

EXAMINATION

September 2005

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

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There was no evidence of time pressures having been a significant factor. The main areas of weakness surrounded valuation issues. This has also been the case in previous exams. Also, some candidates set out standard solutions to non-standard situations whilst others answered the questions that they would like to have been asked, rather than the specific questions asked. The other main problem amongst candidates who failed was not going into sufficient depth in their solutions. Good candidates applied their knowledge to the specific situations and gave a good breadth of answer. It should be noted that there are a significant number of bonus marks available and even the best candidates would not be expected to produce all the points in the standard solutions.

1 (i)

The main risk is that the value of the property is less than the accumulated debt at the time of death. This could be caused by an extended period of high interest rates not matched by an increase in property values, or by a property market crash. Since high interest rates make mortgage payments more onerous these conditions could occur together.

There is also a lack of data on house price inflation and volatility, both of which have a big impact on the value of the contract. This will make pricing difficult and increases the risk that the price is calculated wrongly. Also, different parts of the country may be more exposed to property falls than others. The company may get a bigger proportion of its business from these areas than it expected.

Residential property values may be more likely to fall at times of low equity values. Low equity values may also cause the company difficulties so the risk from this product may be correlated with the other risks that it is running.

The contract is essentially a put option on the property value up until the time of death. There is therefore a risk that policyholders live longer than expected since this will increase the value of a put option. There may be limited data available on the mortality experience of the target market, which increases this risk.

The insurer will have assumed a certain level of future expenses when pricing the contract. There is a risk that actual expenses turn out to be higher than those assumed. The sales process is likely to be lengthy and complex, increasing the expense risk. If fewer policies are sold than expected then development costs may not be recouped. The company might get too much business for its admin areas to be able to process efficiently.

Since there is a lot of uncertainty in future experience, the company is likely to include a lot of prudence in its reserving so the product is likely to be capital intensive. Writing significantly more business than expected may significantly reduce free assets

Any remaining spouse may refuse to move out on death leading to bad publicity. The life insurance company may be affected by bad publicity for the bank arising from mis-selling related to this product or equity-release products in the market place in general.

The property may not be maintained in good condition, leading to a loss of value. This risk is correlated with the risk of people living longer than expected since people who live longer may be less able to maintain the property. There is also a risk that, since the seller has no interest in maximising the sale value, the best price may not be achieved.

In general, this question was reasonably well answered, although there was a tendency amongst some candidates not to cover a sufficient breadth of risks or to concentrate too much on specific risks. Few candidates mentioned the difficulty surrounding the lack of data or the fact that the adverse experience might have an impact at the same time as other risks to which the company may be exposed.

(ii)

The company could use property derivatives to reduce exposure to falls in property values. As there are no traded property derivatives that the company could purchase to match this risk it will have to purchase over the counter derivatives if it wants to match the risk. The price for such a derivative is likely to include significant margins for prudence. The single premium could be invested in short dated bonds to reduce the exposure to increases in short term interest rates charged by the bank, or invested in interest rate swaps that increased in value as interest rates rose.

The other main way to reduce the risk is to reduce the maximum loan as a percentage of the initial property value. The maximum loan could vary by age or region to better match the risk. Also, premium rates could be varied by the loan / value ratio.

The company could also carry out independent valuations of the properties at outset to ensure that they are not in a state of disrepair. It could put a clause in the contract that it will inspect the property on a regular basis and charge for the cost of any required repairs.

The company could set a high minimum age to limit the expected term of the policy, or increase the premium charged for the insurance.

The company could do as much research as possible into the potential market to reduce uncertainty over future volumes as far as is possible, or monitor volumes sold carefully so that it can remove the product if there is too much new business strain or if the admin areas cannot cope. It could also monitor the mix of properties by geographical location and put limits on the weighting in any one area.

The company could carefully monitor and control expenses post launch.

The life insurance company could attempt to influence the bank to have fixed interest rates or to offer only joint life second death contracts to reduce the risk of bad publicity. It could also ensure that the policy terms and conditions were clearly worded to avoid any ambiguity, for example when people move house.

This question was relatively poorly answered. The main problem was insufficient explanation of the points; the general issue would be noted without an explanation of why it would help. There was also insufficient breadth of ideas.

(iii)

Due to the volatility of property prices a stochastic approach would be appropriate. A model would be built to simulate future property values with a large number of simulations needed to give a reliable estimate of the value of the liability. Ideally the model should be calibrated based on historic values and volatility of residential property. The lack of available data will make this problematic.

An assumption would also be made for future interest rates to give the accumulated loan value. If there is sufficient data then this may also be stochastic and correlated with the model for property values.

An assumption would also be made for future expenses, allowing for future expense inflation. An assumption would be made for future mortality experience, including improvements, based on past experience for insured lives in general adjusted to reflect any difference in target market. A light mortality rate would be prudent.

If future lapses reduce reserves then no allowance should be made for future lapses.

In order to project property values, the current property value is required. It is unrealistic to value individual properties each year so this is likely to be the original value increased in line with a regional property index. The original loan will also be accumulated at the interest rates applied since outset to give the current accumulated debt or obtained directly from the bank.

The current property value and accumulated debt will then be projected using the assumptions made to calculate the reserve under each simulation as $\text{probability of death} \times \max(\text{accumulated debt} - \text{property values}, 0)$ summed over all future ages and discounted to current date + value future expenses. The simulations will give a probability distribution for the required reserve which can be used to find the reserve required to meet the liabilities with the desired probability. Due to the lack of data available to calibrate the model the chosen probability is likely to be quite high.

If business volumes are low then the sum of the premiums paid could be held as an approximate simplified method.

This question was very poorly answered. A significant number of candidates did not identify that a stochastic approach was appropriate and gave very generic valuation approaches that were not suitable for this particular product. The better candidates did identify that a stochastic approach was appropriate but, as in part 1, few candidates mentioned the practical issues such as lack of suitable data, and few mentioned the fact that the current value of the property and the loan would be required.

2 (i) The main factors to consider will be:

Volume Potential:

The company would want to ensure that a sufficient sized market exists for its products. For savings, this would depend on the overall level of demand for savings in the country and on the level of competition for the available savings. For protection the level of demand will depend primarily on the extent to which the population perceives it has a need to purchase protection. This may depend on factors such as the level of state benefit provided, or on cultural factors such as the extent to which other family members provide financial support in event of death. The level of demand will also depend on factors such as the wealth of the population and the size of the population .

The company will want to consider the types of products that are currently sold in the market, whether there are gaps, and whether it will need to develop new products. It will also want to assess the extent to which customers are loyal to existing brands and therefore willing to purchase from an overseas company

Profit Potential:

The company will want to ensure that business can be written in the country on profitable terms. Again, this will depend on the level of competition. It will also depend on the regulatory environment such as whether there are restrictions on premiums and charges. It will want to ensure that the profit is sufficient to cover the development costs.

Since the company has no experience in the country, it is likely to include margins in its experience assumptions and / or use a higher risk discount rate when calculating the potential profit. It should also consider the general level of uncertainty about mortality experience, for example due to the potential for epidemics and increases in the level of infectious diseases.

Distribution:

The company will need to ascertain that its products can be distributed. This will depend on the existence of a suitable distribution channel for its current products, or alternatively on whether the company believes its products can easily be adapted to existing distribution models. The company may prefer to sell into a country that enables it to use insurance intermediaries since it has experience of this. It should consider the potential for takeovers if this would aid distribution.

Fiscal Regime:

The choice of country may be affected by fiscal incentives, which may exist to encourage the take-up of insurance products. Alternatively, any incentives may only be available to purchases of products of domestic companies, which

discriminates against foreign insurers. Typical fiscal incentives are tax relief on premiums, favourable tax treatment of benefits and tax-free investment gains.

The company will consider the tax rate that is applied to profits earned. It will take into account whether there are restrictions on taking profits out of the country and the tax treatment in the UK of profits earned in another country, specifically the extent to which this varies between country.

Regulatory Environment:

The choice is also likely to be influenced by the nature of the regulatory regime in the target country. There may be restrictions on foreign companies entering the market; in extremis it could be illegal for the company to sell in a specific country. At the other extreme, the company may be able to distribute its products and be subject to regulation in its home state (such as happens in the European Union for example).

Different regulatory regimes may have different requirements in terms of reserves or start-up capital and this should be taken into account, as should the level of regulation surrounding the sales process and the extent of this on the quality of sale or potential for fraud.

Other:

The company is likely to want to invest in assets in the local country for its unit-linked savings products so will want to ensure that such assets are traded locally. It will consider the availability and cost of reinsurance in the country.

It will want to consider whether there are specific currency risks and that as far as possible that there are not significant political risks. It will prefer a company with a stable economy, so as to minimise investment volatility. It will also want to avoid countries that are prone to epidemics, wars, or natural disasters due to the potential impact on protection business.

It would be preferable to minimise language issues. If it intends to recruit staff locally, it will want to ensure that there is a large pool of suitable candidates from which to recruit. The cost of labour in the country will also be important.

It will want to consider the potential impact on the volume of sales in its country of residence of selling in different countries.

This question was generally well answered with candidates giving a good breadth of the issues that ought to be considered. There were no specific areas of difficulty.

(ii) **Country A**

Potential Market:

If the dominant domestic company sells similar products then it will be difficult for the company to gain significant distribution unless it either cuts price or increases commission it pays on sales — thus reducing unit profit. If the company does cut price, it faces retaliatory pricing from a competitor that has a dominant position that would further damage profitability.

The fact that the market is dominated by 1 state owned company may be an indication that the population is unwilling to purchase from private companies, or may indicate that there are regulatory restrictions on other companies. However, it may be that the market is ready for alternative providers. The company will need to investigate whether there has been recent regulatory change that indicates this is likely.

Population:

The high personal wealth implies that there is likely to be some demand for savings contracts. Average case sizes might be higher than in home market, increasing the potential for profit. On the other hand, the small population size limits the size of the potential market

Development of Market:

The relative lack of development of the market may increase the demand for investment guarantees rather than equity based investment. The relative lack of maturity of the market may mean that it may be possible to increase margin in the contract. The relative lack of development of the market means that only a relatively simple selection of investment funds are likely to be required — an equity fund, a property fund, a managed fund, a bond und and a deposit/cash type fund. The fact that the market is undeveloped may mean switching between product providers is less and persistency better.

Distribution:

It may be difficult to sell through the nationalised bank due to its connection with the dominant state owned insurance company. It is not clear whether it would be possible to introduce an alternative distribution channel but the evidence suggests that this would be challenging. The lack of brand awareness may make sales difficult. The dominant player makes it difficult to resolve this through a joint venture or takeover.

Other:

Given the likely lack of scale of this venture, unit costs may be high.

The fiscal regime implies that there may be high levels of state benefit, hence demand for simple protection products is likely to be low.

It is likely to be difficult to obtain data on past experience to use when pricing the contracts.

Country B

Potential Market:

The market is competitive, so prices may be lower meaning that profits may be low. If company feels it can achieve reasonable volume in the large market, it may be prepared to accept lower unit profitability.

Population:

The lower high personal wealth suggests that average case sizes might be lower than in home market, reducing the potential for profit. On the other hand, the larger population size increases the size of the potential market.

Development of Market:

Since the market is developed, it is possible that there will be demand for specialist types of investment funds for example hedge and derivative funds. The company may find its current range unattractive for this market. The developed and competitive market means switching activity is likely to be higher and persistency correspondingly lower.

Distribution:

The fact that a similar distribution channel is developing to that in the home country may mean that it should be possible to gain low cost penetration into this distribution segment. However building relationships may take time; the company may need to offer development loans in order to develop the distribution channel to be able to deliver significant volume. Otherwise, distribution will be difficult — the product range is too narrow to persuade existing tied distribution to switch. One way of building distribution relationships may be to allow distributors to manage and promote their own specific funds in return for a management fee.

The fact that it is a developed market with a large number of insurance companies may make a joint venture or takeover a suitable approach for obtaining distribution.

Other:

The lower levels of personal taxation may imply a greater emphasis on personal protection, thus increasing opportunity for sale of this type of product.

In general this part of the question was also well answered. The main area in which candidates tended to go wrong was a failure to identify the potential difficulties arising in country A from the fact there is a single dominant player that is state owned. These candidates then tended to conclude that it would be easy to obtain large profits.

3 (i) Impact on Free Assets:

The reduction in reversionary bonus rates will increase the deferral of the distribution of surplus. The director is therefore correct that a reduction in reversionary bonus rates will, in time, increase the regulatory free assets of the company. It will also tend to increase the realistic surplus, since it will reduce the cost of guarantees on the policy. The company would also want to consider whether writing more new business was reasonable in light of this realistic solvency position

Impact on Policyholders:

Treating policyholders fairly would mean that payouts should remain based on asset share. Terminal bonus rates could be increased over time to ensure no impact on the total payouts to policyholders — i.e. to keep in line with asset shares.

Such a large reduction in the level of reversionary bonus may not be in line with policyholder expectations. The PPFM will set out the factors that would give rise to changes in reversionary bonus rate, and hence whether the proposal is reasonable. These expectations will ALSO have been influenced by the company's past practice. If there had been no similar such large changes in the past, it may be considered unreasonable for such a large change at present. This is particularly true if there have been no marked changes to the economic conditions and the long term expected yields on the investments; traditionally this is what has the biggest impact on reversionary bonus levels.

It is possible that the proposed action would lead to intervention by the supervisory authority if they felt that it was not reasonable. The large drop in reversionary bonus rates may also lead to bad publicity. This bad publicity, or general policyholder dis-satisfaction, could lead to increased surrender rates . It could also lead to lower levels of new business. The impact on existing or new business levels is particularly likely if competitors were not taking the same action.

Use of Capital:

The director is correct that, in general, higher free assets will allow the company to write greater volumes of new business. This is because writing new business tends to cause a strain on capital as the reserves which have to be set up at outset tend to exceed the premiums paid less expenses incurred. However, even with such a large reduction in reversionary bonus rates, the impact on the free assets will only build up slowly over time. In the short term it is unlikely to help significantly the company's ability to write new business.

Furthermore, increasing new business volumes may not be the most appropriate use of any increase in free assets, and may result in inequities between different generations of policyholder. The returns available on the new business may not justify the risk to which the capital used to write the business is exposed. It might be more beneficial to the with profits policyholders to use any increase in free assets to increase the proportion of assets held in equity type investments. A higher proportion in equities would tend to increase the expected returns and therefore payouts to policyholders.

Other Options:

Since with profits business is the only source of capital for a mutual, if there is a reduction in volume, the long term impact of the reduction in bonus rates may be detrimental to the company's ability to write new business. If the company wants to generate higher free assets then it should consider alternative approaches such as weakening the valuation basis if this is currently overly prudent.

If it is content for the increase in free assets to build up slowly then it could reduce its reversionary bonus rate gradually or move to a super compound system of reversionary bonus which would increase the deferral of surplus. It could also consider reassuring a higher % of new business as this can help reduce new business strain. It could also investigate whether it could improve the matching of its assets and liabilities and hence its capital requirements.

Ultimately, if the size of the free assets is having a significant impact on the volume of new business which the company can write, it might have to consider alternative strategies such as issuing sub-ordinated debt, some form of financial reinsurance, or demutualisation.

This question was generally well answered. The discussion about PRE was good and most candidates discussed the alternative options available. The best candidates gave a broad answer that covered all areas. The main failing was a tendency to give too much detail about the net premium reserving method; the question did not ask for a detailed description of this method.

(ii) Insensitivity to Changes in the Market Value of Assets:

In the UK, the valuation rate of interest is based on the yield on the underlying assets. For equities and property, this is based on the running yield whilst for fixed interest assets this is the gross redemption yield. Changes in the market value of assets will therefore change the maximum valuation rate of interest.

However, under the net premium method, the future premiums valued vary with the valuation rate of interest. This means that, for regular premium policies, the reserves are relatively insensitive to changes in the valuation rate of interest and therefore changes in the market value of assets. However, for single premium policies, reserves are sensitive to the valuation rate of interest.

Furthermore, in the UK assets are valued at market value for supervisory purposes. So, if a significant proportion of the company's assets are held in volatile investments, such as equities, then the statutory surplus will be sensitive to changes in the market value of assets. This may be undesirable.

Failure to Adequately Reflect Likely Future Payouts:

The net premium method makes no explicit allowance for future reversionary bonuses. An implicit allowance is made through setting a valuation rate of interest less than the statutory maximum or, for regular premium policies, through the difference between the office and net premiums (to the extent that this does not need to cover future expenses). This implicit allowance may not exactly match the likely future reversionary bonus in line with PRE.

Also, the net premium method makes no explicit allowance for future terminal bonus since this is a discretionary benefit. So, if a significant proportion of payouts are in the form of terminal bonus, the net premium reserves may be significantly less than a realistic measure of the liabilities consistent with PRE.

This question was very poorly answered. Relatively few candidates covered both criticisms. A surprising number of candidates did not mention the fact that the net premium method makes no allowance for terminal bonus, whilst some said that terminal bonus did not form part of PRE. Few candidates mentioned the fact that the result depends on the yield on the assets held, whilst some candidates said that the method ignored the assets held. Whilst most candidates mentioned the insensitivity of the reserves, few related this to the volatility of the assets held.

(iii) General Considerations:

There is a need to consider whether the suggestions comply with UK regulations. The FSA has introduced a "twin peaks" assessment of mathematical reserves and realistic reserves. This applies to companies that have with profits liabilities > £500m. This new method does not alter the need for a company to reserve for guaranteed benefits prudently. However, it allows a company to calculate its mathematical reserves using a gross premium method. This makes the director's suggestion of a gross premium method consistent with the new regulations

The director's suggestion of earned asset share would also be required as part of the calculation of the realistic reserves under the "twin peaks" approach.

If liabilities were < £500m then the company will need to decide whether it wants to opt for a "twin peaks" assessment so as to be able to adopt the director's suggestions, or to opt out and continue using net premium reserves. In deciding this it would want to consider whether using an alternative method would leave it out of line with its competitors which may be viewed unfavourably by commentators, and the system development implications.

Gross Premium Reserve:

This method will produce reserves that are more sensitive to changes in market conditions so will address that criticism. This is partly because the future premiums valued will no longer change when the valuation rate of interest changes. It is also because the assumption for future reversionary bonus will fall when asset values fall.

An assumption would be required for future reversionary bonus rates. This can be problematic. In theory this should be the reversionary bonus that would be paid in line with PRE if the valuation assumptions occurred in practice. The assumption should also reflect cross-subsidies between policies that are inherent in the company's bonus policies. It should also reflect a glidepath from the current level of reversionary bonus to the long term supportable rate. To decide on the long-term supportable rate, the company would need to decide on how much of the final payouts would be made up of terminal bonus, which can be subjective.

There is no allowance for future terminal bonus under the director's suggestion so the reserves will still not fully reflect likely future payouts in line with PRE. The director's suggestion could be adapted by including an allowance for future terminal bonus in the value but a more direct way to assess the appropriate allowance may be simply to hold asset share.

The net premium method is difficult to apply for altered policies and a gross premium approach may be more practical for these policies.

The explicit allowance for future expenses is more realistic than under the net premium approach. However, due to high initial expenses, the gross premium reserve could be negative at early durations; negative reserves should be eliminated

Whether the suggestion, as it stands, increases or reduces free assets depends on the assumption made for future reversionary bonus and the market conditions at the time.

Earned Asset Share:

This method will also be more sensitive to changes in asset values as these will be directly matched by changes in the reserves. Since terminal bonus is likely to be based on asset shares, the reserves appear to make a full allowance for likely future payouts in line with PRE.

However, cross-subsidies inherent in the bonus policy, such as between large and small policies or by setting terminal bonus for quinquennial terms and interpolating for other terms may mean that asset shares do not reflect the realistic liability for all policies.

Also, the guaranteed benefits may exceed asset shares in certain market conditions. This probability of this increases, as the proportion of assets held

in volatile asset categories increases, and the higher the level of guaranteed benefits is compared to asset shares. The reserves would therefore not reflect the likely future payouts in all market conditions unless an additional amount was held to cover the guarantee costs. This additional amount would need to be calculated stochastically. If such an additional amount was held then, when the guarantees were close to the money, the reserves would again become insensitive to changes in market conditions.

If payouts are currently markedly greater than or less than asset shares then smoothing in line with PRE might mean that it takes several years before payouts can be brought in line with asset share. Also, if smoothed asset shares are used to determine payouts, and unsmoothed asset shares are held as reserves, the reserves would not necessarily reflect the expected payouts to policyholders. If the company wants to use a realistic measure of likely payouts then it should allow for this smoothing "cost".

If the company aims to pay less than asset share over time or to charge for the cost of guarantees then it should hold less than asset share as the realistic liability. On the other hand, if the company plans to increase asset shares to reflect profits made on without profits business, then this should be reflected in the reserves, if the aim is to achieve a realistic measure of payouts to policyholders.

Due to high initial expenses, the asset share could be negative at early durations; negative reserves should be eliminated for regulatory reporting purposes.

In practice, the company may not hold asset share for all policies on its admin system (e.g. altered policies) which may make the calculation difficult in practice, or expensive to implement. It may therefore need to adopt an approximate approach for these other policies.

If a significant proportion of the payouts on the company's policies are made up of terminal bonus then this approach is likely to lead to a reduction in free assets. If there is little terminal bonus then the value of the guaranteed benefits is likely to be high so if an allowance is made for this, there could again be a reduction in free assets if allowance is made for this cost.

This question was again quite poorly answered in terms of the breadth of points covered and depth of discussion. Although there are a lot of detailed points in the solution, candidates would not be expected to mention all of these. They would, however, be expected to go beyond a high level description of the sensitivity of the reserves to changes in market conditions, whether terminal bonus and reversionary bonus are explicitly reflected, and the fact that payouts tend to be based on asset shares. The good candidates did go beyond this.

Some others, however, gave a detailed description of the calculation method for an asset share, which was not asked for. Few mentioned the fact that realistic liabilities are likely to be in excess of asset shares, in particular due to the possibility of guarantees biting (more identified the impact of smoothing). There

was also little description of how a reversionary bonus assumption might be made for a gross premium reserve.

END OF EXAMINERS' REPORT