

# **EXAMINATION**

April 2006

## **Subject SA2 — Life Insurance Specialist Applications**

### **EXAMINERS' REPORT**

#### **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.

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Chairman of the Board of Examiners

June 2006

#### **Comments**

Individual comments are given after each part question.

**1 (i) Shareholder Fund**

This could simply be included at its market value, as shown in the accounts. Alternatively, the market value could be discounted to reflect the fact that the assets in the fund would not in practice be distributed immediately. It would effectively be discounted at the difference between the risk discount rate used in the rest of the EV calculation, and the net expected investment return on the assets in which the fund is invested.

**“Fund 1”**

The embedded value would include 100% of the present value of future profits expected to arise from the unit-linked business. This would be calculated by projecting future profits on this business, likely on a best estimate basis, and discounting these profits at a risk discount rate. The profits could be calculated as: charges less expenses, less the cost of benefits in excess of the unit value, plus interest on non-unit reserves, less increase in non-unit reserves.

The embedded value would also include the market value of the net assets held within “Fund 1”. These are defined as the excess of the assets in “Fund 1” over the reserves used in the calculation of the present value of future profits. For example, if the projections of future profits allow for the release of the regulatory solvency margin then the net assets should be after allowance for this solvency margin. The net assets might be discounted as for the Shareholder Fund.

**“Fund 2”: Value of In-Force Business**

The embedded value of this fund is the present value of shareholder transfers generated by the distribution of bonuses on the with profits business. It is therefore first necessary to project these future bonuses, again likely on a best estimate basis.

This is likely to be done by using (explicit or implicit) bonus rates that ensure that asset shares are paid out at maturity (option A), assuming an appropriate split between regular and terminal bonus. Alternatively, current bonus rates could be assumed to continue unchanged into the future (option B).

The future projected bonuses can be used to determine the shareholders' transfers in each future year, which can then be discounted at the risk discount rate. The shareholders' share is calculated as 1/9 of the cost of reversionary bonus on the statutory valuation basis, plus 1/9 of projected terminal bonus (or 1/10 of the excess of asset share over guaranteed benefits).

The calculations also need to take into account the profits arising on the conventional without profits business, which will be distributed as with profits bonuses. This could be achieved directly under option A by increasing the asset shares to allow for the projected surpluses arising on this business (option 1). A more straightforward approach for either option A or option B is

to allow for the value of without profits business surpluses within the valuation of the “free estate” (option 2).

**“Fund 2”: Value of Free Estate**

The next step is to calculate the free estate, this being the excess of “Fund 2” assets over those required to meet the “liabilities”, including the future bonuses allowed for in the above projections.

Under option A, for with profits business the “liabilities” would be equal to the total earned asset shares. For without profits business, if the asset shares do not include the value of without profits business surpluses (i.e. option 2) then the “liabilities” should equal a realistic valuation, which could be determined as the statutory valuation less the realistic present value of future profits. If the asset shares do include the value of without profits business surpluses (i.e. option 1) then the “liabilities” for without profits business should be the statutory valuation reserves (consistent with those that are assumed in the calculation of future surpluses arising).

Under option B, the “liabilities” in respect of with profits business should be a realistic valuation allowing for the specific assumed future bonuses, rather than asset shares. The “liabilities” in respect of without profits business should also be a realistic valuation.

The shareholders’ share of the free estate should then be valued. This would be done by one of the following methods:

- It could be calculated as 10% of the market value of the estate.
- The same figure could be discounted to allow for the fact that it is not immediately distributable, allowing for the expected average time to distribution.
- The projected bonus rates could be adjusted so that they extinguish both the asset shares and the free estate.

***Comments on question 1(i):***

*This question required relatively straightforward application of embedded value methodology principles (as described in the Core Reading) to a specific company and fund structure. Candidates who had learned and understood the bookwork thoroughly did well on this question part.*

*The most common omissions from answers were the values of net assets in Fund 1, without profits business in Fund 2 and the free estate in Fund 2. Several candidates confused the 1/9 and 1/10 multipliers, and others missed out on marks by making the methodology too general and not relating it precisely to this particular company.*

*Despite the instruction given in the question, some candidates went into unnecessary detail on setting the basis and/or constructing a model (e.g. derivation of model points).*

- (ii) The bonds in the company's fixed interest portfolio should be grouped according to credit rating, e.g. using Standard & Poor's or Moody's ratings. They should also be grouped by outstanding term.

Past experience of the level of defaults on bonds should be researched and analysed, and judgements made about future rates of default. Investment banks and the insurance company's investment department would be able to provide views on future default rates. An assumption should also be made for the degree of recovery (or "severity of loss") expected on default.

Using this data, appropriate per annum default rate assumptions should then be assessed for each credit rating and each term grouping. The highest rates will apply to the lowest rated and longest dated bonds.

These default rates can be deducted from the current yield of each bond. The resultant adjusted yields should then reflect the "risk free" yield (e.g. close to gilt yields) plus a liquidity margin to reflect the lower marketability of corporate bonds.

Finally, these adjusted yields should be used to determine the future investment return assumption for the company's corporate bond portfolios within its embedded value projections.

Parameter risk (the risk that the default assumptions are mis-stated) and other secondary risks (e.g. random fluctuation or default "catastrophe") could be taken into account when setting the risk margin in the discount rate. However, it is unlikely to be appropriate for the entire allowance for credit risk to be made within the risk discount rate.

It can be noted that, for assets not backing liabilities, credit risk is allowed for implicitly. This is because these are included in the embedded value calculation at market value, and this will allow for the market's expectation of default risk.

***Comments on question 1(ii):***

*This was generally not well answered, with most candidates not writing an amount appropriate for a five mark question. A disappointing number only considered the risk discount rate and did not mention projected returns on corporate bonds. Of those that did, most did not go on to describe how this reduction would be determined, suggesting that relatively few candidates learned this part of the Core Reading well.*

*Some candidates suggested a long list of information that could be obtained on each company and stock in order to assess the default risk. Whilst this*

*would be appropriate for an individual bond, it would not be practical for an entire portfolio.*

(iii) The analysis of change in embedded value might include:

- Expected return:
  - Expected \* investment return on “Fund 1” net assets and the Shareholder Fund (if included in the EV at market value).
  - Expected investment return on the free estate in “Fund 2” if included at 10% of current market value.
  - Unwinding of the risk discount rate: on “Fund 1” present value of future profits and “Fund 2” present value of future shareholder transfers (including the distribution of the free estate, if assumed to be distributed as bonus rather than included at 10% market value).
- Value of new business written during the year.
- Changes in assumptions, such as:
  - Future experience assumptions (economic, demographic etc).
  - Statutory reserving bases.
  - Discount rate.
- The difference between actual and assumed experience during the year, including:
  - Actual v. expected investment returns (including on shareholder funds and net assets \*).
  - Actual v. expected decrements (mortality, lapses etc).
  - Actual v. expected expenses.
  - Actual v. expected bonus declarations (e.g. change in RB/TB split).
  - Actual v. expected tax.
- Capital injections and dividend payments.
- Model changes / corrections.
- Unexplained (this should be minimised).

[\* Alternatively, the analysis could show actual investment return on shareholder funds and net assets, rather than splitting between expected and {actual v. expected}.]

***Comments on question 1(iii):***

*Although seemingly straightforward bookwork recall, this question part distinguished those candidates who understood well the mechanics of an*

*embedded calculation and those who had seemingly learned phrases without full understanding. For example a number of candidates referred erroneously to "actual v. expected new business" and some to "actual v. expected dividends". Many referred vaguely to "actual v. expected shareholder transfers" as a separate item without apparently appreciating that this is already covered by the other "actual v. expected experience" items.*

*Some candidates made things harder for themselves by separating the analysis into two distinct elements: net assets and present value of future profits. They then did not always appreciate the offsetting components between the two and/or omitted one or other part of the new business value.*

*Some candidates did not appear to have read the question correctly and described how the analysis would be done or why the company would wish to do it.*

(iv) **Good points**

This approach has the advantage of being simple to apply.

Proprietary insurance companies may publish supplementary achieved profits information in their Reports & Accounts, where achieved profits represent the change in embedded value plus any profit transfer. For such companies, the methodology therefore only requires data that is in the public domain.

It is consistent with the approach used for other industries.

Since it is based on the change in embedded value, including the value of new business, it gives an approximation to the appraisal value. For example, if the discount rate is 5%, all net assets earn 5% and experience is precisely in line with assumptions, then the change in embedded value would be equal to 5% of the start of year embedded value, plus the value of new business written during the year. If this change in embedded value figure is multiplied by 20 ( $=1/0.05$ ), then the result is equal to embedded value at start of year plus 20 times one year's value of new business. If the change in embedded value is multiplied by 21, this gives embedded value at end of year (= embedded value at start of year plus change over the year) plus 21 times one year's value of new business. This is broadly in line with an appraisal value calculation, which is the theoretical market value of an insurance company.

Using change in embedded value is much better than basing the model calculations on earnings reported on a statutory basis. In particular, statutory profits could be distorted by new business strain.

It would give a very high level view as to which companies have significantly higher or lower theoretical values compared with actual market capitalisations.

It does take into account current economic conditions, albeit this can only be done very crudely.

## **Problems**

The information will not be publicly available for all companies. For companies where it is available, it is likely only to be published once a year and so the analysis cannot be updated very frequently.

The change in embedded value could be negative, which would not give a logical answer.

The determination of an appropriate “average” factor applicable to all insurance companies under given economic conditions will be difficult and is likely to be subjective.

Using a single factor for all life insurance companies is inappropriate, as the ratio of “theoretical market value” to embedded value profits will differ significantly between different companies. For example, where companies:

- Write different types of business.
- Have different levels of options and guarantees within their business.
- Have different levels of new business potential relative to the past year’s new business value.
- Have different levels of prudence within their bases.

It is also not appropriate to use a single factor on the total embedded value profit figure. For example, this is because it can include one-off adjustments such as:

- Assumption changes.
- Exceptional items, e.g. project expenditure, capital injections.

[As well as needing to adjust for these one-offs, the change in embedded value should also have any dividend payment added back.]

Overall, this approach should not be relied upon for use in spotting profit-making opportunities in the stock market.

## **Alternative approach**

A more theoretically correct approach would be simply to calculate the appraisal value directly from the year end embedded value (if available) plus the value of goodwill, where the latter could be calculated as a multiple of the value of new business written during the year.

Alternatively, the total EV profit for each company can be split into its constituents as in (iii), if this analysis is available, and a different multiplication factor then applied to each constituent.

**Comments on question 1(iv):**

*The candidates who performed best on this question part were those who structured their answer well into pros and cons, and used their answer to part (iii) to generate ideas and reasoning. A disappointingly high proportion of candidates stated that the methodology was not appropriate because embedded value does not allow for future new business, apparently not recognising the important point that the change in embedded value is being used and this does include one year's value of new business.*

- (v) The conventional without profits immediate annuity business is written into "Fund 2" so the profits that arise on these contracts are valued as the shareholder share of the additional bonuses that are supported by these profits.

**Valuation rate of interest**

The strengthening of the valuation rate of interest will increase the statutory reserves. This will delay the emergence of the profits on this business. Normally in a traditional embedded value calculation, deferral of profit emergence would reduce the embedded value. This is because the discount rate normally exceeds the net earned investment return assumed on the underlying assets.

However the overall impact may be relatively small, particularly if the margin between earned rates and the discount rate is relatively small and/or the annuitant portfolio is not significant in size relative to the with profits business. It also has a diluted impact on embedded value since only 10% of the overall impact will affect shareholder value.

Therefore, if this business is included within the embedded value of "Fund 2" via explicit calculation of the present value of future surpluses arising on the embedded value basis then the overall impact is likely to be a relatively small reduction in embedded value. This would be the case if the company is following option 1 (as per answer to part (i)) and increasing asset shares by this amount, or if calculating "realistic liabilities" using this amount under option 2.

However, under option 2 the company may instead include the value of this business within the valuation of the free estate by calculating a realistic basis liability directly, using a basis that is not dependent upon the embedded value or statutory valuation bases. In that case, changing the statutory valuation rate of interest would have no impact on the embedded value.

**Mortality assumption**

The impact of strengthening this assumption within the valuation basis is as above, and the impact on embedded value may therefore be the same.

However, the actuaries preparing the embedded value calculation should discuss the reasons behind the strengthening of the mortality assumption basis



with the reporting actuary. If the basis change reflects solely an increased prudence margin, then the impact is as for the valuation rate of interest.

However, it may instead reflect a change in the underlying expected future mortality, perhaps due to data that was not available at the time at which the embedded value calculation was performed. If this is the case then the annuitant mortality basis used in the experience assumptions should also be reviewed, and updated for the next time at which the embedded value is calculated.

Change the experience basis in this way would reduce the embedded value. Due to the sharing of the impact between shareholders and with profits policyholders, the approximate impact will be a reduction in embedded value of around 10% of the change in reserves due to the mortality change.

However, the impact could be significantly greater if the increase in reserves cannot be covered by the existing free assets in “Fund 2” and assets had to be transferred in from the 100% owned Shareholder Fund.

***Comments on question 1(v):***

*Although most candidates applied correct reasoning to the valuation rate of interest change, most then simply repeated this for the mortality change. This was despite a hint in the question that each change should be considered separately, which should suggest that the examiners were looking for a little more than just straight repetition. Disappointingly few considered the need to review the mortality experience basis.*

*Similarly, relatively few linked their answer to the specific company and fund structure, and did not consider the relationship with with profits bonuses. Some candidates did not appear to have read the question properly and included a range of different products and funds in their answer. Some incorrectly attributed the reduction in embedded value due to profit deferral to the difference between the risk discount rate and the valuation rate of interest.*

*A small number of candidates interpreted “strengthening” the basis as meaning increasing the valuation rate of interest and thus reducing reserves (which would in fact weaken the inherent strength of the balance sheet). Some credit was given for these answers if the subsequent reasoning was correct.*

**(vi) Allowance for risk in traditional EV**

In a traditional embedded value, “best estimate” assumptions are normally made about future experience. Projected shareholder profits and transfers are then discounted at a single discount rate. The discount rate reflects the return required by the shareholders, allowing for the appropriate level of risk.

Thus the margin within the discount rate must implicitly cover market risk, insurance risk, operational risk and any other risks not explicitly allowed for

elsewhere in the calculation (noting that credit risk can be allowed for as in (ii) above).

### **Use of a single discount rate**

This traditional embedded value approach is relatively straightforward to apply in practice.

However, the analyst does have a point. Using the same discount rate throughout the calculation has theoretical limitations.

It effectively assumes that all products are subject to the same overall level of risk, which is unlikely in practice. For example, mortality risk is relatively higher for immediate annuity business than for unit-linked savings contracts, but persistency risk will be higher for the latter. However, they are very unlikely to balance out precisely.

This could be mitigated to some extent by loading an explicit risk margin into each different assumption, but these margins will be subjective.

Using a single risk discount rate also assumes that each cashflow valued within the calculation is subject to the same overall level of risk. Again, this is unlikely in practice. Cashflows that are fixed and known can be matched precisely without market risk, and the appropriate theoretical discount rate would therefore be a risk free rate, plus any additional allowance for insurance risk.

The issue could be addressed by using more appropriately risk-adjusted discount rates, by product type and/or type of cashflow. Alternatively this could be achieved through use of a stochastic model which uses carefully calibrated risk-adjusted discount rates.

### **Financial guarantees and options**

A significant shortfall of the traditional embedded value calculation is the way in which it values guarantees and options. For example, this particular company will have significant financial guarantees in its with profits fund in the form of guaranteed benefits payable at maturity and possibly also on death. It may also have guaranteed annuity options.

The traditional embedded value approach is a deterministic calculation, and thus will only allow for the cost of such guarantees to the extent that the guarantee is expected to “bite” on the deterministic investment assumptions. For example if the expected return in the embedded value basis is 6% per annum, and at this expected return the guarantee (e.g. sum assured plus declared bonuses) is lower than the expected benefit (e.g. asset share) then the embedded value will not reflect any cost for providing this guarantee. However in some lower investment return scenarios, the guarantee might exceed the asset share. Hence the expected mean cost of the guarantee, across a range of possible future scenarios, would not be zero. The market risk

inherent within writing these guarantees and options is therefore not appropriately allowed for within the traditional embedded value, so again the analyst has a point.

Sensitivity tests could be performed, but this provides only limited additional information.

The issue could instead be addressed by valuing options and guarantees using a stochastic model. To allow for market risk, the stochastic model could perhaps be calibrated to market prices. Using a stochastic model also enables more sophisticated modelling of management and policyholder actions.

It should be noted that the impact of guarantees is only relevant to the extent that it reduces shareholder transfers. If the cost in a particular scenario can be fully met by surplus assets in the with profits fund, then the impact on shareholder value is diluted (around 10% of the cost). However if the cost exceeds the with profits surplus assets, then the impact on shareholder value is considerably greater. This is because the “burn through” amount will have to be met in full by the shareholders.

***Comments on question 1(vi):***

*The key to answering this question part was first to consider how risk is currently allowed for within the calculation and then to assess shortfalls within this approach. The best answers were those that were well structured and covered a good range of ideas, often assisted by knowledge of the principles that have triggered European Embedded Value developments.*

*However many candidates simply wrote too little, covering just one area. Some candidates appeared to confuse capital calculations (e.g. ICA) with shareholder value calculations. Some candidates suggested using stochastic models to calculate say 95% confidence intervals for the embedded value, without acknowledging the use of such models in calculating the expected cost of options and guarantees.*

**2 (i) Asset/liability matching**

The basic investment principle is to maximise the return to the policyholders, subject to meeting all contractual and PRE obligations with an appropriate level of risk. The AFH would therefore have carried out investigations into the extent to which the existing and alternative asset strategies match the company’s liabilities by nature, term and currency.

The liabilities could be calculated on a conservative/statutory basis or a realistic/best estimate basis. Assets should be valued consistently, for example if considering the statutory basis then they would not include inadmissible assets.

Given that the value of the with profits liabilities as at 31 December 2005 was £750m, the company is a realistic basis life insurance company. Therefore under the FSA's Prudential Sourcebook, the company will be required to calculate its statutory solvency position using a "twin peaks" approach. This requires the company's reported solvency result to reflect the more stringent of a statutory valuation that meets minimum EU standards and a realistic valuation that requires the market consistent valuation of options and guarantees.

### **Cashflow projections**

The AFH would have carried out a projection of the assets and liabilities of the with profits fund.

The projection would have allowed appropriately for the expected future new business that the company expects to write, having regard to the declining trend in new business sales in recent years.

A cashflow model would have been built. Appropriate model points would have been chosen to reflect the business. An appropriate projection term and projection period would have been chosen. The cashflow model would have allowed for the following items:

- Future premiums that the company expects to receive (if applicable) and maturity, death and surrender benefits that the company expects to pay out each year.
- Allowance within these benefits for future bonuses (including terminal bonus, if appropriate) in line with TCF/PPFM.
- Expenses that the company expects to incur, including an allowance for expense inflation.
- Profits attributable to the with profits business arising from without profits business (if there is any).
- Any charges made for the cost of providing guarantees and options and/or the use of capital.
- Tax, where applicable.

To project forward the total assets at each future time period, the company would also have needed assumptions for future investment returns.

Initially, the company might have assumed that assets are held in the same mix as the existing assets held by the with profits fund. However the company might have preferred to project forward a notional portfolio of assets based on the existing investment guidelines rather than the actual portfolio of assets held.

All future experience assumptions would be best estimate.

The modelling of assets and liabilities should be consistent at each point in time. For example:

- The basis used to value liabilities should be consistent with projected economic conditions at that time.
- Bonus rates should be consistent with projected economic conditions.

The projection may have been deterministic or stochastic. If deterministic, then sensitivity tests should have been performed on the key assumptions — particularly investment returns.

If stochastic, then the company would have used a set of economic scenarios to produce a large number of simulated outcomes (e.g. 2,000) for each future point in time. The model would aim to replicate the behaviour of the markets in which the assets are invested in terms of average expected future returns, movements in asset values due to market fluctuations (i.e. volatilities) and correlations between different types of asset.

The model might also include dynamic management actions such as automatic switching of asset mix under certain economic conditions.

### **Projected solvency position**

The cashflow model enables the value of the liabilities and value of assets to be calculated at each future point in time, and these would then have been compared. The deterministic sensitivity tests or stochastic distribution of outcomes enables the AFH to assess the likelihood of the with profits fund being:

- insolvent at any future point in time (if  $A < L$ )
- close to insolvency (e.g.  $A > L$  by less than 5%) at each future point in time
- unable to continue to pay the reversionary bonuses that policyholders expect
- in a position where terminal bonuses are required to vary too widely from year to year to protect the solvency position of the fund.

Given the recommendations put forward, it is likely that these investigations showed that the with profits fund was too exposed to investment return variation. Therefore the company needed to move into a more closely matched position to protect it from insolvency, or to at least protect its ability to continue to pay reasonable levels of bonuses, at some point in the future.

### **Notional investment strategies**

The AFH is then likely to have tested a number of different investment strategies, by projecting a number of notional portfolios of assets, each allowing for a different asset allocation strategy.

These investigations are likely to have shown that by moving to a more conservative investment strategy, the with profits fund is more adequately protected from insolvency in the future and will be able to maintain its current bonus strategy.

**Comments on question 2(i):**

*This part was generally well answered. Candidates who structured their answers in a logical process order generally covered the points most comprehensively. Some candidates appeared not to have read ahead, and included points in this part that did not directly answer the question (e.g. comparison against competitors). Some candidates appeared to confuse the concept of projection of balance sheets with the calculation of values, referring to the use of "risk discount rates" to discount projected cashflows back to the valuation date.*

**(ii) Board of Directors & With Profits Actuary**

The Board of Directors should inform the with profits actuary of its intentions and seek advice from the with profits actuary regarding the implications of the new investment strategy on the with profits policyholders.

The with profits actuary would be required to consider the likely implications for policyholders and provide information in this regard in his/her annual report. This would mean that he/she would need access to all of the models used and results produced by the AFH. Of particular interest would be the assumed management actions. The key focus of the with profits actuary would be the likely impact of the change in investment strategy on the future bonuses (both reversionary and terminal) payable to policyholders.

Under the FSA's principle of "Treating Customers Fairly", both the AFH and the with profits actuary must be mindful of the with profits policyholders expectations with regards to future bonus levels. The company has to consider whether it considers the proposal to be consistent with TCF.

The company may need to update its PPFM (Principles and Practices of Financial Management) to reflect the new investment strategy and any changes in bonus strategy.

A change in the investment allocation percentages may represent a change in the Practices of management of the with profits fund.

As the investment allocation strategy has not changed drastically, e.g. from an equity/bond fund to an all bond fund, it is unlikely that there is a need to change the Principles of management of the with profits fund. The new PPFM would not need to be sent out to policyholders but the company should draw attention to both its existence and important changes in it when communicating with policyholders.

### **Investment management**

The company would need to instruct its investment managers to adopt the new investment strategy.

For the classes of assets where disinvestment is required, consideration will need to be given to the best time to do so, taking into account the level of the market and potential tax crystallisation. The company might decide to use derivative positions to change exposure immediately, and then move to the proposed new asset allocation when conditions are more favourable.

The company also needs to consider which assets should be sold and purchased, as it needs to maintain a balanced and well diversified portfolio of assets in each asset class following the move to the new investment strategy.

If the with profits fund holds any property assets, consideration will need to be given to whether it is necessary to sell these assets under the new asset allocation strategy — and the timing of such a sale. The sale of a large property asset may also give rise to a large windfall capital gain and careful consideration will need to be given by the with profits actuary as to how such a gain is distributed.

### **Marketing**

The company may prepare a press release describing the change in investment (and possibly bonus) strategy. The company would need to consider the impact of the change on its competitive position, and how the news would be interpreted by the media. A move towards fixed interest investments and away from equities may be perceived as weakness in the with profits fund, and the company would need to plan how to respond to such commentary. However the extent to which this will be an issue will depend on whether other companies have taken similar steps in recent years.

### ***Comments on question 2(ii):***

*This part was reasonably well answered, with the better candidates covering all of the key areas of TCF, communication, practical investment management considerations and marketing. Very few candidates mentioned the important role of the With Profits Actuary. A few candidates wasted time by discussing the impact on bonus distribution strategy, which is covered in part (iii), and some included points that would already have been taken into account during the cashflow projection exercise undertaken by the AFH.*

- (iii) The impact of the change in the investment guidelines on the company's bonus distribution strategy would need to be fully investigated. The actuarial function holder would investigate the following in particular:
- Whether the company's current bonus distribution strategy with regards to the balance between terminal bonuses and reversionary bonuses is still appropriate or requires amendment.

- Whether reversionary bonus rates are expected to change over time.
- Whether terminal bonus rates are expected to change significantly.
- Whether the fund's smoothing policy requires amendment.
- Whether new bonus series are required for new business.

### **Balance between terminal and reversionary**

The proposed move in investment allocation strategy has a greater proportion of assets invested in fixed interest and a lower proportion of assets invested in equity-type investments. This may result in a shift towards a bonus allocation strategy with a greater emphasis on reversionary bonuses and with terminal bonuses making up a lower proportion of the overall return.

However the reason for the recommended change in investment strategy may have been because the existing bonus strategy was not sustainable but would be sustainable under the new investment strategy. Hence it may be that the company's bonus distribution strategy can remain unchanged following the change in investment strategy.

### **Level of reversionary bonus**

The company may aim to declare reversionary bonus rates broadly in line with the yields earned on the underlying investments. If yields have increased as a result of the change in investment strategy and this is expected to be sustained in the future, then the company may decide to increase its reversionary bonus rates slowly over a number of years until the reversionary bonus rates declared are in line with investment yields.

The extent to which the company will do this will depend on a number of factors:

- The level of the existing reversionary bonus rates. Reversionary bonus rates may be high compared to previous investment yields and may be broadly in line with the investment yields expected to be earned under the new strategy, in which case it is unlikely that they would be increased further.
- The extent to which the with profits fund is matched and the extent to which it is exposed to reinvestment risk in the future. The less well matched the fund, the greater the need for the fund to keep an asset cushion to withstand market shocks/investment return volatility — and hence the less likely it is that reversionary bonus rates would be increased. (A recommendation to move investments towards fixed interest is likely to mean the fund is better matched than previously but this may not necessarily be the case.)
- The extent to which policyholders expect reversionary bonus rates to increase. If there is no strong expectation then there may be no strong compulsion to pay out higher reversionary bonus rates which would increase the guarantees in the fund.
- The reversionary bonus rates paid by competitors.



- The solvency position of the fund. If the solvency position is threatened then the company will look to minimise the guarantees it gives to policyholders.

### **Level of terminal bonus**

The relative increase in fixed interest rather than equity-type investments means that the expected future investment return is likely to be lower, thus reducing expected future terminal bonus rates.

If reversionary bonus rates have increased, as discussed above, then this would further reduce expected future terminal bonus rates.

### **Smoothing**

As a result of the change in investment strategy, investment returns may be expected to be less volatile. Thus the need for smoothing should be less and hence the extent to which the company pays out something different to asset share at maturity may reduce.

### **New business**

If the changes to the with profits fund are considered to be significant in terms of the overall returns that a policyholder can expect to earn over the term of their policy and in terms of the smoothing/risk sharing with other groups of policyholders, then the company may decide to introduce a new bonus series for new policyholders.

### **General**

The company must consider policyholders' reasonable expectations and the principles of treating customers fairly.

The company will need to consider equity amongst different cohorts of policyholders as a result of any changes to its bonus distribution strategy and smoothing strategy.

The company will need to communicate any expected changes in its bonus distribution strategy and smoothing policy in the PPFM.

### ***Comments on question 2(iii):***

*This question part was looking for a good grasp of bonus distribution philosophy, and was answered reasonably well by many candidates. Common omissions were consideration of changes to the smoothing approach, the treatment of existing v. new business, and the need to weigh up the impact of the investment changes against other influences on bonus strategy, e.g. competition. Some candidates stated that smoothing would be higher due to the reduced volatility, apparently not understanding the difference between the*

*natural smoothness of the raw asset share and the smoothing policy that the company chooses to apply to this information in order to set bonuses.*

(iv) **Reasons for sensitivity**

The Director is correct that the realistic working capital is sensitive to changes in market conditions.

As it is likely that the working capital is invested largely in assets other than cash, the value of the working capital will clearly vary as market conditions change.

Further sensitivity is due to the existence of guarantees and financial options on with profits business. Their cost is included within the liabilities when calculating the realistic surplus. For example, maturity guarantees are like a put option and therefore increase in value when the asset share falls and increase in value when risk free rates decrease.

Similarly the fact that with profits benefits are smoothed increases sensitivity, since a liability must be held for the expected cost of smoothing and this could act in a similar way to the cost of guarantees under different economic conditions.

If the company does not hold assets to back these liabilities that move in the same way when market conditions change then the realistic surplus will be sensitive to changes in market conditions.

Since the company is a mutual, the realistic value of without profits business written in the with profits fund is included as an asset in realistic surplus. Unless this business is perfectly matched, it may also contribute to sensitivity. However, the impact is likely to be less significant than the impact on the cost of guarantees.

**Potential solutions:**

***Assets backing working capital***

The company could simply invest the assets backing the working capital into cash. This would reduce sensitivity to market conditions but would clearly limit the upside potential for returns on this capital.

***Assets backing asset shares***

The company could further reduce the equity and property holdings backing the asset shares. This would reduce the exposure to falls in equity or property values. However, as a very low equity backing ratio is unlikely to be consistent with policyholders' expectations, it is unlikely that market risk can be removed completely through this strategy.

Also, if the fixed interest stocks are not matched to the duration of the guaranteed liabilities, exposure to changes in fixed interest yields would remain. It is rarely possible to match duration precisely, because assets of long enough term may not be available and because the timing of liability cashflows is not known with certainty.

### ***Derivatives***

The company could attempt to purchase a derivative, or series of derivatives, for example that moves in line with the cost of guarantees or options when market conditions change.

However, the cost of guarantees and options depends on assumed future management actions, such as bonus rates, and changes in asset mix within the asset share. The company is therefore unlikely to be able to find a derivative that moves exactly in line with the cost of guarantees.

Also, tradeable and liquid equity derivatives are only available at relatively short terms, whilst the liabilities may be longer duration. Property derivatives are not actively traded. The company could purchase a tailored OTC derivative, but this would involve passing significant profit margin to the provider.

Alternatively, it could develop a strategy based around shorter dated options, which are then rolled-over with time. In doing this it will have to consider whether it is comfortable in re-balancing the portfolio in this way as time progresses.

Holding options would also reduce exposure to changes in market implied volatility, which also affects the cost of guarantees and options.

### ***Dynamic hedging***

Another approach would be to develop a strategy of selling equities as market values fall. This can be done to attempt to replicate the impact of holding a put option. However, in practice, such sales may not be possible within the required timescales in a rapidly falling market. This will be particularly true for property, which can only be traded in discrete amounts unless it is held via unit trusts. Also, this approach would leave the company exposed to changes in the market implied volatility.

### ***General Points on Assets in Excess of Asset Share***

It may be possible to reduce exposure to interest rate movements by changing the duration of the fixed interest assets not backing the asset shares.

In theory it should be possible to completely remove market risk through an appropriate investment strategy in respect of those assets not backing the asset shares (with the cost of the assets being equal to the cost of the guarantees); this is difficult to achieve in practice.

***Product design and bonuses***

The sensitivity could also be reduced if the costs of guarantees, options and smoothing were reduced or even removed.

Although it is unlikely that guarantees could be removed from existing policies, the company could reduce future sensitivity by removing explicit guarantees from new products or by reducing the level at which guarantees build up, e.g. by reducing reversionary bonus rates.

Similarly it could reduce the level of smoothing applied to payouts.

***Comments on question 2(iv):***

*This was a difficult question which required candidates to apply a general knowledge of the types of assets available and knowledge learned in earlier exams to a life insurance situation. Candidates generally struggled with this question part, with very few covering more than one or two ideas. Few students appeared to understand well the components of the realistic balance sheet and how they might move relative to each other under different market conditions. Even very basic points, such as what assets the working capital is invested in, were covered well by very few students. Some candidates wasted time by discussing how the working capital changes due to things other than market conditions, which does not address the director's concern. Some candidates did not appear to read the question correctly and discussed the relative sensitivity of the net premium and gross premium valuation methods.*

**END OF EXAMINERS' REPORT**