

REPORT OF THE BOARD OF EXAMINERS ON THE EXAMINATIONS HELD IN

April 2002

Subject 302 — Life Insurance

Introduction

The attached subject report has been written by the Principal Examiner with the aim of helping candidates. The examiners are mindful that a number of interpretations may be drawn from the syllabus and Core Reading. 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.

The report does not attempt to offer a specimen solution for each question — that is, a solution that a well prepared candidate might have produced in the time allowed. For most questions substantially more detail is given than would normally be necessary to obtain a clear pass. There can also be valid alternatives which would gain equal marks.

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Chairman of the Board of Examiners

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Overall this paper was well answered. The candidates who were not successful tended to reproduce the contents of the core reading without relating the points made to the contract or type of business covered in the question.

1 (i) Additional risks accepted

Investment risk because the initial expenses incurred at outset are now to be recouped by a charge related to the fund value. With poorer than anticipated performance it will take longer to recoup the expenses so profit will be reduced. This is outside the company's control if the policyholder has a choice of investment funds.

Persistency risk because the time taken to recoup expenses will be longer. There is therefore more exposure to persistency fluctuations.

Model risk may increase. For example withdrawal experience may change because higher values will be available earlier. This could affect the profitability if not allowed for in the pricing.

The company also accepts a one-off marketing risk — it is presumably making the change to attract more business, and hopes that its analysis of the market is correct so that more business results. There is a risk that potential policyholders could be put off by the changes in design

If reductions in yield or similar figures are used at the point of sale, the deterioration may reduce sales volumes.

The new structure is more capital intensive, so there is a risk that sales might have to be restricted if capital is limited

Risks reduced

The only risk reduced is the marketing risk: a contract with poor early termination values is believed to be poor value to the consumer. Allocating units immediately will improve the perceived value.

(ii) Early termination values would increase because units are allocated immediately and there is no surrender penalty.

As there is no change in persistency rates or the pricing basis the ultimate maturity payouts would reduce because:

More of the total premiums paid by any cohort are paid out to early leavers, so less is available to those who stay.

The new business strain is not repaid as quickly as with a nil allocation period. The providers of the finance will require a return on the capital provided. The return they will require will be greater than the investment return on the linked funds. This will reduce further the funds available for those who stay to maturity.

Part (i) was answered well. In part (ii), many candidates talked about the introduction of a termination penalty, despite the question stating that contract design features were unchanged. Similarly, if more is paid on surrender, as correctly identified, and profitability does not change, then the money can only come from normal terminations. This point was only grasped by few candidates.

- 2** The company will wish to maximise its total profit, which is the profit per policy multiplied by the number of policies written.

Hence the company will be prepared to pay higher levels of commission to those intermediaries from whom it expects greater volumes of business. This would help protect its market share. The company shares the benefits of economies of scale with the intermediary in the expectation that this encourages the intermediary to continue placing business with the company. This sharing is achieved by the company accepting lower profit per policy in order to pay the additional commission

If the company pays commission at a greater rate than is loaded into the product pricing then it accepts the risk that loadings may not cover all expenses if the anticipated business volumes are not written. This risk could be reduced by paying the additional commission as an override depending on the volume of business actually written.

If on the other hand the product is priced such that the highest level of commission the company pays is loaded for, then it may be that the product will appear uncompetitive.

Some intermediaries may do more administration themselves, reducing expenses and giving scope for increased commission.

The company might also offer higher rates of commission to intermediaries that it expects to introduce business with better persistency (lower lapses) than the average. Here the company is giving the intermediary a share in the benefits of improved persistency.

Similarly higher average premium sizes might attract higher commission rates. If fixed expenses are recovered by size related charges, there is a benefit that might be shared with the intermediary.

The obvious risk is that the persistency or average premium size deteriorates (or does not live up to that expected). It is thus necessary to monitor the performance of each intermediary. To avoid this the additional commission could be paid as renewal

commission, or some years after commencement, or initial commission could be clawed back if the business proves not to be of better quality.

Another reason for paying higher commission might be to encourage business from a new source. The additional commission may be funded from a marketing budget rather than the commission loading. Unlike general marketing expenditure that may not result in additional business, the increased commission is only incurred if the business is written, and so risks are reduced.

It might be market practice to have a series of commission scales. There is a list of losing business if intermediaries think they are on the “wrong” scale.

Most candidates scored well by identifying that better persistency and higher case sizes are more profitable, although not many developed their thought processes to the other reasons for enhancing commission. Only the better candidates identified that total profit is sales multiplied by profit per unit.

- 3** The appropriate investment policy for the company would be to attempt to match the liabilities by nature, term and currency. To the extent that it does not do this it opens itself to risk.

Some risks may be unavoidable — for example matching assets by term may not be available — and the investment policy should be to minimise the risk, for example by immunisation.

The extent to which the company is able to take risks by departing from the above principle in order to maximise returns will depend upon the level of the company's free assets.

The liabilities are of known amounts (either in real or nominal terms) at known times (provided mortality fluctuations can be ignored). Hence the natural matching assets are fixed interest or index-linked guaranteed bonds.

In order for the annuities to be both competitive and profitable the company will need to earn a rate of return in excess of the returns available on government stocks.

It may achieve this by investing in assets other than government stocks or it could invest in a portfolio of government stocks and attempt to increase returns through switching activity. It is unlikely that switching activity would generate an adequate additional return.

If there are large free assets, then the company can take a long-term view of the returns it might earn on ordinary shares and use the free assets to protect it from short-term fluctuations in value. Over the long term, the shares might be expected to produce the required extra return above government stock. However, there is no guarantee that the extra return can be earned over the duration of any particular block of business, and so the company could face the risk of insolvency if it adopted an investment policy similar to that described.

Using ordinary shares means that the liability outgo of the annuity portfolio cannot be matched. Furthermore a large equity content is likely to lead to greater reserving requirements, for example resilience reserves may be required.

Stocks issued by for example the European Investment bank and the World Bank are guaranteed by a group of governments. There is no risk of default but they offer a higher yield than government stock because of poorer marketability. Company loan stock will typically offer an even higher return to reflect both the poorer marketability and the risk of default. The default risk may be more acceptable than the risks of equity investment to gain the additional return required and poorer marketability may not be an issue if it is possible to match the liability outgo of the portfolio since the theory assumes the assets will be held to maturity.

Overseas assets might give higher yields, but the currency risk needs to be allowed for.

A derivative strategy might increase returns, but costs may be prohibitive.

Future expenses are likely to increase in real terms, and a matching asset with similar characteristics is appropriate. Equities or index-linked stocks may be a good match.

Many candidates scored well, although some spent time proposing an alternative investment allocation (not asked for) and others wasted time criticising the basis for being too aggressive rather than answering the intended question. The arguments for including (or excluding) equities in the portfolio were generally not developed in a logical manner

4 (i) Advantages:

Guaranteed income for life.

Opportunity to link income to inflation.

No upfront premium payment required, so appeals to the capital rich but income poor by unlocking the equity in their houses.

Disadvantages:

Poor perceived value. The initial annuity will appear low since the company will have to reflect the risks of matching a stream of annuity payments with a reversion on the house, which yields no income in calculating the annuity rate.

The house valuation is a matter of valuer's opinion rather than fact.

Legal costs are likely to be large and these will form part of the initial expense loading in the annuity rate.

Difficult for policyholder to understand, legal advice may be required.

What happens to a surviving spouse / partner if written on a single life basis (e.g. if married after annuity purchased)?

What happens if the policyholder wishes to move house or needs to go into a long-term care home?

Reduces children's inheritance — may cause disagreements.

Policyholder ceases to benefit from house price movements (could be an advantage or a disadvantage).

- (ii) Longevity risk in respect of immediate annuity. The impact of the longevity risk is multiplied by reversionary nature of premium because the house value will only be realised on death.

Anti-selection risk.

Investment risk, particularly since house price growth is mismatched against level or inflation-linked annuities (although closer for the latter), or house prices may even fall.

Expense risk, particularly important here as expensive to administer.

Cash flow mismatching risk — no cash is received until the policyholder dies so liquidity is needed from elsewhere to pay the annuity.

Volume risk — low perceived value may limit sales and so development costs may not be recouped.

Capital requirements due to prudential margins in reserving.

Reputation risk — there may be disputes if the company forces a sale to realize its part share of house on death. There may be accusations of misselling a complex product.

Have to ensure the house is maintained in good condition and adequately insured. The cost of this might be shared with the insurance company as it has an interest in the property.

Overall answered well.

- 5** (i) If the company is completely new to this market then it will have to obtain information from sources outside the company to determine the claim inception and termination rates. This will include obtaining information from reinsurers and from other publicly available information such as Continuous Mortality Investigation reports in the UK.

The assumptions need to be relevant to future experience, and thus any investigations need to be recent and credible.

Trends in results need to be allowed for, and projected into the future allowing for advances in medical science.

Alternatively, the company might compare its final set of premium rates with those of its competitors to assess the competitiveness of its pricing basis overall.

If the company has previous experience in this market and is launching a variation of a product it has sold previously, then it is likely to use the sickness assumptions from that product as a starting point.

The assumptions will then be modified to allow for differences that are anticipated due to a different distribution channel being used to market the product, different terms and conditions (e.g. higher free cover levels, different deferred periods) and so on.

- (ii) The expenses will need to be split into those that vary according to the size of the policy and those that are fixed. In the pricing basis, this will result in an expense loading expressed as a percentage of premium and a fixed amount per policy.

The company will be able to use the expense analyses for similar regular premium policies results as a starting point, since many of the types of expense associated with administering the policy will be similar, e.g. setting up a new policy and direct debit instruction, annual statement of benefit, etc.

However the assumptions must then be adjusted to allow for the factors that are specific to this product, including:

- The costs of underwriting the policy. These will be related to the size of the policy and will impact the premium expense loading.
- The costs of writing a piece of new business. The number of quotes necessary to generate a new policy may be different for this type of business.
- Development and marketing costs need to be included and appropriately spread.
- The costs of processing a claim will be higher for an income protection policy than for a term assurance policy, since more evidence will be collected to ensure the claim is valid, claim payments will need to be made regularly and expenses will be incurred in managing the claimant back to work.

Some of these costs will be fixed per claim and some will vary according to the size of the claim, hence these adjustments are likely to impact on both the policy fee and the expense loading expressed as a percentage of premium.

Allowance needs to be made for the contract to bear an appropriate share of overhead expenses.

Expenses need to be inflated from the date of the investigation and (for initial expenses) up to the mid-point of the intended life of the premium rates.

If the company does not have any similar products on which it can base the expense assumptions, then advice from a reinsurer may be sought.

The split of expenses between the policy fee and the expense loading may have to be modified, since the policy fee may make policies with low benefits look prohibitively expensive when compared to competitors products.

Part (i) was answered well with most candidates picking up most of the points. Part (ii) was more varied. A number of candidates described how to carry out an expense analysis (despite the question stating "...how you would use the results of an expense analysis..."), and others did not show how a general analysis would be adjusted for the particular contract type.

- 6** (i) A model point is a single policy that is used to represent a homogenous group of policies from an underlying portfolio of business. The results produced by a single model point will be scaled up in order to give the result for the group of policies represented by that model point. A number of model points will usually be used to represent a portfolio of business.

The crucial factor in choosing model points is that they must adequately reflect the distribution of the business being modelled. This is so that the results produced by the set of model points are as close as possible to those results that would have been produced if all of the policies in the portfolio had been run through the model individually.

It is necessary to consider the risk factors that affect the profitability of the contract. These factors will have been considered when the contract was being priced and checking the model points used in the pricing model would be a sensible first step.

The factors likely to have the most impact on the profitability of the contract are the age and sex of the policyholder, original term and date of entry of the contract, sum assured/size of the policy, smoker status and the premium rates in force at the time the policy started.

An extract of data providing details from the in-force portfolio of business will be obtained and the policies grouped according to the factors identified, with the number of policies and total sum assured in each cell being noted.

By summarising the in-force portfolio according to the number of policies in each cell, it will be possible to identify cells that may be banded together. For example, it is likely that there will be a small number of lives at very young ages and at very old ages, with a large number of policyholders in the 25–45

age group. It may, therefore, be appropriate to group into a single cell all lives less than 16, for example, with the policies for lives between 25 and 45 being grouped into 5-year age bands.

The extent of the grouping will depend on the size of the portfolio, the accuracy required from the results of the model and the speed with which the results must be produced. In any modelling work, there is usually a trade-off between the accuracy of the results, requiring a large number of model points, and the need for the model to be easy and quick to run, requiring a smaller number of model points.

Checks against independent sources, such as the Continuous Mortality Investigation Reports, which are produced in the UK, can be carried out to ensure that all the appropriate risk factors have been identified and that the policies have been banded together appropriately.

- (ii) In order to check the appropriateness of the model points, the multiplying factor (i.e. policy count) attached to each model point need to be determined.

Compare the model points with those used in the pricing process.

Check the total number of policies and sum assured currently being modelled, against the in force data.

Check the data for outliers, such as sums assured greater than maximum allowed, ages above/below the maximum/minimum allowed, etc. Ensure these are removed or corrected before the model points are derived.

Check the sum assured against the premium paid for each cell to ensure that there is consistency between the two.

Calculate supervisory reserves using the model points and compare the result with the actual figure from published returns.

Calculate expected revenue account figures, such as premium income and claims, from the model points and compare with the actual results.

Vary the model points used and assess the impact on the modelled profitability results if there is doubt over the validity of the model points chosen.

Choose a model point and compare its calculation of profits with the subset of policies it represents.

Most candidates were able to define and describe the purpose of model points, but fell down in describing how they would be determined for the book of business under consideration. In part (ii) many candidates reproduced the bookwork relating to data checking for valuations, without adapting it appropriately.

- 7 (i) The principal reasons why an insurer may wish to defer profit distribution are:
- To provide a cushion of free assets to absorb worse than anticipated experience. For example, worse than anticipated claims experience.
 - To enable the insurer to write more new business than would otherwise be possible, since the insurer will have sufficient free assets to absorb the new business strain associated with writing new business.
 - To finance the acquisition of new sales channels, product developments, systems, etc.
 - To provide the insurer with the investment freedom to invest in riskier asset classes, such as equities, to achieve higher investment returns, which can be passed on to policyholders.

Profit deferral provides a cushion against which movements in volatile asset values can be absorbed without threatening the solvency of the insurer. If distribution is deferred unrealised gains do not need to be distributed.

Achieving attractive investment returns and declaring attractive rates of bonus may have an impact on the insurers competitive position which may, in turn, attract more new business.

To meet the expectations of the with profits policyholders. The policyholders may have expectations that the insurer will smooth investment returns, by deferring profit distribution in years when investment returns are very good and distributing more than earned during the year, in years when investment returns are poor.

(ii) (a) **Addition to Benefits**

This method can lead to significant deferral of distribution of profit.

The extent to which deferral of profit distribution is achieved depends on the balance of the profit distributed via terminal bonus, as opposed to reversionary bonus.

Terminal bonuses provide the greatest deferral of distribution of profit, since the profits are only distributed on maturity or surrender of the contract.

For reversionary bonuses, a super-compound reversionary bonus structure achieves the greatest deferral of profit distribution, followed by a compound bonus structure, with a simple reversionary bonus structure achieving the least deferral of distribution of profit.

(b) Revalorisation Method

Under this method the profit arising is likely to be divided into two parts, savings profit and insurance profit. The extent of deferral depends on how savings profit is defined, for example it may only include investment income, not gains.

The savings profit will usually be distributed at the end of the year in which it has arisen, hence there may be no deferral of distribution of the savings profit. In practice, a proportion of the savings profit may be retained, for example to enhance the free estate, and may not be distributed either to the shareholders or to the policyholders.

The insurance profit will usually be retained by the company for distribution to shareholders, as a reward for the insurance risks that they have undertaken. For a mutual the insurance profit may be distributed to the with profits policyholders or used to enhance the free estate.

The company can choose the extent to which the insurance profit is distributed. However, it is unlikely to be a large source of profit and it is likely that it would be distributed immediately, hence there is little deferral of profit distribution under this method.

(c) Contribution Method

Under this approach, there are different methods for calculating the profit arising on a contract.

One method divides the profit arising into three components, savings profit, mortality profit and expense profit, with the profit being distributed as a paid-up addition to benefits.

A second method compares the statutory reserve with the earned asset share and, where the latter exceeds the former, the company returns a proportion to the policyholder.

In practice, the profit arising does not have to be distributed each year as it arises — a portion can be held back to be paid as a terminal dividend. This terminal dividend is the difference between the earned asset share at maturity (or surrender) and the sum assured at that time. The extent to which deferral of profit distribution is achieved depends on the size of the terminal dividend relative to the dividends paid out during the lifetime of the contract. The greater the terminal dividend element, the greater the deferral of profit distribution.

In practice, this method provides greater deferral of profit distribution than the revalorisation method, but a lesser deferral of profit distribution than the additions to benefits method.

In part (i) candidates who recognised that surplus deferral increases free assets did well, although surprisingly few mentioned acquisition and merger activity. In part (ii) the addition to benefits method was well covered by most candidates. Answers relating to revalorisation and contribution methods were generally poor.

8 (i) The following items would appear in a cash flow profit test

Investment return
Premiums and benefits (annuity payments)
Contract design items (payment frequency, advance/arrear, escalation)
Expenses
Taxation
Age and sex
Commission
Expense inflation
Inflation assumption for index-linked annuities
Mortality — possibly a base table with improvement factors
Profit criterion — usually both an amount of profit and a risk discount rate
Valuation basis for establishing statutory reserves
Solvency capital requirements

A formula approach would not use the last three of these, and it would be difficult to allow for complex mortality improvement factors.

(ii) This is a significant assumption as reserves are high.

The expected return on the assets backing the contract is the starting point.

Reinvestment needs to be considered. However annuities are normally backed with a matched fixed interest or indexed portfolio, so there is normally little reinvestment. Hence the current yields (either nominal or real) would be used.

It is necessary to be consistent with other assumptions, particularly inflation.

There may be legal or regulatory constraints in certain territories.

(iii) The fall in new business needs to be investigated. It is most likely due to the price not being competitive, unless there are external influences affecting the whole market, such as a change in tax treatment.

For non-profit contracts, insurance intermediaries normally only give business to companies near the top of current rate tables.

The company could therefore reduce the price for each contract and thus reduce the profitability of each policy. The rationale behind accepting a reduced profit per policy is that there will be a greater number of policies written and so the overall profit, which is the product of the profit per policy and the number of policies, will increase.

The company could investigate expenses and implement efficiency improvements where possible without damaging service levels.

Reductions in commission would feed directly into the price, but this is likely to have a detrimental effect in this distribution channel.

The investment strategy could be changed to achieve a higher yield on the assets so that the annuity price can be reduced. This might involve an increased default risk, which needs to be taken into account, and will also require sufficient free assets to cover the risk.

Review reinsurance arrangements (e.g. reinsure to reduce risk and therefore remove pricing margins, or find cheaper reinsurance if used already).

Investigate possible tax efficiencies that are not currently being exploited.

Pay more commission to the intermediaries without changing the price. This again reduces profit per policy in the hope of getting additional volumes to compensate.

Develop alternative sales distribution channels, or product enhancements, such as with profits or unit-linked annuities.

Start to underwrite the business and offer higher annuities to impaired lives.

Invest in the general promotion of the company, either to all intermediaries, or to a targeted group.

Part (i) was generally well answered, although few candidates identified correctly the elements that would not appear in a formula method. In part (ii) some candidates repeated the answer to question 3 and discussed what an appropriate investment strategy ought to be, rather than answering the question set. Part (iii) was well answered.