

EXAMINATIONS

April 1999

Subject 302 — Life Insurance

EXAMINERS' REPORT

Comments on each specific question appear in italics at the end of each solution.

1 Mortality

On a without profit basis the only tools to limit risk are underwriting and reinsurance.

Reinsurance passes all, or a portion of, the risk to the reinsurer.

Original terms methods pass on all the risks; risk premium methods only reinsure mortality risks.

Reinsurance also passes on profit making ability.

Underwriting aims to remove substandard lives from the population charged standard rates.

On a with profits basis, the final payment can be determined by consideration of the earned asset share, which can be based on the actual experience of a cohort — although there may be practical constraints e.g. due to guarantees or PRE.

Model, parameter and random fluctuation risk sufficient data needed to reduce risk.

Expenses

On a without profits basis the full risk of expense overruns is borne by the company.

For with profits policies, asset share can reflect actual expense experience.

A lot of the risk is passed to the policyholder.

Inflation

For with and without profits, as with expenses.

Investment

For a without profits contract the full risk is borne by the company, and the risk can be minimised by matching the assets to the liabilities as closely as possible. In practice matching can be difficult because of the long term of the liabilities.

For with profits policies, asset shares reflect actual experience and so pass the risk to the policyholder.

However, as payouts are smoothed, the company picks up some risk (or benefit) in periods of volatile investment returns.

Persistency

For without profits products, until the policy has recovered its initial expenses, the risk of higher than expected lapses falls on the company.

For with profits contracts, the company is exposed to higher than expected lapses when the asset share is less than the surrender value.

For with and without profits contracts the surrender value scale is not normally guaranteed.

Thus it can be set to recover a desired proportion of expected profit from the contract, and can be altered with experience.

For PRE reasons it may be necessary to have higher than desired surrender values at early durations which will involve the company in some risk.

General

Margins may be built into the pricing of the products for miscellaneous risks.

This question was not well answered by the majority of candidates. The differences between with and without profits contracts were not emphasised and candidates tended not to specify which risks could be passed to the policyholder and which were borne by the company.

2 (i) Morbidity / Mortality

Analysis of the company's experience over a 3–5 year period

- long enough to have reliable data and short enough to be homogenous
- males and females separately
- make allowance for any changes in underwriting standards
- maybe for unit-linked whole life, or just unit-linked.

In addition — and particularly if company has insufficient data

- Industry data (such as CMI Reports in UK)
- Data from reinsurer
- Published tables

Published data will probably need adjustment for the particular circumstances of the company and its products

Need to consider trends in experience especially for morbidity
Would reconsider illnesses and conditions covered

Because of doubts over morbidity rates the company is likely to reassure considerably more of this business than of a whole life assurance contract.

If sufficient data may analyse by specific disease.

Rates included in reinsurance terms would probably be followed. AIDS projections are available, but only as industry-wide data. Data need to be interpreted with care. Deaths from the critical illnesses covered will be irrelevant, because a claim will have already been paid.

Other deaths release reserves as no benefit is paid. This is a different situation from the type of policy the data were collected from. Comparison of the proposed target market and that in the data is important.

Almost certainly likely to use the experience to generate an adjustment to a standard table.

Investment Returns

The purpose of having a unit-linked contract with no surrender value is to pass to the policyholder some of the investment risk.

Reserves will not be large, as there is no certainty that a claim will ever be paid.

The assets backing the unit-linked funds and the historic and expected future return on them will be available.

Low rates are cautious as they reduce the income from management charges.

Interest on sterling reserves will be assessed similarly, using fixed interest returns.

Expenses

The company should have analyses of expenses over recent years.

A series of analyses helps to identify trends to use in assessing future rates.

Expenses would be split into acquisition, maintenance and claim, and between contract types. The level of detail would depend on the size of the company.

Need to allow for any specific one-off costs.

Expenses might also be analysed into those which are contract size related and those which are policy related.

If the company's expense investigation does not provide credible data down to the particular contract type, broader averages may have to be adjusted.

Probably with input from reinsurers.

Inflation needs to be allowed for from the date of investigation up to the date the rates will be used and allowance made for any expected trends in future inflation assumptions

Commission

The rates and structure that the company intends to pay can be loaded directly into the basis.

Expense Inflation

National data on inflation of prices and earnings.

Expected future rates of inflation — possibly as measured by the difference in returns on government fixed interest and index-linked securities.

The expense inflation rate will be chosen to be consistent with the investment return assumption.

Withdrawals

The company should have an analysis of experience available relating either to this contract or to broadly similar contracts

Limited industry aggregate data may be available but will have to be adjusted to meet the particular contract and target market.

The analysis may need to be adjusted because it has been affected by unusual economic circumstances over the period the data were collected.

Adjustment may also be needed if the intended target market or sales channel are different from those in the data analysed.

Tax

Suitable assumptions will need to be made taking into account the company's current and future tax position

Profit

Risk Discount Rate/Profit criteria set according to the Company's requirements.

- (ii) Items which also appear in the valuation basis:

Mortality: As no payment is made on death, lower rates are more prudent.

Morbidity: The valuation basis would use higher rates than in pricing. This is the most important element of the basis.

Investment Return: Lower rates are prudent because they generate lower management charges. But as reserves are low anyway, the same rates might be used as in pricing.

Renewal and Claim Expenses: Valuation assumptions would be higher than in pricing to provide a margin, and may include an allowance for the impact of being closed to new business.

Expense Inflation: This would also be higher, but as in pricing the key is the difference between interest and inflation rates.

Renewal Commission: Unchanged from pricing basis.

Tax may need to be allowed for depending on the tax basis.

- (iii) Initial Expenses
Initial Commission
Withdrawal
Tax may not be needed if taxed on profits only
Profit

Candidates who concentrated on answering only the question asked generally did well. Part (iii) was not well answered despite its simplicity.

- 3** (i) Mortality risk: Death strain of 2.5% of value of units.

No medical underwriting and high ages so mortality will be heavy.

Lapse risk: Initial charge pays for commission but only a small margin for other initial expenses.

Company will make a loss on early lapse, or if excessive partial surrenders.

Mix of business/policy size risk: Per policy expenses paid for by fund-related expenses. For small policies this may be insufficient.

Also vulnerable longer term to poor investment performance.

- (ii) Increased mortality risk: in early stages of policy, when value of units has not grown to offset initial charge.

Increased risk in later stages too, if investments do not grow and/or partial surrenders are high.

Guarantee of “no loss” on death might lead to anti-selective applications

Increased lapse risk: if investments do not grow and/or partial surrenders are high.

Guarantee of “no loss” on surrender might mean higher use of partial surrenders.

Selective lapse risk: if market values are (temporarily?) low, policyholders who have SV guarantee may lapse causing a loss to the company

- (iii) Reduce maximum age at entry to control mortality risk.

Underwriting should be introduced to reduce mortality risk.

Increase initial charge and reduce monthly charge to match expenses better

Set minimum single premium to avoid large volume of small policies.

Remove/don't introduce guaranteed minimum surrender value.

Reduce/remove guaranteed minimum SA if partial surrender option is used.

There was a wide range of standards in answering this question. The candidates who took account of all the information given did well.

- 4 (i) It can protect the company from those lives whose health is so seriously impaired that they would have to be declined.

The underwriting process will enable a company to identify lives with a substandard health risk for whom special terms would need to be quoted.

A company may however aim to accept a large proportion of the business it accepts at its standard rates of premium.

For the substandard risks, the underwriting process will identify the most suitable approach and level for the special terms to be offered.

Adequate risk classification within the underwriting process will help reduce the possibility of anti-selection.

Underwriting will help in ensuring that the actual mortality experience does not depart too far from that assumed in the pricing of the contracts being sold.

For larger proposals, the underwriting process will help to reduce the risk from over insurance.

Lives could be individually underwritten rather than being put into broad risk bands

Claims underwriting will be used for admitting claims on products such as PHI and critical illness.

- (ii) Specific question on the proposal relating to travel to the region in the last 20 years, or any known intention to in the future.

For larger cases proof may be required concerning past travel e.g. sight of the applicants passport — although this will be of little help if the passport is relatively new and passports may not be stamped by the country concerned.

For larger cases, medical reports or medical examinations may be requested.

An exclusion clause may be included in the policy.

However, this may cause problems if the disease itself is not put as the actual cause of death, even though the disease lead to the fatal condition.

It is unlikely that the family of the deceased will allow post mortem investigations by the insurance company if the result is likely to exclude payment.

Product substitution: it may be that an alternative product may be offered that does not bear the same risk. For example, a shorter term policy may be offered where the contract terminates well before the expected time of death.

Special terms. Higher premiums may be charged based on the probability of infection.

Decline. For those lives seriously affected by the disease.

- (iii) (a) If this person develops the disease, then death will occur well within the term of the contract.

An exclusion clause could be included but this has the difficulties noted above.

A shorter duration policy could be offered, but it is unlikely to meet the policyholder's needs.

Death will occur late in the policy and so the sum at risk will be relatively low. An extra premium is likely to be the most suitable option.

- (b) Death from the disease will occur well after the end of the contract. Ordinary rates can apply.

Provided that there are no continuation or conversion options on the policy.

- (c) One of the lives is uninsurable.

However, a joint life last survivor policy can be written using the premium that would apply if the healthy person applied on his or her own life.

A small deduction could be made from the single life premium rate to allow for the possibility of accidental death of the healthy life prior to the death of the uninsurable life.

Again, this would be dependent on there being no conversion options on the policy.

Part (i) and (ii) were answered well.

Part (iii) was answered surprisingly badly: it requires only a careful reading of the question to gain several marks.

- 5** (i) The results of the analysis can be used to update the assumptions used to profit test the contracts, to calculate the embedded value of existing contracts and to determine the statutory valuation basis.

The results will enable the company to monitor adverse trends in the sickness experience.

So that it can take appropriate actions, for example tightening claims management or increasing the charges made for the sickness benefit, to rectify the situation.

The results will provide management information on the effects of past decisions, for example as regards initial underwriting or benefit conditions, on the resulting experience.

This will determine whether premium rate changes are needed.

- (ii) There could be a rise in claim inception rates.

Under group schemes, (unscrupulous) employers may see the existence of the scheme as a good alternative to making staff redundant.

A similar temptation would also arise under individual contracts, as a form of unemployment benefit.

There would almost certainly be a reduction in claim termination rates.

This would be due to a reluctance on the part of claimants to recover if they have little prospect of getting suitable employment.

The company should reconsider the definition of sickness it uses for new contracts.

A change to “inability to carry out any occupation” claims definition, if not already used, would be more appropriate in a situation of high unemployment.

As regards existing contracts, it might need to tighten initial claims management so as to reduce fraudulent claims, and to review actively existing claims.

The cost of doing so needs to be balanced against the resulting increase in claim management costs, and the possible bad publicity which may result.

Checks on existing claimants may need to be increased in frequency or made more stringent, for example all claimants may be asked to provide doctor's certificates at regular intervals. Alternatively, the company may choose to employ counsellors.

Again the cost needs to be considered against the potential benefit.

If the company has the ability to vary its sickness charges and its experience actually is worsening, it may need to consider increasing the charges.

The adverse competitive effect of doing so would need to be considered.

Part (i) is largely bookwork and was answered well. In part (ii) few candidates covered many of the actions possible.

- 6** (i) (a) The additions can take the form of “reversionary bonuses”, which usually are given on a regular basis throughout the lifetime of a contract.

There are 3 different types of reversionary bonus which can be used: simple compound or super-compound. These represent an increasing deferral of surplus.

Once declared they become attached to the basic benefits and cannot be taken away.

The additions can also take the form of a “terminal bonus” which is determined when the insured events occurs.

In theory this gives a lot of flexibility to change bonus.

In practice this does not happen, but even so a company will not guarantee to maintain the bonus at any particular level.

- (b) The profit to be given to a particular contract is expressed as a percentage of that contract's supervisory reserve.

The benefit under the contract and the premium payable by the policyholder are then increased by the same percentage.

Where this method is used, it is not unusual for the profit of the life insurance company to be divided into a “savings” profit and an “insurance” profit.

The “savings” profit represents the profit arising from the investments and is distributed to policyholders.

The “insurance” profit represents the profit from other sources and flows to the shareholders.

- (c) The dividend given to a particular contract may be calculated using a formula which takes into account that contract's contribution to profit from different sources – typically interest, mortality and expenses.

Alternatively, it may be taken as a proportion of the excess of the earned asset share of the contract over its supervisory reserve.

For this purpose, it may be necessary to use a special earned asset share that avoids new business strain.

The dividend can be paid in cash or converted into an addition to the benefits under the contract.

A terminal dividend may also be given.

- (ii) The “additions to benefits” method is eminently suitable as a significant deferral of surplus can be achieved by a suitable split between RB and TB.

Hence market value risk from equities is reduced by the ability to reduce TB.

Under the “revalorisation” method there is no deferral of investment surplus.

Hence significant investment in equities would require significant free assets to be held to cover the investment risk.

Thus it is unlikely that this method would be suitable.

Provided that it is the practice for companies to distribute capital appreciation from the equities as a terminal dividend, the contribution method can also significantly reduce the market value risk.

The bulk of this question is bookwork. It was generally very well answered.

- 7** Because of the impact of initial expenses, the asset share at early durations may be negative.

Even if it is positive, it may be considered too low to meet policyholders' reasonable expectations, given the premiums paid. Hence, the surrender value may be set above the asset share.

Competitive pressures may force the company to pay surrender values in excess of asset shares at some durations. This is particularly so where surrender values appear on the quotation issued to prospective policyholders.

The company may have a policy of paying benefits above asset share to with profits policies, in order to distribute part of its Estate, which it considers it no longer requires, or may pay less if it wishes to build it up.

The company may seek to make profits from discontinued policies through a deduction from the underlying asset share.

This may then be used to improve the benefits under maturing policies.

Alternatively, it may represent a charge to the company's Estate for the capital provided during the period the policy has been in force.

The benefits at maturity under a with profits policy are smoothed. The company will probably wish to adopt a similar approach under normal circumstances to the benefits payable on early discontinuance.

The asset share is likely to fluctuate from day to day. For practical reasons, the company will want to maintain a more stable surrender value.

Hence, even if the surrender value is targeted to be equal on average to the asset share, it is likely at times to depart from it.

The asset share may not make allowance for profits from miscellaneous sources.

This question is fairly straightforward. It was generally well answered but few candidates got most of the relevant points.

8 (a) The liability outgo is fully guaranteed in monetary terms.

A company will ideally want to invest so as to ensure that it can meet the guarantees.

This means investing in assets which produce a flow of asset proceeds to match the liability outgo.

This will involve taking into account also the term of the liability outgo, and hence the probability of the payments being made, so as to indicate the term of the corresponding assets.

It will probably be impossible in practice to find assets whose proceeds exactly match the expected liability outgo.

A best match is all that can normally be hoped for because of the uncertain cash flows and the length of the liabilities.

Modelling techniques will help to assess what such a best match may be.

(b) The liability outgo is partly guaranteed in monetary terms (the basic sum assured and reversionary bonus, once declared) and partly discretionary.

Considerations for the guaranteed part of the liability are as for (a) above.

The aim of the company will be to maximise the discretionary benefits and the investment strategy should aim to do this.

This means investing in assets that will produce the highest expected return.

The policyholders will usually expect the proceeds of these contracts to maintain their value in “real” terms.

Equity shares meet the criteria outlined above.

The existence of free assets enables the company to depart from the matching strategy required for the guaranteed benefits to improve the overall return to policyholders.

Thus a portfolio of equity shares would be appropriate if the free assets were sufficient to provide the necessary cushion.

- (c) Here the liabilities depend on the operating efficiency of the company, and on future inflation of prices and salaries.

Although the liabilities are not guaranteed in money terms they have to be met and are effectively index-linked.

The assets depend on the performance of the funds in which the contracts are invested.

Although in general terms there is an expectation that the income from equity-type assets will increase, over the long term, in line with or in excess of inflation, the theory of matching or immunisation cannot be applied to this situation.

The risk is that future expenses will increase at a rate faster than would be covered by increases in the management charges.

A resilience test approach is required to assess whether additional assets would be required and this would normally be done as part of the calculation of the non-unit reserves for the linked contracts.

This question caused some difficulty. Part (i) was well answered; part (ii) less so with many candidates missing the relevance of the free assets. Part (iii) was not well answered with many candidates missing the link between inflation and fund growth for equity-type investment.