

EXAMINATIONS

September 1999

Subject 402 — UK Fellowship Life Insurance

Paper One

EXAMINERS' REPORT

- 1** The with profits policy will probably be valued using a net premium valuation.

This is a discounted cashflow method with the following items of cashflow:

- + Gross premium income
- Renewal expense outgo. This is equal to the difference between the gross and net premiums.
- Death outgo. The death benefit is taken as the sum assured plus attaching bonus increasing at a rate of bonus implicit in the difference in the valuation rate of interest and the rate used to value the benefits.
- Maturity outgo. The maturity benefit is as per the death benefit.

The reserve is the above cashflows discounted at the valuation rate of interest.

The unit-linked policy is also valued using a discounted cashflow method. However, the method recognises the different forms of the guaranteed and unit-linked benefits and charges. Part of the reserve is measured in units and part in sterling.

The unit flows on the unit account are as follows:

- + allocated premium / offer price
- unit deductions / bid price
- + bonus units on eighth anniversary
- units paid on death
- units paid on maturity

There are no charges that can be used to discount units.

All the future unit allocations / cancellations are covered by the sterling account, therefore the number of units required to meet the future unit liabilities is those units credited in the past — the current unit holding.

The cashflows on the sterling account are as follows:

- + gross premium
- allocated premium * (1 – bid / offer spread)
- + monthly policy fee
- renewal expense
- + monthly mortality deduction
- sum at risk on death
- + annual management charge
- cost of bonus units on eighth anniversary

The sterling reserve is the discounted value of these cashflows starting from the last negative cashflow. With this design this is likely to be at the eighth policy anniversary.

No credit can be taken for positive cashflows after this, since it is prudent to assume withdrawal at the worst time for the company.

This is the same for the conventional policy, only the last negative cashflow will be at the maturity date.

2 (i) Internal Rate of Return

This is the rate at which the net cash flows to and from the company discount to zero.

The company may set a Risk Discount Rate which is the lowest acceptable value for the internal rate of return.

Net present value (NPV)

The net cash flows discounted at a set rate — probably the risk discount rate. The company may set a minimum value for this NPV, perhaps expressed as a percentage of the annual premium or commission.

Pay-back period

The period over which the company is repaid any financing, allowing for interest at the risk discount rate. A maximum period may be set.

(ii) (a) Withdrawals are not financially neutral and affect profits.

At early durations, withdrawal benefits may well exceed premiums accumulated less expenses (the asset share) thus giving a loss.

Note the asset share may be negative at early durations.

At later durations there may be a profit but this is unlikely to equate to the potential profits from a continuing case.

Withdrawal rates are variable and unpredictable and there is a need to test different withdrawal patterns to see the effect on profitability.

An unstable result may indicate faulty product design. At the very least we need to recover initial expenses by considering surrender terms for early withdrawals.

(b) The requirement for statutory reserves and solvency margins will often require a provision from external sources in excess of the accumulated fund.

A policy will normally have to pay a premium for this borrowed funding and this must be allowed for in the pricing.

The profit flows will be altered and the ultimate profitability affected by this need for further financing.

As a secondary effect, the requirement for capital from the company may restrict its capacity in other functions of its development and on-going operations.

These components will be particularly important when completing model office projections into the future to identify calls on capital in the future.

- (iii) There is some confusion here between accumulated fund and valuation reserve.

The reserve should exceed the surrender value but the surrender value may well exceed the accumulated fund.

This would give a valuation profit but a real loss.

If the argument is that we are making profits all the time so why bother allowing for them, then this is also wrong.

The initial valuation reserve usually requires an injection of funds from sources external to the policy.

When pricing policies it is important to measure the amount of profits that are being made to assist in the efficient management of the company's capital.

- 3** (i) The liabilities have to be determined in accordance with generally accepted accounting principles appropriate to life insurance companies.

The value must be based on actuarial principles using prudent assumptions for each element of the basis.

The valuation must make allowance for policyholders' reasonable expectations.

It must take account of any options available under the contracts being valued.

The value must be determined on a policy by policy basis using a prospective method.

Future valuation strains must be avoided.

The regulations specify a minimum permitted basis. This uses a net premium method of valuation.

However, a different approach may be followed, provided it can be demonstrated to produce results at least as great as those that would arise from the minimum basis.

The net premium may be increased by a Zillmer adjustment. The adjustment is subject to a maximum equal to the loading for acquisition expenses, net of tax, included in the premium basis, or to 3.5% of the sum assured if lower.

The gross valuation rate of interest can be no higher than 97.5% of the yield on the assets.

The yield is defined as the redemption yield for fixed interest securities and the running yield for equities and property. In both cases, the yield has to be adjusted for risk.

Assets can be apportioned between different types of contract for the purposes of determining the yield.

The gross interest rate for amounts to be invested more than three years in the future is subject to a maximum of the lowest of the following:

- The yield on the 15-year medium coupon fixed interest gilts index.
- 6% plus one quarter of the excess of that yield above 6%.
[Candidates also received marks for the new basis.]
- 7.5%.

The valuation must use prudent rates of mortality and disability appropriate to the country in which the policyholder is resident.

The allowance for expenses has to be at least as great as that required to meet the expenses, net of tax, of closure to new business 12 months after the valuation date.

Any negative reserves must be eliminated so that no policy is treated as an asset.

No allowance can be made for withdrawals if the effect is to reduce the value placed on the liabilities.

The valuation of the liabilities should take into account the nature and term of the assets backing them. Thus, provision should be included for any cashflow mismatching and for the impact of future changes in the value of the assets.

(ii) The required solvency margin is:

4% of the gross mathematical reserves, plus
0.3% of the gross sum at risk.

However, because the policy is 50% reassured, the first element can be reduced by 15% and the second element by 50%.

Thus, the required solvency margin is:

$$\begin{aligned} & 0.85 \times 0.04 \times 5,000,000 \\ + & 0.5 \times 0.003 \times (50,000,000 - 5,000,000) \\ = & \text{£}237.50. \end{aligned}$$

4 Reversionary bonus

The company could increase the rate of reversionary bonus declared under its contracts.

This may have marketing benefits.

However, if all the additional surplus were distributed at one declaration, the use of a reversionary bonus is unlikely to be suitable, as policyholders might expect the higher rate to continue.

In addition, it would increase the company's guaranteed liabilities, possibly leading to a more constrained investment policy.

However, given that the company has decided it does not require the part of the Estate it is distributing, this may not be an issue.

In theory, the additional surplus could be used to augment reversionary bonuses at successive declarations. But in practice this augmentation could not continue indefinitely.

This would have the possible disadvantage that future policyholders would also receive a share.

Special reversionary bonus

The company could pay an additional reversionary bonus, in addition to its normal one.

This has the advantage over the previous method of eliminating any expectations of the higher rate continuing into the future.

However, it would still increase the company's guaranteed liabilities.

Terminal bonus

The surplus could be distributed by paying a higher terminal bonus when policies discontinue.

This would be achieved by augmenting the asset shares backing those policies entitled to share the surplus. If this were by increasing the investment return credited to asset shares this would benefit contracts in proportion to both their size and duration. Also future new policies could be excluded.

This has the advantage of retaining the surplus as additional capital, until it is eventually paid out.

It is also more flexible than using reversionary bonus.

However, it is the least visible of the options to policyholders, unless it is shown as an explicit addition to the maturity proceeds.

It also involves more work, retaining a record of the augmentation until all the policies concerned have matured.

None of the methods result in an immediate release of surplus to the policyholders.

Delays transfer to shareholders.

- 5** (i) It is the amount of money that the company should put into the fund in respect of each unit it creates in order to preserve the interests of the existing unitholders.
- The offer price value of the assets within the fund plus the expenses that would be incurred in the purchase and the stamp or any other duty payable in respect of such a purchase.
 - Plus the value of any current assets such as cash on deposit or investments sold but not yet settled.
 - Less the value of any current liabilities, such as investments purchased but not yet settled or loans to the fund.
 - Plus any accrued income such as interest income from fixed interest securities or deposits, net of any outgo such as fund charges.
 - for BLAGAB funds any accrued investment income should be net of tax — normally at the policyholder tax rate.
 - Allowance for any potential tax payable on unrealised capital gains but taking into account that the company will not realise such gains or losses immediately.

The sum of the above is then divided by the number of units existing before any new units are created giving the appropriation price.

(ii)

- Policyholders not being equitably treated.
- Errors in the calculation of the price at which units are allocated or de-allocated.
- Errors in the calculation of the price at which units are created or cancelled.
- The valuation date of the units needs to be consistent with the dealing date to avoid anti-selection by policyholders.
- The basis used to calculate the unit prices should depend on whether the company is a net allocator or redeemer of units.

There is a risk the pricing doesn't reflect the company's change in position with a corresponding change in the pricing basis.

At the time of pricing units the company's position for that day is not always known.

- The allowance for realised and unrealised chargeable gains and losses may affect surplus as the company's tax may differ from that charged to the linked funds.
- There may be a risk that systems carry inaccurate or out of date information. For example incorrect accrued interest or dealing costs.

- 6** (i) Product design must control the cost of the guarantee, and in particular avoid anti-selective use of it.

Because policyholders can choose to defer retirement, the guaranteed annuity rate, ("GAR"), should apply only on the chosen retirement date.

The GAR should not apply to units bought with single premiums within (say) two years before retirement.

Similarly the GAR should not apply to increases above inflation in, say, the two years before retirement

The cost of the guarantee should be allowed for in bonus declarations, for all policyholders of this product type.

The theoretical cost of the guarantee should be modelled stochastically.

Allowing for future improvements in mortality and inflation of expenses.

This cost should be converted into a reduction in the annual bonus rate.

The theoretical cost (not the actual cost of guarantees exercised in the year) should be deducted from asset shares in an equitable way each year.

It should be made very clear in product literature what the terms of the guarantee is, to avoid setting unreasonable policyholders' expectations.

The guaranteed interest rate could be reduced from 4%.

- (ii) Waiver benefit should be underwritten medically and occupationally and financially.

For some occupations, the risk of disablement from "usual occupation" will be unacceptably high

Those cases should be either declined for waiver, or offered an alternative benefit, e.g. based on disablement from any occupation.

The policyholder should be required to tell the company if he/she changes occupation. This may lead to a change in terms for the waiver benefit.

The company may reserve the right to vary the waiver charge if claims experience differs from pricing assumptions.

The level of premium waived may be either "current" or "highest ever".

Pricing should follow similar principles to IPI (PHI). The charging structure is likely to be simplified, e.g. charge a % of the monthly premium depending on age and sex.

There could be a maximum age at which waiver will apply or a maximum age at entry or a maximum benefit term.

The waiver would not apply if the policyholder were to become unemployed for reasons other than poor health.

The deferred period could be increased or a waiting period introduced.

Benefits could be restricted or withdrawn if past premiums have not been kept up to date.

The waiver of premium benefit could be made a compulsory element of the product in order to avoid anti-selection.

- (iii) The company's liability for retirement benefits, for a policy in deferment, is "on call" at the policyholder's option.

To match this liability, short-dated investments are needed. This is a different investment profile from the usual with profits fund.

It is inequitable for the other with profits contracts to bear the risk of this option.

Therefore, at normal retirement date the units should be switched out of with profits investment. Terminal bonus should be added at that point.

The fund used for policies in deferment may be a unit-linked cash fund (with normal unit pricing, including a capital risk).

Or a "unitised non-profit" fund with a unit price that cannot fall.

Or a fund investing in long-dated gilts, which would "match" the annuity to be bought on vesting.

The overall maximum retirement age even allowing for the deferment could be restricted to 70.

- 7** (i) Extract data for policies in force at the latest year end, and at the previous year end, and check that the difference equals the net movements in and out of the portfolio.

Suitable data for the previous year may be available from the previous investigation.

Carry out validity checks, broadly as for a statutory valuation, such as unusual policy/benefit/premium values or relationships.

Subdivide the data by class of business (life, PHI, pensions) and by major contract type.

Subdivide pension business into rebate-only and other business if the volumes are sufficiently large.

Further subdivide the latest year's data into new business written during the year, and business in force throughout the year. (This is necessary to establish the new business contribution to embedded value.)

Normally, group the data according to sex, age, term, deferred period and derive representative sample policy records for each resulting group.

Alternatively, if the volume of data allows it, the calculation might be carried out on ungrouped individual policy data.

Much of this work may have been carried out for the statutory valuation.

- (ii) To assist in validating of the shareholder interests/embedded value results.

To enable the basis of calculation to be revised by comparing actual experience against expected experience.

To provide an analysis of the value of new business within the year.

To identify particular areas of profit and loss.

From these areas identify any actions that may be needed to address losses or improve profits.

Identify unprofitable contracts so any redesign or repricing can be carried out.

To help in the design of new contract and identify which charges should be variable

To use as an element in profit-related incentive schemes for staff.

- (iii) The components of the movements in embedded value are:

- unwinding of the discount rate
- net investment income on undiscounted assets and shareholder assets
- value of new business
- change in basis
- variations in experience

So there are several other elements which affect the movements in addition to investment income.

If the experience is exactly in line with assumptions, if there is no change in basis and if there is no new business, then the growth in the embedded value will be the weighted average of the discount rate and the net rate of return on undiscounted assets.

As discount rates are typically in the range of 9% to 12.5% this would help explain the high rate of return.

The rate of return will be increased by new business — assuming its contribution is positive.

If there is an expense overrun then this may be negative.

If the basis is conservative then the value of new business is reduced but it is more likely that there is a positive contribution from actual experience versus expected.

Earnings may also have been increased by gradually weakening the basis from year to year.

- (iv) Unit linked funds will have a large proportion of equities which typically would be expected to earn 2% to 2.5% in excess of gilts.

The company may be adopting a passive basis for its embedded value calculation.

If this is so, it is likely that the gilt yield assumed in the embedded value would also differ from the current gilt yield.

In using the passive basis the embedded value assumptions do not necessarily reflect current investment conditions.

The assumptions are only changed when there is a significant change in the long term investment conditions.

Thus a reduction in interest rates at one year-end may not be sufficient to justify a change in the basis.

However, if the following year rates are still lower, and in particular if they have reduced further, then it is likely that the basis would be reviewed.

It is likely that the rates would be closer when the basis is next reviewed.