

# **EXAMINATIONS**

September 2003

## **Subject 302 — Life Insurance**

### **EXAMINERS' REPORT**

#### **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.

J Curtis  
Chairman of the Board of Examiners

25 November 2003

# **EXAMINATIONS**

September 2003

**Subject 302 — Life Insurance**

**EXAMINERS' REPORT**

**1** (i) Existing shareholders through rights issues.

Policyholders — either from the with profits fund, retained surplus on non-profit or unit linked business, or through capital efficient new business i.e. with upfront charges.

Re-insurers through financing re-insurance.

Capital markets through issue of debt securities, preference or ordinary share capital

Securitisation of existing business profits — particularly for mutuals.

(ii) Capital is required in order to demonstrate solvency to regulatory bodies. It is also of use to demonstrate strength to other institutions such as rating agencies and insurance intermediaries, which helps to secure new business.

Capital protects insurers from the effects of adverse deviations in experience, for example fluctuations on claims experience or unexpected costs.

Most forms of new business require capital in their early years to cover the initial strains from expenses, commission and reserving. While excess capital enables the life insurance company to pursue more aggressive investment or pricing strategies Holding excess capital also reduces the need for external financing and can help insurers retain profits.

For with profits business capital can be used to smooth bonuses or pay more than asset share on maturity.

The company may use capital for investment in projects designed to create efficiencies in its business and consequent future profits. Additionally, it may be used to develop new products or sales channels, and can be used in merger and acquisition activity.

*This question was fairly well answered by most candidates. In part (i) most candidates were able to identify a range of sources of capital.*

*In part (ii) most candidates commented on new business strain and investment mismatching. Stronger candidates also identified a range of other uses including smoothing of bonuses and wider investments such as in the development of new products or sales channels, other infrastructure projects and merger and acquisition activity. However, many candidates failed to comment on the basic solvency related requirements such as demonstrating statutory solvency to the regulator and withstanding adverse deviations.*

- 2 Some expenses are directly related to the size of the premium, e.g. renewal commission payments, and it may also be decided that overheads should be shared in proportion to premium size. A model using premium related expenses would deal with these well.

However, many expenses are independent of the size of the policy, for example premium collection costs. If these are loaded in proportion to premium rather than on a per policy basis, then the modelled expenses will be incorrect if different sized policies lapse at different rates.

It is very unlikely that the company does not sell single premium products. These products do have an ongoing maintenance cost (e.g. publication of annual statements, dealing with queries) and should also contribute to overheads. Thus the company will need a separate per policy loading for single premium products, in which case additional work may be required to the EV model

The combination of a % premium and a per policy expense loading will complicate both the model and the process of setting the assumptions. Alternatively the company could load all expenses onto regular premium policies. However, if regular premium policies tend to lapse (or become paid-up) faster than single premium policies, then this will mean that the EV calculation is understating future expenses and thus over-stating the EV.

The same point is valid for policies that are currently or are expected in future to become paid-up; servicing costs do not disappear completely when a policy becomes paid-up.

Future premiums are unlikely to increase in line with expense inflation. Some policies will have automatic indexation, although this is likely to be at RPI rather than NAE. Group contracts with premiums linked to salaries will also have an element of inflation built into the premiums.

While initially the aggregate expense loadings in the EV will be set in order to meet current expenses, in future years the premium loadings will not keep pace with the inflationary increase in expenses incurred, hence again over-stating the EV.

Termination expenses are best reflected as a per policy amount., whereas investment expenses are usually expressed as a percentage of fund.

*This question was not well answered. Many candidates spent time describing in detail embedded values and the different types of expenses without relating them to the question. Most candidates identified that the incidence of some expenses matched the approach used in the question whilst other expenses did not but many failed to give examples to demonstrate proper understanding. In addition only the strongest candidates made wider comments for example about the complications caused by single premium and paid up policies or the incidence of expense inflation.*

- 3 (i) The policies are likely to incur similar levels of expense.

The cost of life cover is likely to be relatively small (compared to the premium) and so is unlikely to lead to different maturity values.

Typical investment assets for each type are:

- UL — equities
- WP — mixture of equity and fixed
- NP — predominantly fixed

For a long-term contract, this would normally lead to the unit-linked policy having the highest maturity value and the without profits the lowest, but the returns are volatile and at times may be lower than with profits.

A large fall in equity values just before the maturity date could mean that the UL could have a lower value than the WP, and possibly even the NP. The with profits bonus smoothing policy would protect against market volatility.

The with profits policy may be higher due to the over payment relative to asset share through bonus smoothing, or due to being credited profits from other sources.

The choice of unit-linked fund would also affect the outcome. A cash or gilt fund would be expected to have lower returns and hence lower maturity values.

- (ii)

The policyholder carries the risk of movements in interest payments on the loan. The without profits endowment would have a sum insured equal to the loan. So if the policy is held to maturity or the policyholder dies during the term, then the loan is guaranteed to be paid, and the policyholder takes no risks in respect of death or maturity.

The risk for the with profits policy depends whether the amount on which bonuses are declared is the full amount of the loan, or whether the policy is of the “low-cost” type where the estimated maturity value, including some (possibly prudent) allowance for bonuses is equal to the loan.

In the former case the policyholder takes no risks regarding repayment of the loan. There is a risk that the bonuses will be lower than anticipated, so he may not consider the additional benefit worth the additional premium.

Under the “low-cost” with profits policy and the unit-linked policy, the policyholder carries the risk that if investments under perform the loan will not be repaid.

With the unit-linked policy, poor investment performance will be compounded by the unit deductions, which will reduce the fund more proportionately. The smoothing policy under the with profits policy mitigates this risk.

The death risk is covered by the policy, although in theory deteriorating mortality experience could be passed to the with profit policyholder via lower bonuses. In practice this is unlikely to threaten the repayment of the loan on its own. The same is true of expense risk although this is more likely to impact than mortality.

Under all policies:

The policyholder risks being unable to repay the loan if sickness or redundancy means that he is unable to keep up interest or premium payments.

The policyholder runs the risk of failure of the insurance company, but in this case there may be state organised schemes to compensate to some extent.

If for any reason the policyholder has to surrender the policy, the return received on surrender is not guaranteed.

*In part (i) most candidates were able to identify the expected order of the size of the maturity values but only a few candidates explained the key reason for this as being the likely different investment mixes. In addition only a small number of candidates explained the circumstances in which the expected profile would change, e.g. after an equity market crash. Only the strongest candidates showed understanding of how the detailed operations of with profit contracts may impact on the order through use of smoothing, overpayment of asset share or incorporation of profits from other sources.*

*In part (ii) most candidates dealt well with the issue of investment risk. Many failed to discuss how the pooling concept in the operation of with profit funds may leave the policyholder exposed to expense or mortality risks. Many candidates identified generic risks around the failure of the Life Office and surrender values not being guaranteed. However, only a few candidates mentioned generic risks relating to the policyholder such as sickness or unemployment which may prevent them from paying the premiums required to ultimately secure a sufficient maturity value.*

- 4** (i) The fall may be as a consequence of competitors' actions. For example the introduction of new product features, price cuts or commission rises.

Alternatively, the fall may simply be due to the external factors causing a fall in market volumes, for example, the economic situation or changes to the tax or regulatory environment. The fall could also be due to internal problems. For example the company may have suffered reputational issues e.g. from poor service standards or adverse press comment.

- (ii) In order to calculate the impact of the change in rates a series of profit tests would be performed using the revised premium rates. Suitable model points should be used in these tests to reflect the expected business.

It is important to use up to date assumptions for all elements of the basis. In particular it is likely that mortality rates may have improved since the rates were set, and future improvements may be able to be taken into account.

Per policy expense assumptions may change if expected volumes result in a different allocation of fixed costs.

Experience investigations are needed for mortality, expenses and persistency.

Profitability would be calculated on various measures: internal rate of return; discounted payback period; and net present value. Each gives a different insight into profitability.

- (iii) If the new rates are still profitable, they can be implemented. If not, a limited price cut may be possible, or the product could be sold as a loss leader. Professional Guidance states that new business as a whole must be supported by the premium rates. Price cuts for particular ages and terms could also give rise to discontinuities in rates and marketing difficulties.

If certain rates are unprofitable there is the possibility of changes in business mix leading to anti-selection or lapse and re-entry. It is necessary to consider the profitability of the total portfolio.

Volumes are assumed to rise by 57%. The profitability of the portfolio will deteriorate if the profit per policy is reduced by more than 36%.

The reactions of competitors and the possibility of long-term problems with price wars need to be considered. As do the capital requirements of writing increased volumes that will increase new business strain. Reinsurance can reduce the impact of this, but will probably reduce profitability further as the reinsurer will wish to make a profit too.

Alternatives to cutting rates to restore volumes should be considered. For example, adding other features like conversion/extension options or rider benefits, or offering additional sales support to insurance intermediaries.

*Part (i) was generally well answered with strong candidates identifying competitive, external economic and internal reputational issues that may have contributed to the fall in new business.*

*In part (ii) most candidates identified the need for a profit test but failed to give sufficient detail on the inputs required performing this and what outputs would be analysed.*

*Part (iii) was not well answered. Many candidates recited a standard list of considerations relating to profit testing outputs but many of these were not particularly relevant to the question. However, stronger candidates identified a range of practical issues including the possible consequent actions from current policyholders and competitors and also gave alternative options the Life Office could explore as alternatives.*

- 5** (i) Underwriting at the proposal stage can be used to manage risk in the following ways:

It can protect a life insurance company from anti selection and in particular is used to identify lives whose health is so seriously impaired that they would have to be deferred or declined. It also identifies risk arising from geographical location, occupation and lifestyle.

The underwriting process will enable a company to identify lives with a substandard health risk for which special terms would need to be quoted. A company may however aim to accept a large proportion of the business it accepts at 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 to ensure that all risks are rated fairly.

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

For larger proposals the financial 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 and monitoring claims on products such as Income Protection and Critical Illness. Additionally, claims underwriting can be used to assess the validity of other claims, for example, by checking for non-disclosure and implementing exclusion clauses.

- (ii) Evidence can be obtained from the following sources:

Questions on the application or proposal form completed by the applicant

Reports from medical doctors that the applicant has consulted.

A medical examination and report carried out on the applicant.

Specialist medical tests (such as AIDS/HIV test).

Applicant's answers to further questions asked by the company.

The sales person's personal knowledge of the applicant.

- (iii) (a) Accept at ordinary rates since the disease should not affect mortality during the life of the contract.



- (b) Accept at ordinary rates but impose restrictions on conversion options if symptoms still exist at the time of conversion.
- (c) Accept at ordinary rates as the sum at risk is likely to be small at the time of expected death from the disease.
- (d) Either charge an extra premium or reduce the sum assured to equate the policy to a twenty year endowment, accept at ordinary rates but include an appropriate exclusion clause (although this will be difficult to police), or defer acceptance and suggest they take out a three-year term assurance and reapply if and when clear.
- (e) The correct decision is not obvious from the information given since we are not told whether the disease impacts health during the twenty years before expected death. If it does not significantly impact health then ordinary rates will be appropriate, but if it does then the expected problems will indicate whether the proposal should be declined or accepted on special terms.

*This question was generally well answered. Parts (i) and (ii) were bookwork and many candidates were able to show good knowledge. However, on part (i) some restricted their answer to medical underwriting and failed to identify other forms of underwriting such as claims underwriting or financial underwriting.*

*In part (iii) many candidates gave reasoned arguments for the first four products described and showed good understanding of the impact of the disease. Some candidates lost marks through concentrating on technical impacts of the disease on the product experience and not converting this discussion into recommended actions. In addition, many candidates failed to demonstrate an understanding of what benefits waiver of premium business provide and consequently scored poorly on part (e)*

## **6 (i) Features of target market**

Financially unsophisticated clients on low disposable income so little scope to save. Often they have a need for protection benefits. Some will be without access to a bank account and neither need, nor can afford, large sums insured. They will often not consider insurance a priority so will need to be sold it.

## **(ii) Possible distribution channels**

### *Insurance intermediaries*

They usually target the more sophisticated clients who often approach the intermediary. Some charge fees — which are likely to be unacceptable to this target market. Intermediaries look for a significant premium and hence commission size. The conclusion is that the channel and market don't match

*Tied agents*

Little different from insurance intermediaries, although sometimes they initiate sales themselves, and the conclusion is the same.

*Direct sales force*

The salesforce normally initiates the sale and often use lists of prospects although sometimes cold call. If they are operating in the right area they could address the target market.

A bank account is required for direct debits but premiums could be collected by the salesman or via a branch network – but the small premium size may make little financial sense for the salesman.

The conclusion is that this would be a possible route, although this may not be cost effective.

*Direct marketing*

Telephone selling would be similar to direct sales force but press advertising could target the market accurately by choosing the right publications. Incentives could improve the response rate — e.g. a free gift or have a free cover period.

You would still need bank account for direct debits or a branch network.

Usually there is guaranteed acceptance or short form underwriting is used so there is an anti-selection risk

Mailshots are similar if targeted to the right areas but the premium size is less of an issue if volumes are big enough.

Marketing could be via the internet, but this market's access to a PC may be limited.

The conclusion is that this route targets the market well

*Workplace or affinity marketing*

You would need to sell the concept to the employer first but by choosing employers could target the market accurately. Paying commission to the employer would help commitment. For enhanced commission the employer might offer payroll deduction which removes the bank account problem and also improves persistency considerably.

You would still need salespeople to sell, firstly to employers and then to the employees. But you may possibly get many sales from a single visit to one company, so small premium size is not a problem.

The conclusion is that this is probably the best match

In some territories there may be other valid alternatives to these.

*Most candidates were able to describe the characteristics of the target market in the question.*

*In part (ii) many candidates clearly understood the key characteristics of independent intermediaries, tied agents, direct sales forces and direct marketing. However a large number of many candidates failed to apply many of the features of the market in this question to the different distribution channels and consequently did not score well. Very few candidates made any mention of affinity or workplace marketing.*

- 7 (i) The supervisory reserves have to ensure that a life insurance company can meet all liabilities arising out of the contract without recourse to further capital. Hence, the reserve will be made up of two elements, a unit reserve and a non-unit reserve.

The unit reserve would be equal to the value of the units held on the valuation date, where the value is calculated by multiplying the number of units held by the “mid-market” price of a unit on that date. This would ensure that, for a contract maturing on the valuation date, a unit reserve is being held of sufficient size to cover the maturity benefit.

In addition, a non-unit reserve would need to be set up to ensure that any guaranteed benefits, in excess of the unit reserve, can be met by the company. A non-unit reserve is also necessary if expenses are likely to exceed charges at any future time. A non-unit reserve would be necessary in this instance because there is a minimum guaranteed death benefit, of a fixed amount, that may exceed the bid value of the units. This is particularly so at early durations when the guaranteed death benefit is likely to be significantly higher than the bid value of the units.

The non-unit reserve would be calculated by determining all the non-unit cash flows arising under each contract, allowing for mortality decrements:

- Unallocated premiums
- Bid/offer spread
- Any charges received (e.g. policy fees, AMC etc)
- Expected renewal and termination expenses
- Mortality charges
- Expected death claims
- Any profits/losses on surrender
- Surrender penalties

Starting from the last negative cash flow, a reserve would be established to eliminate it. The reserve would be discounted back to the beginning of the

previous period at the valuation rate of interest, and added to the cash flows in that period. The process would be repeated to the start of the policy. Any positive non-unit reserve resulting is the reserve to be set up.

Allowance would be made for paid ups, surrenders or partial surrenders if it increases the reserve.

The company has been selling these contracts for many years and hence will have submitted supervisory reserves to the relevant authorities in the past. The company must not make arbitrary changes to either the method for calculating the supervisory reserves or the assumptions used in the calculations. This ensures that there are no discontinuities in the level of reserves calculated from one year to next, as a result of arbitrary changes in the basis, and hence the movement in reserves from one year to the next should be easily comparable.

(ii) **Expenses**

The expenses used in calculating the supervisory reserves must be established prudently, based on the expected experience of the company.

The starting point would be the most recent analysis, inflated to the valuation date, with a margin for prudence. The company should take into account inflation of expenses over the future lifetime of the contracts.

The inflation assumption used should be consistent with the assumptions used regarding future levels of investment return.

If the expenses would increase further were the company to close to new business, it would be appropriate to use an expenses assumption allowing for closure to new business. Closure might be assumed immediately, or at some future date.

The company should only assume a level of expense charges deducted from the unit funds that is consistent with past practice and with representations made to policyholders.

The mortality charge deducted for life cover may be variable. The amount that can be taken into account in the supervisory reserves is constrained by the need for prudence and by the expectations established regarding the variability of the charge.

**Interest**

The rate of interest used in the calculation of the non-unit reserves should be chosen prudently taking into account both the current yields on the assets backing the non-unit reserve and the future yields expected to arise on those assets. In particular, the yield should be chosen taking into account the nature, term and currency of the assets backing the non-unit reserves.

Reinvestment risk should be allowed for by using a prudent, low level of investment return in the future.

A prudent assumption for the unit growth rate will ensure that the future expected stream of charges for the death benefit and expenses are not over-inflated. The unit growth rate and the discount rate should be consistent.

Rates used would need to allow for the incidence of tax.

The benefit on surrender is less than the bid value of units. There is likely to be a surplus released as a result of taking the surrender penalty. Allowance for lapses would not be made unless it increased the reserves. Hence, it would be prudent to assume no surrenders occur.

The company should disclose the method and bases used in calculating its supervisory reserves.

Before finalising the basis, the impact of deviations in key assumptions would be considered through scenario and sensitivity testing.

- (iii) The assumptions used in the supervisory reserves will generally be prudent, i.e. best estimate assumptions with appropriate margins for adverse deviations in experience.

In some countries, the assumptions used in the pricing basis are also prudent, so that the same set of assumptions are used for both pricing and reserving. However, it is less justifiable for pricing without profits business since the policyholder will be charged significantly more than required to meet the benefits under the contract. For this contract, it would mean assuming high mortality rates, especially at early durations where the minimum guaranteed death benefit was required, and higher expenses than are actually incurred to administer the contract.

Unless all companies were using this approach and there was no alternative savings vehicle for potential policyholders to use, this method of pricing this type of contract is likely to be unsuccessful since it will not be perceived as good value for money by the market.

A more likely approach is that the pricing basis will be based on best estimate assumptions, with the risks to the company of these not being borne out in practice, allowed for by using an appropriate risk discount rate and profit criterion. Hence, in this instance the assumptions used in the reserving basis will be different to those used in the pricing basis, since the reserving basis will contain margins to allow for adverse deviations, that the pricing basis does not allow for in this way.

*This question was not well answered. In part (i) many candidates did not adequately describe the need for the calculation of a unit reserve and a non unit reserve. Very few candidates showed they understood how such reserves should be calculated and scored very poorly.*

*In part (ii) most candidates covered the themes of prudence and disclosure of bases. In addition considerations in respect of assets held were also well described. However, most candidates underestimated the amount of detail required regarding individual assumptions in order to score well. For example many touched on the need to consider expenses but did not describe what experience would be used to form assumptions, how to allow for inflation and considerations such as possible closure to new business.*

*In part (iii) most candidates showed understanding of the key difference in the strength of the basis that is typical between pricing and statutory reserving.*