

INSTITUTE AND FACULTY OF ACTUARIES

EXAMINERS' REPORT

April 2014 examinations

Subject ST2 – Life Insurance Specialist Technical

Introduction

The Examiners' Report is written by the Principal Examiner with the aim of helping candidates, both those who are sitting the examination for the first time and using past papers as a revision aid and also those who have previously failed the subject.

The Examiners are charged by Council with examining the published syllabus. The Examiners have access to the Core Reading, which is designed to interpret the syllabus, and will generally base questions around it but are not required to examine the content of Core Reading specifically or exclusively.

For numerical questions the Examiners' preferred approach to the solution is reproduced in this report; other valid approaches are given appropriate credit. For essay-style questions, particularly the open-ended questions in the later subjects, the report may contain more points than the Examiners will expect from a solution that scores full marks.

The report is written based on the legislative and regulatory context pertaining to the date that the examination was set. Candidates should take into account the possibility that circumstances may have changed if using these reports for revision.

D C Bowie
Chairman of the Board of Examiners

July 2014

General comments on Subject ST2

The Examiners' Report covers more points than would be expected to get full marks. This is so that alternative approaches to questions by different candidates can be accommodated within the marking scheme. Candidates are expected to show knowledge of the relevant content of the Core Reading, but those who tailor their answer to the specifics mentioned in the question will score more highly than those who answer in a more generic way.

Comments on the April 2014 paper

As with previous papers, questions that focussed on knowledge of the Core Reading were well answered. In some questions, candidates tended to only list factors to consider rather than applying them specifically to the particular situation, for example question 3. Similarly, where questions required candidates to think more widely, candidates often did not develop responses to the required depth, e.g. question 5. Stronger candidates considered the specifics of the question and used these in their answers. Candidates should use Examiners' Reports to practice applying their knowledge to the situations set.

- 1**
- (i) The basic equity principle of unit pricing for an internal fund is that the interests of unitholders not involved in a unit transaction should be unaffected by that transaction.
 - (ii) The company would calculate the unit prices based on the appropriation price. Since the company is growing and is actively selling unit-linked products, it would price on an “offer basis”.

The appropriation price is the price at which the company will create a unit, i.e. the amount of money the company should put into the fund in respect of each unit it creates in order to preserve the interests of the existing unitholders.

The appropriation price is calculated as:

- the market offer price value of the assets held by the fund,
- plus the expenses incurred in the purchase,
- plus any stamp or other duty payable in respect of such a purchase,
- plus the value of any current assets e.g. cash on deposit or investments sold but not yet settled,
- less the value of any current liabilities e.g. loans to the fund or investments bought but not yet settled,
- plus any accrued income, e.g. interest income from fixed interest securities and deposits, net of any outgo e.g. fund charges
- less any allowance for accrued tax.

This gives the net asset value of the fund on an offer basis. When divided by the number of units existing at the valuation date (before any new units are created) this gives the appropriation price. The appropriation price would then be used to determine the offer and bid prices.

The offer price would be determined as the appropriation price plus an initial charge (e.g. bid/offer spread). The bid price would be determined as the appropriation price.

The offer and bid prices would then be rounded to a pre-defined number of decimal places. For example, rounding up would be in the company's favour or down would be in the policyholders favour.

- (iii) Given that it is a significant outflow of money the company would look to switch the pricing to a “bid basis” i.e. pricing on the expropriation basis.

When determining the expropriation price the investments of the fund are valued on a market bid basis rather than a market offer basis and expenses

incurred on the sale of the assets would be deducted rather than adding in the purchase expenses.

If the large outflow is a one-off or temporary situation, the company would then switch back to an offer basis.

The management box could be used to absorb the effects of a one-off outflow.

May consider the viability of the fund, dependent on the reason for the outflow and if outflows are expected to continue.

Part (i) was answered well by most candidates. In part (ii) stronger candidates focussed on the specifics of the question and stated that the company would be using an appropriation basis rather than just describing both bases. Marks were low in part (iii) where candidates focussed on finding the cause of the price drop rather than actions or did not relate this to the question of pricing and considered wider business implications.

- 2** (i) The embedded value (EV) is the present value of future shareholder profits in respect of the existing business of a company including the release of net assets.

Only the shareholder owned share of net assets is included in the value.

Net assets are the excess of assets held over those required to meet liabilities.

The net assets may be at market value or may be discounted to reflect “lock in”, for example if held to cover solvency capital requirements.

The present value of shareholder profits arising on existing business is calculated as follows:

For conventional without profits, it is the present value of future premiums plus investment income less claims and expenses plus the release of solvency reserves.

For unit-linked, it is the present value of future charges including surrender penalties less expenses and benefits in excess of the unit fund plus investment income earned on and the release of any non-unit reserves.

For conventional with profits, it is the present value of future shareholder transfers e.g. as generated by bonus declaration.

Note that this could allow for the gradual distribution of the estate, if this is not included in the value of the shareholder share of net assets component.

For without profits business EV is effectively the release of margins within supervisory reserves, relative to assumptions used in embedded value.

The reserves used in the calculation of net assets should be consistent with those used in determining the present value of future profits.

Tax will be allowed for as appropriate and assumptions used are likely to be prudent for reserves and best estimate for VIF.

(ii) **Solvency Ratio:**

Assets in With Profits Fund plus Assets in Non Profit Fund = 95,000

Liabilities: CWP + CNP + UL + COB

$40,000 + 10,000 + 30,000 + 5,000 = 85,000$ (excluding COB)

$+ 500 = 85,500$ (including COB)

Solvency Requirement:

4% of all non-linked liabilities + 1% of linked liabilities

$4\% \times (40,000 + 10,000 + 5,000) + 0.01 \times 30,000 = 2,500$ (excl COB)

$+ 4\% \times 500 = 2,520$ (including COB)

Solvency Ratio = $(95,000 - 85,500) / 2,520 = 377\%$

Embedded Value:

Take shareholder assets only = 50,000

Shareholder share of net assets:

$50,000 - 10,000 - 35,000 = 5,000$

The assets in the With Profits Fund are not included, given they are effectively included in the present value of shareholder transfers from that fund.

Add on COB transfer of $500 \times 10\% = 50$

And total PV of future profits = 21,000

Embedded Value = $5000 + 50 + 21,000 = 26,050$

- (iii) The solvency capital requirement can be seen as providing an additional level of protection for policyholders. Need to ensure that all requirements of the local supervisory authority are met and consider any local professional guidance.

The CFO is correct that when considering the adequacy of the reserves, it is important to consider this within the overall context of solvency capital requirements. It may be possible, in some jurisdictions, to hold best estimate base reserves with an additional risk margin and risk-based solvency requirements.

However, in this case the solvency capital requirement does not necessarily adequately reflect the risks borne by the company for each of the blocks of

business. The 1% of unit reserves will move in line with market movements – which would not suitably reflect the risks to the company associated with this block of business e.g. low capital requirements when low unit fund giving rise to a low level of expected future charges. The 4% of non-linked liabilities implies the risks for with profits business are similar to those of the without profits business. This is unlikely to be the case, since with profits experience is largely borne by policyholders.

Hence could reconsider the prudence of reserves, but need to ensure that the principles of setting them are still met.

Under this method if the reserves fall then the capital requirements also fall.

The company would want to avoid arbitrary changes in basis and hence would need to ensure that any changes are justified based on analysis. The reserves held could already be at the minimum prescribed level required by the regulator and hence could not be reduced further. The company is healthy so no driver to reduce prudence though arguably figures in (ii) show prudence could be reduced. Reducing prudence would allow more investment freedom.

In part (i) the stronger candidates expanded the definition of shareholder profits to describe this across the different profit types where weaker candidates either did not expand their answers or focussed on specific products, e.g. term assurance. The most common mistakes in part (ii) were to miss out the cost of bonus elements or to use all net assets rather than only those owned by the shareholder. For part (iii) most candidates picked up some marks but few commented on the inadequacy of the solvency capital to reflect the risks borne by the company.

- 3** (i) The surrender value paid should take into account the policyholders' reasonable expectations. This is met if this has been clearly described in marketing literature provided to the policyholder at the point of sale.

The surrender value should not exceed the earned asset shares, in aggregate, over a reasonable time period. This surrender value approach will over pay on surrender early in the policy term and under pay towards the later part of the policy term. This gives a lapse and re-entry risk at early durations.

Whether it meets the principle in aggregate will depend on sales volumes over time and lapse rates over time. But it would be difficult for the company to manage actively. Particularly since such an approach would be more likely to encourage early surrenders and discourage late surrenders.

The surrender values should produce a fair contribution to company profit. This objective may be difficult to meet, since (as per the arguments above) profits made may be excessive for surrenders at later periods and losses may be made on surrenders at early periods.

Surrender values should treat both surrendering and continuing policyholder equitably. As this is a without profits contract, the terms offered to surrendering policyholders do not directly affect the continuing policyholders. However the price of the product might be greater than it would otherwise have been, to allow for the high cost of early surrenders.

It is also hard to see that the surrender value close to maturity is equitable relative to the benefits received by policyholders continuing to maturity.

At early durations, surrender values should not appear too low compared to premiums paid taking into account any projections given at the new business stage. The method meets this principle well (subject to appropriate information being provided at the new business stage – as mentioned earlier).

Surrender values should take into account those offered by competitors and auction values, where available. It may be that this is typical for the market and so is consistent with competitors otherwise, it will not compare well. Auction values tend to be based on a prospective valuation, so this basis will not compare favourably at later durations.

At later durations, surrender values should be consistent with projected maturity values. It is very unlikely that this will be the case, so this principle is not met. The maturity value is a contractual amount and is unlikely to have a direct relationship with the total premiums paid. Due to the anticipation of investment earnings over the period of the policy, the maturity value would normally be expected to be materially higher than the total premiums paid in.

Surrender values should not be subject to significant discontinuities by duration. The surrender value basis will meet this objective.

Surrender values should not be subject to frequent change, unless dictated by financial conditions. The surrender value basis will meet this objective.

Surrender values should not be excessively complicated to calculate. The surrender value basis will meet this objective.

The surrender values should be capable of being documented clearly. The surrender value basis will meet this objective.

Whilst the basis meets many of the principles, overall it is unlikely to be satisfactory in the market as a result of those which it does not meet.

- (ii) The **surrender value respread** method could be used. PUP respreads method gives the same as effect as SV respreads for a term assurance. The surrender value of the original policy at the alteration date is used to reduce the premium that would otherwise be paid for the new policy. A special surrender value, of the existing contract, is calculated that makes allowance for the initial expenses. The premium is reduced by spreading the special surrender value over the outstanding term but conventional term assurance has no surrender

value. So the resulting premium would merely be the same premium as for a new without profits endowment.

The policyholder has received no benefit from the value of the existing policy under these alteration terms. He has received death benefit protection from inception to the alteration date but this has not been used so its value may not have been appreciated. The policyholder may not feel that it is acceptable to receive no credit in respect of the premiums already paid.

However, the company may feel that the request goes beyond “an alteration”. And so does not feel compelled to pass on any value from the existing policy.

But there will be some accrued value as the company has received a premium designed to be level over the term, whilst being on risk when the mortality was lightest.

The **equation of policy values** method could be used. This would equate the value of the contract before alteration with the value after alteration.

A prospective valuation should be used for the post-alteration value but the pre-alteration value could be done using either a retrospective or prospective method. It would therefore allow some value from the existing policy to be used to offset the premium that would otherwise be charged for a new without profits endowment assurance.

The choice of method and basis used to value the policy before alteration determines the profit released at the alteration date. The choice of method and basis used to value the policy after alteration determines the profit expected after the alteration date. The company might use its current premium basis to value the policy after alteration. To value the policy before alteration it might use a basis that retains, for the company, the profit accrued to date.

It may not be appropriate to take both the expected profit from the endowment assurance and the total expected profit from the term assurance.

The **accumulation of premium arrears/surplus** method could be used. The premium is compared with that which would have been paid had the policy been in its altered form from the outset with the accumulated difference being spread forward as a premium adjustment. This might be an appropriate method as the benefits of an endowment assurance from the date of commencement to the date of the alteration are the same as for the existing term assurance.

However, the simplest method might be to recognise that the only difference in the benefits after the alteration date is the **addition of the maturity benefit**.

The additional premium required would therefore be the premium required from the alteration date to provide only the maturity benefit, i.e. the premium payable for a pure endowment. This would probably be on the pricing basis for the endowment assurance product.

The company might also allow for the costs of making the alteration in any of the methods shown

Generally good marks were scored in part (i) with highest marks where candidates logically outlined each of the principles and whether the method met these or not. Candidates struggled with part (ii) and in particular few noted that a term assurance would not generally have a surrender value. Many also got distracted from discussing alteration methods and instead concentrated on the principles again and very few discussed the methods in sufficient depth.

- 4** (i) 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, inter alia, on the extent of the company’s free assets and the company’s appetite for risk.

Alternatively:

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) **Conventional with profits endowment assurance:**

- The liability has a guarantee in money terms equal to sum assured plus reversionary bonuses declared to date.
- There is also a discretionary part equivalent to future bonuses that have not yet been declared or added particularly terminal bonus.
- To match the guaranteed benefits, the starting point is likely to be fixed interest securities of appropriate term such that the flow of asset proceeds is best matched to the liability outflows may be a mix of government and corporate bonds.
- To back the discretionary benefits, likely to be invested in real assets in order to seek higher potential returns and thus to generate competitive bonus levels such as equities and properties.
- The mix overall depends on policyholder expectations, what has been described in literature, past practice, asset mix held by competitors, 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.
- There may also have some derivatives to hedge the guarantees.
- Consideration of PRE and/or reversionary/terminal bonus mix.

Level immediate annuities for impaired lives:

- The liability is guaranteed in money terms with the term depending on degree of impairment, but likely to be significantly shorter than for non-impaired annuities.
- Regular income is required from assets to pay annuity outgo.
- Fixed interest securities are likely the best match.
- A mix of government bonds and corporate bonds likely.
- Corporate bonds give higher yields which may be important if annuity pricing is competitive or if government bonds are in short supply.
- But corporate bonds are less secure, with a higher chance of default.
- The proportion of corporate bonds is relative to free asset levels
- Should aim to match cash flows by term so the fixed interest bonds are likely to be fairly short term.
- Expenses may be matched by index-linked bonds.

Both

- Possibly need cash for liquidity.
- For optimal matching, all investments held should be in the same currency as the liabilities.
- Consider diversification of investments and any regulation restrictions.

- (iii) Company A has a free asset ratio of $(23,000/48,000) = 48\%$
Company B has a free asset ratio of $(2,000/27,000) = 7\%$

The existence of a significant level of free assets in Company A means that it can move further away from the ideal matched position in order to invest in riskier assets that could yield higher overall returns.

Company B has very low free assets and so will need to match its liabilities more closely.

Company A is therefore likely to invest a higher proportion of its assets in riskier or real assets than company B e.g. equity, property, overseas investments or corporate bonds. They also have wider scope for diversification. However Company B's policyholders may still have an expectation that their assets will be invested in some equities.

Company B may therefore have some derivatives to aim to hedge the guarantees (e.g. protect against equity falls).

Company B's guarantees are likely to be heavily in the money, as shown by the relationship between the asset shares and the reserves. Therefore this could mean that Company B policyholders are unlikely to get any terminal bonus unless markets did extremely well. This again may mean that Company B is invested more in fixed interest with perhaps some derivatives which pay off if equities do well.

Company A's asset shares are well above the reserves and so this means even more flexibility and this could mean even more scope to invest in real assets.

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.

The standard bookwork in part (i) was well answered. In part (ii) candidates were often able to discuss the key requirements of an investment strategy (in terms of matching to term, nature and currency but many failed to expand these concepts as they apply to the products contained within the question. Some candidates spent considerable time discussing the different bonus distribution methods which scored no marks. Only the stronger candidates calculated the free asset ratios in part (iii) and while most candidates realised that high free assets means potential investment freedom, very few understood the relationship between asset shares and the net premium reserve.

5 The actions that could be effective will depend on what is causing the decline in sales.

It could be either driven by lack of products/insurers selling products, a low customer propensity to buy or from a general reduced level of wealth, e.g. due to recession.

The government could relax any existing restrictions including:

Contract type

Any restrictions on types of contracts that can be sold could be lifted which could lead to new products coming to the market or more innovation in the market.

Though this is only likely to increase sales if a new product meets a customer need that is not addressed by the existing products.

Rating factors

Rating factors that are allowed to be used in pricing may be restricted and these restrictions could be relaxed. This could allow insurers to have differential pricing for more subsets of customers. This could lead to increased sales if it now allows an insurer to offer a product which they previously were not comfortable about pricing on the restricted rating factors though this will only happen if the rates they offer are then competitive.

Alternatively it may mean that, for pricing purposes, insurers now split a group that was previously priced together into smaller groups, some of which will result in more competitive pricing and some in less competitive pricing. This could increase sales in those groups where prices become more competitive but would result in a skewed customer population for the insurer.

Underwriting

The government could alter any restrictions on the ability of insurers to underwrite policies. For example, a prohibition on the use of the results of genetic testing or prohibition on the use of past claims history or medical history. Requirements that encourage simpler underwriting could work to increase sales by removing the “hassle” factor but there is a danger that any higher morbidity risk could offset the benefit of lower underwriting costs, which would increase premiums and so not increase sales.

Distribution channels

Any restrictions on the channels through which the business may be sold could be relaxed. This may allow more customers to have access to these products or give the insurers access to lower cost distribution methods.

Information provided to customers

The amount of information that has to be provided to customers at sale could be changed but this would only increase sales if it was a lack of this information or too much information that has been preventing customers from making the final purchase.

Premium caps

Any caps on premium rates could be revised or removed though this is only likely to result in higher premiums which would only be effective if the cause in decline was due to the products being unprofitable for companies to write rather than due to premiums being too expensive for customers.

Reserving requirements

Reserving requirements could be relaxed for example reducing the required prudence level or minimum solvency capital requirements could be reduced. This would only be effective if the products were capital intensive, which a lot of life insurance products can be, and would depend on the profit basis on which they were written and whether it was capital constraints that were preventing insurers from actively selling these products. It would also reduce the protection that customers are provided with from prudent reserves, that in turn could reduce customers' propensity to buy.

Investments

The government could relax the investment restrictions that are imposed on companies. This could be by allowing a higher proportion to be invested in riskier or illiquid assets or allowing investment in different/new asset types. This would be effective if this would allow the company to obtain a higher return on the assets backing life insurance products which it could pass onto the customer through lower premiums. This would only be effective if it was high premiums that were causing low sales.

Tax

The government could alter the tax regime for life insurance products alternatively they could alter the tax regime for other markets to make life insurance more attractive relatively. There are two places where the product could be taxed: at the company level or at the customer level.

The government could reduce overall tax on the companies that generally sell these products or it could reduce the tax paid specifically on these products. This could make tax calculations more complicated for the companies, but if customers found products unaffordable before then this is only effective if companies pass on subsidies to customers. Alternatively it could reduce any tax, where it exists, that the customer pays on the benefits from these products, or allow premiums into these products to be income tax free e.g. paid from gross income or be credited with the tax back.

Amending taxation could be effective for either source of the problem, though given the potentially complex nature of implementing this, it would need to be a more permanent feature than a temporary one.

The effectiveness would also have to take into account the cost of any related system changes.

Commission

The government could remove restrictions on the maximum levels of commission that are allowed to be paid on these products. This could aim to boost sales by incentivising advisers to sell them. However, this higher commission is likely to be paid for by customers which could reduce sales.

The additional products sold due to this type of incentive could be more likely to lapse if they realise they didn't really need the product originally. It goes against trends in some countries at the moment to reduce commission payments.

Compulsory products

The government could make the purchase of life insurance products compulsory in certain situations to increase the market, e.g. making life insurance compulsory when taking out a mortgage or requiring employers to take out life cover for their employees.

But this could have other consequences, as lower prices may be needed in this situation, since a reasonably high proportion of potential customers may not be able to afford premiums if it was compulsory. Given other restrictions that may be put in place to ensure those that had to buy a life insurance product could afford it, some product providers may choose to not sell these products any more.

Subsidies

The government could subsidise these products directly by providing a subsidy to the insurer for each policy sold (or amount of benefit). This could be effective if the cause of declining sales was the unprofitability of them to the insurers as this would boost profitability. But if it was customers finding these products unaffordable that caused declining sales, this would only be effective if the insurer passed the benefit of the subsidy onto the customer through lower prices.

Advertise

The government could invest directly in advertising or an educational programme to promote the benefits of life insurance products. This could help increase sales if it is a lack of awareness that is causing the decline in sales.

State provision

The government could reduce the provision of State benefits e.g. State pension or raising the means testing limit. This could help provide a larger market, e.g. for life insurance products that provide benefits in retirement.

Help companies

The government could implement measures to help new life insurance companies enter the market e.g. by providing start up grants or grants to existing companies or by implementing anti-monopoly/oligopoly legislation or by assisting in the collation of life insurance data to aid pricing of products.

Other actions

The government could provide free financial advice. They could take actions that improve the general economic state and hence personal wealth so stimulating sales.

The government could be guarantor for an insolvency scheme and so increase customer confidence or they could relax restrictions on overseas companies and their access to domestic markets.

The highest marks were scored in this question by candidates who considered a broad range of possible actions and expanded each to consider why they would be effective. A number of candidates scored lower marks because they concentrated on discussing possible causes of the lack of confidence and then focussed solely on actions to address this, rather than considering other causes. Other candidates touched on the key themes but marks were then limited as they did not develop these in sufficient depth.

END OF EXAMINERS' REPORT