

EXAMINATIONS

April 2001

Subject 302 — Life Insurance

EXAMINERS' REPORT

- 1 The purpose of the supervisory reserves is to ensure that the company can meet all its liabilities as they fall due for payment. Because the liabilities do not crystallize for several years, assumptions need to be made in assessing the level of supervisory reserves required.

The solvency capital provides an additional level of protection for policyholders. It provides a cushion in the event of the assumptions used in setting the supervisory reserves not being borne out. The level of solvency capital may depend on the risks inherent in a particular product type.

In considering the adequacy of the reserves that have been set up it is important to consider the combined impact of the supervisory reserves and the solvency capital. In some countries reserves are set up on a relatively strong basis, i.e. with significant margins in the assumptions compared with expected future experience. These countries have relatively small solvency capital requirements. In other territories the position is reversed.

Should asset values not cover the total of supervisory reserves and solvency capital, regulatory authorities can be warned and take appropriate action.

Despite this question being an almost exact repeat of Question 1 in April 2000, a significant number of candidates did not know the correct definition of solvency capital.

- 2 (i) Solvency is measured by comparing the value of the company's assets with its liabilities on a statutory basis, as projected to different points in the future.

The deterministic method uses different future scenarios to test the effect of adverse future experience. The local regulator may prescribe the scenarios to be tested.

The expected future experience forms the central projection. As well as economic and demographic assumptions, other features such as new business volumes, product mix for each distribution channel, and persistency would be considered. The assumptions should be linked so that a change in one generates logical changes in the others.

- (ii) Using stochastic assumptions, it is possible to assess the company's probability of ruin within a specified time period. Ruin could be defined as the company not being able to meet its liabilities, or not being able to set up the supervisory reserves and solvency capital required. The latter is likely to be the more stringent.

The tests may be carried out either with or without assumptions for future new business, depending upon the purpose of the investigation.

The stochastic approach utilises at least one random variable to generate future investment scenarios. Consequently a number of different runs are needed to derive the ruin probability distribution (eg 1000)

Most candidates generally answered this question adequately.

3 (i) Advantages

- Simple to calculate.
- Easy to collect and the government will usually get the tax quickly.
- Hard to avoid (disadvantage for company!).
- No distortions between different types of business if the tax is universal.
- Easy to build into premium calculations.

Disadvantages

- A high profile front-end tax on savings is likely to be commercially and politically unpopular
- Insurance penalized compared with other forms of saving if the tax is only applied to insurance premiums.
- The tax take does not increase if the profits of companies increase (advantage for companies)
- May conflict with other government objectives (e.g. encouraging individuals to fund their pensions privately).

(ii) Other possible ways of taxing insurance business are:

- Tax on profits (i.e. change in value of assets less change in value of liabilities).
- Tax on investment income.
- Possibly with some sort of relief for management expenses.
- Tax on realised capital gains.
- Possibly with some allowance for inflation over the period held
- Tax on unrealised capital gains.
- Tax on policy proceeds (possibly tax excess over premiums paid).
- Tax policy proceeds only in the event of non-contractual termination
- Depending how policy proceeds are taxed, tax relief might be given on premiums.
- Include policy values as assets and subject to a wealth tax.

Many candidates tried to answer a different question to that set for part (i). Candidates were not asked to consider a country replacing the UK tax system with a premium tax. Many candidates went to unnecessary lengths in part (ii) when only asked to state alternative taxation methods, not discuss them.

- 4 The main expectation of policyholders is that the total maturity payout will be close to (or at least will move in line with) the smoothed accumulated asset share. This payout will be a combination of the guaranteed sum assured and all bonuses added.

The fall in fixed interest yields will have led to a substantial increase in the market value of the company's fixed interest portfolio. However, the outlook for future fixed interest investment returns may be poorer. Future premiums and other reinvested income may earn lower returns than previously. In addition, lower fixed interest yields are likely to be coupled with lower inflation.

The extent to which these features, and also the increase in equity market values, affect bonus decisions depends on the assets deemed to back the with profits business and hence on the accumulated asset shares.

Policyholders' expectations are likely to have been built up by:

- documentation issued by the insurance company
- the company's past practice, including changes in the mix of guaranteed and terminal bonuses.
- the general practice in the insurance market

It is likely that the regular bonus rate will have been based on fixed interest yields of 6.5%. In the changed environment new policies will not support this bonus rate, and existing business will gradually be unable to support the current bonus rates.

A move to a lower regular bonus rate will be essential if this is more than a short-term reduction in interest rates or rise in equity values. How quickly this occurs will be governed by policyholders' expectations. Some measure of smoothing in the reduction is likely. The extent of the company's free reserves and its terminal bonus cushion are also relevant factors.

If part of the accumulated equity gains is considered consolidated and secure, distribution by means of a special reversionary bonus is possible. This action will establish policyholder expectations. The company must take care to inform policyholders of the reasons for such a bonus and the likelihood of recurrence to avoid establishing inappropriate future expectations.

The company will have to consider how to treat the capital gains on fixed interest stocks. With a matched portfolio of fixed interest stock where the intention is to hold to maturity, market values will revert to par, so distribution of the gain may be inappropriate. Alternative investment approaches may mean that part of the gains can be distributed by terminal bonus, along with the equity gains. Terminal bonus rates can be reduced if market values fall.

Although there are likely to be only low expectations of the *amount* of terminal bonus, strong expectations are likely to exist regarding the smoothing policy, both between one year and the next and between contracts of similar duration within each year.

If both fixed interest and equity gains are reflected in terminal bonus it is unlikely that the smoothing policy will permit full allowance to be taken for all the increase in market values at the coming bonus declaration. However, terminal bonus increases will offset regular bonus reductions, which will be a marketing advantage.

Actions competitors are taking in the same investment conditions will also be relevant.

Even successful candidates generally answered this question poorly. Many candidates did not recognise that a fall in fixed interest yields would be coupled with an increase in market values. There is a danger in not reacting to change because you think it will be a short-term effect. If the effect persists, you may be forced to react in a year when markets are stable, which is more difficult to justify in PRE terms.

- 5** Reinsurance can be used to help reduce the variance of the company's expected mortality experience relative to its mean. This might be high because there are a small number of contracts for a very high level of cover. This may be a particular problem for this company as a small mutual since a few large claims may impact on its overall solvency.

This risk can be reduced by reinsuring the excess, if any, of the benefit over the company's retention limit for each policy. The retention limit for a small office entering a new market is likely to be low. This could be done using either original terms or a risk premium method.

The variance relative to the mean can also be high if the lives insured are not independent risks. This risk can be reduced through the use of catastrophe or stop loss reinsurance.

Reinsurance can also be used to help reduce the risk that the company's assumption about future experience is wrong. This may be particularly relevant for a company that is new to the market. Reinsuring a proportion of the benefit under every contract (quota share reinsurance) can reduce this risk. This could be done using either original terms or a risk premium method.

Reinsurance can also be used to reduce the capital strain involved in writing new business and thus enable more business to be written. This may be relevant for this particular company as it is a small mutual so will have a limited supply of capital. Original terms or financing reinsurance could be used.

Pure reinsurance companies will have a considerable degree of expertise on underwriting, product design, systems design and likely future experience which they could share with the company until it has built up its own expertise. This will be particularly relevant to this company as it is new to the market.

With a greater volume of business reassurers can benefit from a greater pooling of risk than the direct writer. They might also benefit from a different regulatory or tax regime. Even allowing for the reinsurer to make a profit, the direct writer

may be able to offer lower premium rates by using reinsurance than without it, and still make a given level of profit.

Treaty reinsurance enables immediate acceptance to be given without reference to the reinsurer. The company might use facultative cover to allow it to accept impaired lives.

Most candidates answered this question well.

6 Profitability

- The company will want to ensure that in most foreseeable circumstances the charges taken over the duration of the contract are sufficient to cover the expenses incurred whilst meeting its profit target.
- The higher the level of commission, the lower the level of profit per policy. However, it might mean more sales and hence more overall profit.
- Profit will increase with premium size because the value of the fund management charge will increase whilst some expenses will be independent of premium size.
- The higher the minimum premium the less exposed the company is to losses from small premium sizes.

Marketability / Competitiveness

- Since all companies have the same charging structure, commission and minimum premium will be two of the features that are used to differentiate products.
- Advisors will prefer products with low minimum premiums.
- Advisors will also prefer products with high commission paid at the outset of the contract, as they will incur high costs themselves at outset.
- Marketability and competitiveness therefore conflict with profitability.
- If the minimum premium is too high then the company may exclude a large part of the potential market.

Financing Requirements

- Consideration needs to be given to financing requirements.
- Since the only charge is a 0.75% fund management charge, the financing requirements will be high for a high initial commission product.
- This would suggest level commission is more appropriate but this again conflicts with marketing considerations.
- A low minimum premium will result in a higher financing requirement as the new business strain is greater for small premiums and the total number of contracts is likely to be greater.

Sensitivity of Profit

- It is desirable to have a design that minimises sensitivity of profit to changes in experience.
- Since the company is likely to incur a high initial expense (irrespective of the commission structure) and the only charge is the fund management charge, the profit will be particularly sensitive to lapse rates.
- This feature will be even more pronounced if high commission is paid at outset.
- Since lapse rates are unpredictable, this is an undesirable feature that suggests that initial commission should be a lower level of each premium.
- Initial commission that is repayable on early termination would reduce sensitivity to early termination.
- This again contrasts with marketing considerations.
- The possibility of premiums ceasing but the policy remaining paid-up may mean that the annual management charge on a small fund is inadequate to cover maintenance expenses.

Cross-Subsidies

- The nature of the charging structure means that there will be unavoidable cross-subsidies between small and large policies and short and long term policies.
- The main way of limiting this is through setting of a high minimum premium.
- Again this conflicts with marketing considerations.
- If commission is expressed as a percentage of the initial premium, varying the percentage with the term of the contract will reduce cross-subsidies.

Miscellaneous

- It is necessary to ensure that the contract can be administered on the company's administration systems.
- The minimum premium may be determined by legislation.
- Higher commission rates may attract bad publicity if the product proves not to meet policyholders' needs.
- Commission rates and minimum premiums should be broadly consistent with other contracts in the company's product range.

The question referred to the "bid value of units" which led some candidates to infer that there was a bid/offer spread available in the pricing basis. This was not intended, but candidates were not penalised for making this assumption. Successful candidates were those who had a logical structure behind their solutions, usually based on the core reading, and who addressed the specific areas of the question in each section.

- 7** (i) All assumptions should reflect expected future experience in the new environment.

The company's recent expense experience over a period, long enough to pick up trends but recent enough still to be relevant would be analysed, allowing for inflation since the investigation. Expenses would be split between maintenance, claim and investment expenses.

Overheads previously allocated to new business expenses will need to be transferred to another category, although there might be some increment business that would take its share of overheads.

Exceptional costs as a result of the closure (e.g. redundancy costs) will need to be modelled over the period over which they are to be incurred.

There will be diseconomies of scale as the volume of in-force business declines and overheads have to be shared across fewer contracts. Therefore there is a need to project future expected expenses and in-force volumes of business, and hence there is a close link to the withdrawal assumption.

Analysis of expenses between "fixed" and "variable" would be useful, so that the latter can be modelled as per policy expenses in the embedded value calculation and varied by in-force volumes. The fixed expenses could be modelled separately, with an allowance for inflation. Alternatively, the diseconomies of scale can be approximated by assuming a higher rate of expense inflation.

- (ii) Base on analysis of company's recent experience, split by duration, product and type of withdrawal and making allowance for special factors such as an adverse economic situation.

Allow for effect of closure to new business:

- If a sales force that is no longer employed serviced the clients, the level of contact will reduce and this may adversely affect persistency.
- If another life insurance company purchased the sales force then the clients are actively targeted and encouraged to transfer.
- Policyholders may have a lack of confidence in the company now that it has closed, which may cause surrenders to increase.
- There may be significantly higher withdrawals immediately following the closure that have not yet come through in the data
- However, if there are surplus assets (or "estate") in the fund then the prospect of sharing in their distribution may have a positive effect on persistency.

- (iii) The starting point is the assets currently backing the business, which are likely to be a mixture of equities/property and fixed interest.

The assumed yield on fixed interest will be based on the current average gross redemption yield with a reduction for risk depending on investment grade. Reinvestment may be assumed to be at lower rates.

The assumed return on equity and property is likely to be based on fixed interest yields plus a margin, where the margin may be derived from historical results.

The investment return on the with profits fund is then taken as a weighted average of these returns. As the fund declines and the portfolio matures, one could assume an increasing proportion invested in fixed interest. The speed at which this happens depends on the projected free estate of the company.

If strong, the fund can remain invested in real assets for longer, but the reasons for the closure may mean that a change in asset mix is necessary.

It is necessary for all the economic factors to be internally consistent, including the inflation assumption.

On the whole this question was answered superficially. Unsuccessful candidates either concentrated entirely on the special points relating to closure to new business and ignored the general points that should always be considered, or did exactly the opposite!

- 8 (i) The extent of the analysis will depend on the volume of business written. The aim is to split the data into homogeneous groups whilst keeping the volume of data within each group credible.

The investigation may be carried out on amounts basis as well as a lives basis and also net and gross of reinsurance. Only business accepted at standard rates would be included.

It is important that the claim data and the exposed to risk data correspond. The exposed to risk will normally be the average of the in-force policies at the year start and the year-end (but more accurately if the data are available), except that critical illness claims will be given a full year's exposure (rather than a half) in the year of claim.

The analysis would be performed to cover the experience for each year since commencement, but as significant volumes have only been sold for the last 3 years, it may be necessary to group the experience for some calendar years together.

The most important levels at which to carry out the investigation are:

- Sex
- Age (grouped as required)
- Smoker Status
- Duration since outset (grouped for longer durations)
(Experience will be lighter at early durations due to underwriting)
- Sales Channel (this is an indicator of target market)
- Type of illness

If enough data exists then the investigation could also be split by:

- Medical / non-medical cases
- Occupation
- Premium size
- Premium payment method

As there may be a delay between the date of claim and when it is admitted, care needs to be taken to include the claim within the calendar year and duration to which it relates. Allowance should also be made for any incurred but not reported (IBNR) claims in the more recent years.

- (ii) Assumptions are required for both the current level of critical illness experience and the expected future changes in this over the duration of the contract.

In interpreting the experience, care needs to be taken to allow for any features that may have impacted on the experience over the period of the investigation that may make it an unreliable guide for future experience.

The more recent years' experience would be used to help make an assumption about the current level of critical illness experience. This might be expressed as a percentage of reinsurer's rates, of a standard table if one exists, or of the pricing basis if different.

The trend in experience for recent years would be used to help make an assumption about the expected future trend in critical illness experience. If the volume of data were sufficient this trend would be considered separately for each type of illness to understand better the causes of the experience.

- (iii) Underwriting standards may have changed over the period of the investigation.

The experience for durations greater than three is based on small volumes of data so may not be credible. Similarly the trend in experience is only based on significant volumes of data for the last 3 years. This is unlikely to be sufficient to give an indication of likely future trends.

Changes in the sales process or the target market over the period of the investigation may affect experience.

The average premium size may have changed over the period of the investigation. This will affect the results if the analysis is not split by premium size.

Reductions in market premium rates over the period of investigation may have led to selective lapses and worse experience. If this will not be a feature of the marketplace in future then the results will not give an appropriate assumption.

Changes in the definition of a critical illness or the critical illness covered over the period of the investigation will distort results, as will changes in claims admittance standards. Consumerist pressure may lead to more pressure in future to admit claims that do not meet the strict definition

Future medical advances may lead to earlier detections of critical illnesses or more routine operations in future such that past trends are not indicative of the future. Particular medical advances that are not expected to continue in future may have caused past trends in experience

Candidates seemed to have difficulty in deciding which part of the question was appropriate for the points they wished to make. Credit was given even if points were made in the 'wrong' part of the answer. Many candidates suggested that only recent years experience would be analysed, which means that the selective effect of underwriting cannot be measured. Overall part (i) was answered adequately, part (ii) very poorly and part (iii) well.

- 9 (i) The main risk accepted is that the company will still be in existence at the maturity date, especially if there is no industry or state compensation scheme for failed companies.

The main risk avoided is any inability to repay the loan amount at maturity since the survival benefit is exactly equal to the mortgage amount.

There is no benefit payable on death or critical illness before the end of the loan period. This can be overcome by taking out a term assurance covering the £60,000 on death before 25 years. Alternatively the effect might be achieved slightly more cheaply by combining the term assurance with the pure endowment and taking out a without profits endowment assurance where the benefit is payable on death or survival 25 years. In either case critical illness cover could be added to the policy.

Depending on the terms of the contract no benefit may be available on early surrender and there is therefore a risk involved if the mortgage is to be repaid early. This may be avoided if the product does have a benefit payable on early discontinuance although this is likely to be on worse terms than if the contract remained in force to maturity. Alternatively the investor may be able to sell the paid up or ongoing product as a traded endowment for an amount in excess of the surrender value.

There is a risk that because of sickness the client cannot afford to pay the premiums. This could be overcome by including waiver of premium benefit. Similarly accident or unemployment may affect ability to pay premiums. There are short term insurance products to cover these specific risks.

(ii) **Product b**

This covers the death risk since the benefit on death is £60,000, or £40,000 plus bonuses if greater. An additional risk is accepted because the maturity benefit is only £40,000 plus bonuses. This may total less than £60,000.

The risk might be considered small however as a simple bonus of 2% in each of the 25 years will give a maturity value of £60,000. Even without the payment of a terminal bonus. The recent rate of regular bonus has been 50% higher at 3%.

Product c

This covers the death risk since the benefit payable on death is at least equal to the mortgage amount of £60,000, but an additional risk is accepted since the maturity benefit is expressed as the value of units. This could be more or less than £60,000.

The level of this risk will depend on the level of premium being paid, and whether there are any policy reviews to keep the policy “on track”. Even with reviews, a sharp fall in unit values close to maturity may result in a maturity value less than £60,000.

(iii) **Product b**

The premiums payable will probably be significantly higher than under (a), since as well as funding the death benefit, they will also need to fund any maturity payment above £60,000. They will also be increased to reflect the absence of the mortality profits that will accrue under (a) if the investor dies before maturity.

However because the company takes on all the risk in product (a) it will include greater margins in the pricing basis. This would tend to narrow the gap between the premiums for (a) and (b).

Product c

Although the premium might be expected to be greater than under (a), this need not necessarily be the case. The premiums will depend on the level of investment growth needed to return £60,000 at maturity and whether this is extreme or might reasonably be expected.

The additional cost of the death benefit will depend on the age of the investor and might be quite small if young, and especially if the level of premiums means that the sum at risk will fall quickly.

The facility for policy reviews might mean that the company is prepared to offer an initial premium based on a relatively high growth rate assumption.

Parts (i) and (ii) were answered well by most candidates. A number of candidates failed to read part (iii) correctly and spent time comparing the likely premiums under all three contracts, whereas all that was required was comparisons of each of (b) and (c) with (a). Very few candidates appeared to realise that the level of premium under a unit-linked mortgage endowment policy depends on the growth rate chosen (by the insurance company or sometimes even by the policyholder) to repay the target sum required at maturity.