countries.

This may be effective in increasing sales if the new products meet customer needs that existing products do not meet.

Distribution channels and the selling process

The government could increase insurance companies' freedom to sell, *eg* by allowing the use of multiple distribution channels.

This may be effective if it improves customer access to insurance products.

The government could also change the rules about the information insurance companies provide to customers at the point of sale.

This may be effective if it was a lack of information (or too much information) that was preventing customers from buying insurance products.

Investment freedom

The government could reduce the investment restrictions on insurance companies.

This may enable them to invest in more risky assets with higher expected returns.

This may be effective in improving sales if these higher returns are passed on to customers through lower premiums and if high premiums had been a cause of the decline in sales.

Premium or charge caps

The government could introduce measures to make products cheaper, *eg* by introducing charge caps.

This is likely to be effective if the problem is that insurance is too expensive for customers. It could be especially effective for certain customers (*eg* those with less disposable income) and certain products.

Its effectiveness could be limited if it led insurance companies to withdraw from the market (if charge caps made products unprofitable to sell) and so reduced the availability of certain insurance products.

Rating factors



This is another point for which real-life experience may help: following a European Court of Justice decision, EU insurance companies are no longer able to use gender as a rating factor.

The government may relax the use of certain rating factors, *eg* gender, family medical history.

This may be effective if it improved the ability of insurance companies to rate fairly and lead to lower prices on average (as companies had less need for prudence in the pricing given they no longer have to allow for the uncertainty about cross-subsidies resulting from the mix of business).

Using more rating factors would result in insurance companies dividing customers into more groups for pricing purposes.

Some groups will gain and some will lose out from such a change, *eg* allowing gender as a rating factor would make annuities more attractive to males and less attractive to females.

The move is therefore likely to be effective in promoting more purchases from the groups that benefit from lower premiums, but could change the mix of policyholders.

Underwriting

The government could relax restrictions on the ability of insurance companies to underwrite products.

For example, insurers could be allowed to use genetic test results or allow them to decline policyholders with certain medical conditions.

This tighter underwriting is likely to be effective in reducing premiums and so increasing sales.

Reserving and capital requirements

The government could relax the regulations about the reserves and solvency capital that insurance companies are required to hold to demonstrate solvency.

This may increase sales, particularly as products with marketable features, *eg* with more guarantees, may be especially capital-intensive.

Additional points

The potential actions will depend on the cause of the decline in sales. For example, it could be caused by:

- a lack of suitable products
- a lack of insurance companies
- customers not being aware of or willing to buy products
- poor economic conditions in the country reducing consumers' level of wealth.

In several of the areas covered, an action could be proposed 'the opposite way round'. For example:

- Underwriting restrictions could be *increased*. This may lead to simpler underwriting, and may be effective in increasing sales if underwriting processes are deterring potential customers. However, its effectiveness could be reduced by the fact that less underwriting may lead to worse mortality experience and so higher premiums.
- Premium or charge caps could be *reduced* or *removed*. This may result in higher premiums or charges which may increase sales if the decline was due to products being unprofitable for insurance companies to sell.
- Reserving and capital requirements could be made *more* demanding. This may be effective if it improved customer confidence in the financial system and in financial institutions, *eg* that insurance companies will hold adequate capital and not take excessive risks. However, it may also lead to increased premiums and charges and limit the range of product designs and insurance companies competing in the market.

Commission

The government could remove restrictions on the levels of commission that are allowed to be paid.

This may be effective in boosting sales by incentivising advisers to sell.

However, this higher commission is likely to be paid for by customers.

Any additional policies sold due to this type of incentive could be more likely to lapse and there is a greater risk of customers being sold products they don't really need.



A commission action could also be proposed the opposite way round, ie lower commission reducing premiums and so potentially increasing sales.

Subsidies

The government could subsidise life insurance products directly, *eg* by providing a subsidy to an insurance company for each policy sold.

This would increase the policies' profitability to the company and so this could be effective if the cause of declining sales was the unprofitability of the products to the insurers.

However, if it was the high cost of insurance that caused the declining sales, subsidies would only be effective if insurance companies passed the benefit of the subsidies onto the customer through lower premiums or charges.

Education / advertising

The government could look to boost sales by being a trusted source of information on the need for insurance, *eg* it could run government media campaigns on the importance of pension savings or of providing for dependants.

These would be effective if it was lack of awareness or information (rather than high cost) that was the problem.

State benefits

The government could reduce the level of State benefits, *eg* State pension.

This may be effective in boosting insurance sales of certain products provided sufficient customers made private provision as a replacement.

Promote competition in the market for life insurance products

The government could try and increase the amount of competition, for example by improving transparency of costs and comparability between providers, or by reducing barriers to entry, *eg* allowing more overseas insurance companies or implementing anti-monopoly legislation.

Help insurance companies

The government could take actions to help insurance companies, *eg* providing them with grants or assisting in the collation of life insurance data to aid product pricing.

General economic environment

If the contraction in life insurance sales has been a result of poor economic conditions, such as lower levels of disposable income and job security, then any actions the government takes to improve the general economy should help increase sales.

Other actions

The government could:

- provide free financial advice
- be guarantor for an insolvency scheme and so increase customer confidence.

The hints start on the next page so that you can separate the solutions and hints.

April 2014 – ActEd's Hints

Question 1

- (ii) Explaining how to calculate unit prices is largely bookwork, but remember to make use of the fact that the company is *growing* to tailor the answer to a company pricing on an offer basis.
- (iii) A large outflow of money may lead to a contraction of the fund. Consider whether the company should change its unit pricing basis.

Question 2

- (i) Embedded values have two components:
 - the present value of future shareholder profits in respect of the existing business
 - the shareholder-owned net assets.

Consider how 'shareholders profits' and 'shareholder-owned net assets' should be defined for the different types of life insurance.

- (iii) Consider both the positive and negative aspects of the CFO's suggestion. Think about the constraints that there might be on the company reducing the level of prudence in its reserves.

Question 3

- (i) The general principles for surrender values include that they should:
 - take into account PRE
 - treat both surrendering and continuing policyholders equitably
 - at early durations, not appear too low compared with premiums paid
 - at later durations, be consistent with projected maturity values
 - not exceed earned asset shares, in aggregate, over a reasonable time period
 - take account of surrender values offered by competitors
 - not be subject to frequent change
 - not be subject to significant discontinuities by duration
 - not be excessively complicated to calculate
 - be capable of being documented clearly.

Assess the method described against each of these principles in turn.

- (ii) Describe the 'equating policy values' method. Also consider an alternative approach where the current policy is credited with a zero value at the alteration date. Comment on the suitability of the alternatives for this particular alteration.

Question 4

- (ii) For each contract, break down the components of the liability by type, *eg* guaranteed in monetary terms. Describe suitable assets to match each component. Comment on how the company might mismatch in pursuit of higher expected returns.

Question 5

The eight common regulatory restrictions are particularly useful here, *ie* contract types, premium rate or charges, rating factors *etc.* Consider how the government could take action in relation to each of these in order to boost sales.

Also consider other aspects of the general business environment that the government controls or can influence, *eg* taxation, economic conditions, distribution of insurance products.