

EXAMINATIONS

September 2001

Subject 402 — UK Fellowship Life Insurance

Paper One

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.

K Forman
Chairman of the Board of Examiners
20 November 2001

1 *A number of candidates failed to help themselves by splitting their answer to part (ii) between the three products.*

- (i) (a) The majority of the underwriting would take place prior to the policy being accepted by the company.

When non-disclosure is suspected, underwriting may take place at the claim stage.

However, obtaining evidence can be difficult.

- (b) No underwriting is likely to take place on this contract unless enhanced terms are offered to those in poor health.
- (c) Underwriting will typically take place at three points in time.

Underwriting will take place prior to the policy being accepted by the company.

It will also be carried out at the time a claim is made and throughout the duration of the claim.

This ensures that the claim is, and continues to be, valid in accordance with the terms of the contract.

- (ii) (a) If the disease is undetectable, a general increase in premium rates might be considered.

If initial underwriting uncovered the presence of this disease, then this will probably result in the case being not accepted by the life company

However, if the term selected is suitably short, it may be possible to offer terms either on a rating, or even on normal terms if the status and the progression of the illness is well understood or there are adequate margins in the existing product pricing.

Including a specific exclusion clause could be possible, but it may be difficult to prove that the illness was the ultimate cause of death.

Particular options in the policy might also be removed.

- (b) The policy would be offered on normal terms or possibly there might be a general improvement in premium rates.

Impaired life annuities may be offered.

- (c) Including a specific exclusion clause is possible here as it would be possible to test for the existence of illness at the point of claim.

If the presence of the disease was found at the initial underwriting stage, then terms may be offered if the disease has little effect on morbidity rather than mortality. A rating to the normal premium may be possible.

However, most diseases will impact on health at some point so refusing the case at the initial underwriting stage is the most likely outcome.

- 2** (i) We are told that the company is pricing on an offer basis, hence the fund is expanding.

In an expanding fund, there will be no need to sell assets and therefore the tax liability on any capital gains does not immediately arise.

However, even if the fund is expanding, normal active investment management involves the sale of assets from time to time and thus a capital gains tax liability will crystallise.

The basic equity principle requires that the tax charge, which will need to be paid when the assets are sold, be equitably proportioned amongst all the unit-holders that have benefited from the capital gain.

This is achieved by adjusting the appropriation price to allow for the potential future tax liability on the unrealised gains.

Chargeable gains only relate to equities and property, since all gains on bonds are treated as "income" rather than as a "capital gain".

The unrealised gains are determined by subtracting the value of the assets at the original purchase date (after indexing the initial purchase price to allow for the change in the RPI index) from the value of the assets on the pricing date.

The company is liable to pay tax on any net realised gains on the sale of the assets.

The tax rate will be the company's tax rate (which will vary depending on whether the company is a mutual or a proprietary company). For a mutual, the tax rate will be the policyholders' rate, i.e. the basic rate of income tax, and for a proprietary the tax rate will be a mixture of the policyholders' tax rate and the shareholders' tax rate.

In practice, for a proprietary it is likely that the tax rate, which currently applies to taxable gains, (22%), would be used, as opposed to the company's full rate.

Therefore, the adjustment to the appropriation price is achieved by taking the calculated unrealised gains and multiplying by the tax rate above discounted to allow for the future net income and net gains that will be

earned by the fund until the assets are sold. The period until assets are sold will depend on investment strategy and projections of both new business and offs.

[NOTE: the wording above is that in the Core Reading which is incorrect. However, marks were given either for this version or the correct version:

The tax rate applicable to realised chargeable capital gains is the same for mutual and proprietary companies.

The current rate is 22%.

This should be discounted at the real rate of return expected to be earned on the funds until the expected date of realisation of the gains. The period until assets are sold will depend on investment strategy and projections of both new business and offs.

It should be remembered that indexation relief will be available on any future gains, hence the discount rate to be used should be the net real rate of return expected on the fund's assets.

Estimates of future income and future gains should be as realistic as possible, so that the adjustment to the appropriation price is as accurate as possible.

This is because it is not possible to adjust the position of the unit-holders who have gained or lost as a result of the actual experience being different to that expected when calculating the adjustment to the appropriation price.

Special rules apply if the company invests in unit trusts — deemed disposals occur at the end of each year and gains are spread over seven years.

- (ii) If the units were being priced on a bid basis then the fund would be contracting.

This would mean that it would be necessary to sell some of the assets in the fund to pay the unit claim values.

Capital gains would be immediately realised on the sales of the assets and hence a tax liability would immediately arise.

Therefore, in calculating the expropriation price, full provision is normally made for tax on any accrued gains (net of indexation relief).

- 3 (i) The shareholders' interest in a life insurance company comprises:
- The net asset value of the shareholders' fund.
 - The present value of the future profits from the long term business that will be transferred into the shareholders' fund in due course.
 - The value of surplus assets held within the long term business fund.
 - An allowance for Goodwill
- (ii) The company would want to analyse the change in value of the shareholders' interest as part of the control cycle.

Monitoring experience is part of the feedback loop. It enables the terms on which the company transacts business to be reviewed and if necessary amended.

In particular:

- It enables the calculation of the shareholders' interest to be validated while analysis components could also be required as part of a remuneration scheme for Directors.
 - Comparison of actual against expected experience assists in the revision of bases.
 - The value of new business written during the year is calculated.
 - Individual sources of profit and loss can be identified and action can be taken where necessary. This information may be disclosed in the commentary in the accounts and in analysts briefings.
 - Unprofitable contracts can be identified, redesigned and repriced or action taken to address unprofitable distribution channels.
- (iii) The sources of profit (and loss) are:
- The investment return on the assets in the shareholders' fund
 - Expenses and other charges to the shareholders' fund
 - The change in the value of the surplus assets within the long-term business fund
 - Unwinding of the discount rate used to discount the expected future transfers.
 - The difference between the actual and expected transfers from the long term business fund in the current year.
 - As well as differences between actual and expected experience items (mortality, expenses, investment, persistency, etc), this item would also be affected by different volumes of new business than expected.
 - Any difference between the expected future transfers from the long term business fund (i.e. a change to the valuation basis or the basis used to assess the Embedded Value).
 - Any changes in methodology.

4 (i) Advantages:

Allows interest and bonus loading surpluses to emerge in a form suitable for distribution by compound reversionary bonus system providing a suitably low valuation rate of interest is used.

Is relatively stable.

Only requires assumptions regarding interest and mortality for valuing benefits, plus assumptions for future expenses and inflation for testing the adequacy of the margin between office and net premium.

Simple to apply.

Is currently the minimum required by insurance companies regulations. If not used then need to check that minimum satisfied.

Disadvantages:

Net premium may be greater than the office premium, and hence require restricting.

Only has implicit allowance for renewal expenses, defined as the difference between the office premium and the valuation net premium.

The implicit allowance does not exist at all for single premium contracts.

Doesn't allow adequately for uneven incidence of acquisition expenses, unless appropriately modified.

Doesn't allow for inflation of renewal expenses.

Defers emergence of surplus, which may be unpopular with shareholders.

Places a value on the liabilities that may be inconsistent with using market value of assets. Cannot be used to assess affordability of bonus rates.

(ii) There are several reasons why the free asset ratio may be lower than in the previous year:

Most simple being that acquisitions have been made.

Asset under-performance in other sectors (the FTSE 100 only covers less than 50% of UK equity investments by market capitalisation, and its performance may be distorted by the performance of one or two stocks).

Lots of new business has been written in the year, which causes new business strain and dilution of free assets.

The valuation basis may have been strengthened or there has been a change in Solvency Margin requirements or the amount of inadmissible assets has increased.

Additional reserves may have been set up for specific contingencies (e.g. pension review, guaranteed annuity options).

Expenses may be increasing or mortality/morbidity experience has been exceptionally poor.

There may be less need for free assets as the office is now writing a greater proportion of unit-linked business, which has lower risk.

Changing profile of with profits business may mean less assets required to be held against terminal bonus.

There may be a policy of gradually reducing reversionary bonus rates, which for reasons of equity across generations is being done gradually. Thus it is possible that the cost of this years declaration exceeds asset growth and is being financed from the Free Estate.

- (iii) It will reduce the company's investment freedom and potentially the level of future sustainable bonus.

It will reduce the company's ability to finance new business.

It is commonly used by intermediaries as a proxy to assess the financial strength of the company.

The ability to show a strong free asset ratio is important in the UK, as it is a major factor considered by intermediaries when deciding where to place new business. A decline in Free Asset Ratio may also prompt questions from regulator or auditors.

There will be more concern if the decline in the free asset ratio is because of changes in items affecting the real underlying value of the company (for example asset under-performance, increasing expenses).

There will be less concern if the decline arises for other reasons, for example writing more new business that incurs more new business strain but is ultimately profitable.

However, whatever the reason, a fall in the free asset ratio may adversely impact the share price/credit rating.

And may indicate a need for injection of capital in the near future.

- 5 (i) The minimum 30% might be little different from the current asset mix.

It is possible that the asset valuation regulations may be causing some assets to be rendered inadmissible for supervisory solvency purposes.

If the government stocks are fully admissible, then this may improve the solvency position of some companies on the supervisory basis.

But such a change may merely make some almost insolvent companies “appear” more solvent, and so would appear to be contrary to the objectives of prudential financial supervision.

Government stocks likely to be much less volatile, unless there are large structural changes in the economy that shifts the entire yield curve.

There may therefore be a reduced risk of insolvency than arising from holding a high proportion of assets in volatile assets (e.g. equities/property) in the event of a sharp market fall.

Government stocks have effectively nil risk of default.

There may not be enough available, so they will be expensive with low yields. The government might have to issue stock.

The figure of 30% appears arbitrary and unrelated to the profile of the business (e.g. extent of guarantees, mix between with and without profits business, and between reversionary and terminal bonus).

Insisting that companies hold specific asset classes is contrary to the principle of investing appropriately for the nature and/or the term of the liabilities.

They are not a good match for “real” liabilities such as future expenses although index linked stocks would be.

Traditionally, equity type investments have proved a better long-term hedge against inflation.

The suggestion may not have anything to do with supervisory solvency, but be more to do with government financing plans.

- (ii) The purpose of the RMM is to act as trigger for remedial action in the event that it is breached.

Current RMMs sum of 2 calculations:

- Either 4%, 1% or 0% of gross mathematical reserves, reduced by up to 15% for reinsurance; plus
- 0.3% of the sum at risk reduced by up to 50% for reinsurance.

Proposal would simplify the calculation.

Proposal would increase the RMM for companies that have low levels of guarantees (e.g. unit-linked companies, with fully reviewable charges).

Conversely, the RMM would reduce for companies writing significant volumes of non-linked business.

The proposal would also reduce RMM for companies that write mainly protection business with high sums at risk, but relatively low reserves.

The reinsurance restriction is removed so there is now no cushion in the RMM against the contingent risk of reinsurance failure.

The current approach attempts to set a minimum margin by reference to the risks being taken by the company. This proposal removes that link including the current short term rule.

If the RMM is reduced, then this would improve supervisory solvency position, but if that is the aim then the same comments apply as they did to the first suggestion.

In fact, this may encourage companies to weaken their valuation bases to reduce their required minimum margin, which directly contradicts the point of prudential supervision, as it might ultimately increase the threat to solvency.

- (iii) Presumably, the objective is to facilitate comparisons of solvency positions between companies by removing one source of variability in results. The impact on individual companies will depend on their current basis.

The basis may be fed into tax calculations based on reserves, causing distortions and possible immediate tax charges.

Current regulations allows some discretion in areas such as margins of prudence in valuation yields, expense provisions, mortality.

It is vital that the liabilities are valued in a manner consistent with the value placed on the assets.

This would not be achieved by this proposal, unless the asset valuation basis was similarly defined.

Any defined basis is likely to be inappropriate to some companies, who have wide diversities in their business portfolios, and operating methods.

There will be uncertainty if basis changed regularly, so the regulator may therefore default to a basis which is not expected to require frequent amendment, and is therefore onerous for most companies. Changes will also mean companies have uncertain capital requirements which will make business planning very difficult.

This proposal would appear to contradict the “freedom with disclosure” method of supervision, and may have little effect on the observed results.

6 *Credit was also given for any discussion enhancing examples based on the various numbers quoted in the example.*

- (i) The premium rates were designed with a loading for 80% of the bonus that it was then expected to declare. Thus most of the bonus was paid for directly by the bonus loading.

If the premium rates had been loaded for the full amount of the bonus it was intended to declare, then all the other basis items would need to be set at “best estimate” levels.

The intention was that the balance of the bonus would come from variance in the experience items, and so some margins were left in these elements.

Mortality surplus is small and variable, and doesn't fit easily with the increasing requirements of the additions to benefits method.

Expense surplus is likely to be large and negative initially, then positive and later negative again as expense inflation begins to bite. This also unsuitable for this method.

The relationship between loading and declaration might also reflect the relationship for existing business, with the balance being funded from the estate.

Normal practice would be to expect the balance of the bonus to come from interest surplus, which grows with the policy reserve, and hence is suitable for the desired distribution method.

- (ii) If the premium assumptions are not borne out in practice, then the company has three options:
- Review the premium rates with the aim of leaving the bonus rate unchanged
 - Change the bonus rate so that premium rates can be maintained.
 - Do nothing and account for any differences through terminal bonus.

It is normal practice to choose the second option because:

- This enables the returns offered to existing business to be adjusted during the term.
- Only new policies are affected by a change in premium rates.
- Otherwise it is difficult to maintain equity between policies taken out just before and after the change.

- If the changed experience is due to changed investment returns, these can easily be reflected in the reversionary bonus rate, (because of its suitability for dealing with interest surplus)
- Investment changes will have had the greatest effect on surplus over the last 15 years.
- Leaving everything to terminal bonus will build up possibly unjustifiable guarantees. Investment policy may need to change to support them, reducing the overall return.

Equally competitive pressures to maintain bonus rates may be a reason to increase premium rates.

There again the product may not be strategic at present and so the company might not be concerned to change premium rates. Or the overall effect on all elements of the basis may mean that the current premium rates are still valid.

- (iii) One of the main features of the reversionary bonus system is that it defers surplus. A compound bonus defers more surplus than simple bonus, and super-compound more than compound.

When the system was changed it would have been difficult to determine whether the cost of bonus was reducing or not. Thus a tacit reduction could have been made in the overall cost of bonus, disguised in the terms of the rate change.

The extent to which the cost of bonus could have been reduced would have depended on the amount of existing bonus, and hence on the average duration of the portfolio.

The new approach will become increasingly beneficial to the company over time because of a slower build up of guarantees allowing greater investment freedom.

If lower interest rates are expected in future, guarantees for new policies would reduce proportionately more than for older policies.

It would have followed what other companies were doing at the same time, and thus would be within policyholders' expectations.

- (iv) The investigations to determine an appropriate level of reversionary bonus would consider

- New business premiums
- Current in force business

For new business, the main investigation would be to determine the bonus earning power of the premium rates.

This is the value of the future benefits less future premiums and expenses discounted to the start of the policy.

A formula or a cash flow approach could be used.

Calculations would be carried out for specimen premium sizes, ages and terms.

A realistic basis should be used.

The premium rates are known, and the equation is solved for the bonus rate. With a super-compound system, various combinations of bonus on sum assured and bonus on bonus will solve the equation.

In order to allow for the potential higher returns from investing in equities rather than fixed interest there are two approaches:

- Assume only the fixed interest return in the basis, and presume any excess return will be distributed as terminal bonus.
- Allow for the overall expected investment return, but assume that only a percentage of the resulting bonus rate will be declared as reversionary bonus.
- Finally competitors premium and bonus rates would also be compared.

For existing business a global investigation into supportability would be carried out in a similar way or even by reference to all policies if sufficient computer power is available.

A gross premium valuation on a realistic basis (using a cash flow or formula method) would be compared with a realistic value of the assets backing with-profit business.

The asset value would be market value (provided that the liability discount rate was consistent with this), or a discounted cash flow value.

Using all the company's assets would result in the company's free estate being capitalized, so aggregate earned asset shares or some other method of calculating the assets backing the with profits business could be used instead.

As with the new business investigation, the company might either use fixed interest yields only in the investigation, or might have some more subjective view of what proportion of the assets should be earmarked for terminal bonus.

As well as this global investigation equity between contracts also needs to be considered. A similar investigation to the above would be carried out for specimen in force contracts of varying duration, ages, terms and policy sizes. The asset value would be the earned asset share of the specimen policy. The global investigations would indicate whether the overall level

of reversionary bonus was supportable, or whether reductions were necessary. Scenario testing might also be undertaken to consider future requirements for changes and this might look at the interaction of Reversionary Bonus, Terminal Bonus and Solvency.

Although from year to year, the main change in surplus will be due to investment performance, over a fifteen-year period differences in mortality, persistency and expenses will build up. These are unlikely to be as consistent between different specimen policies as the investment changes.

There will come a time when the results from the investigations into specimen policies (both new and in force) will indicate too wide a variance between supportable premium rates.

There is little that can be done for existing business, although the two-tier bonus system gives some scope for making adjustments between policies of different duration within the constraints of Policyholders' Reasonable Expectations.

Terminal bonus could be varied to achieve a final payout as close to the asset share as practical.

However, if the bonus earning power for new policies varies too much across the age/term range, it will be necessary to re-set the premium rates to achieve a more consistent result.

"too much" in the previous sentence is a subjective judgment. There is no real objective measure available.

- 7** (i) The company will determine the assumptions required as follows:

Mortality:

This is the most important aspect of the pricing basis.

The Group Life market is very price competitive and it is essential that the mortality assumption chosen is not out of line with that being used by the rest of the market.

Equally the company has no previous experience at writing this business and must take care not to use too light a mortality assumption although the marketability of prudent rates could be enhanced by also offering a profit share or rebate.

The mortality experienced by the employees under Group Life policies will be different to that experienced by individual term assurance policyholders.

This is because the individual term assurance policyholders have individually selected to take out their insurance policy....

.....unlike the Group Life cover, where the employer initiates the purchase of the cover for his/her employees.

Hence there should be less selection against the life insurance company for Group Life business and the mortality experienced should be lighter than that experienced by the term assurance portfolio.

The mortality experienced will be dependent upon the occupation of the lives to be covered (and to a lesser extent on the location of the employer/employees in the UK).

In particular the mortality of blue-collar workers is likely to be heavier than the mortality of white-collar workers.

As a result the company may apply a loading factor to the basic mortality rates to allow for occupation and geographical location.

Free cover levels and the amount of underwriting that will be used in the take-on of new business will influence how prudent a mortality assumption is to be used as well as the term (if any) over which premiums are guaranteed, and any options built into the contract.

The higher the free cover levels, the lower the number of individual lives that are likely to be underwritten and hence a more prudent assumption is required.

The company may be reinsuring some of the business, to protect itself from variability in claims experience, and hence could get advice from its reinsurers on the mortality assumption to be used, and the underwriting standards to be adopted. While for individual companies previous mortality history of the company's employees could be taken into account in setting the rate.

It is likely that a percentage of an assured lives mortality table would be used. e.g. a percentage of AM92/AF92.

An assumption is also required for the spouse/dependent's mortality (the latter could be an assumption of no mortality up to age 18 or 21), and for the age difference between the spouse and the life insured, for those policies which choose the pension option.

Allowance for future improvements in mortality should be allowed for in costing the pension option.

Advice could be sought from the reinsurers for an appropriate assumption.

The risk to the insurance company is that the spouses/dependents live longer than anticipated (and hence the pension is paid for longer than anticipated) so a light mortality assumption is cautious especially if selection against the life company is possible here if the employees select

the addition of the pension benefit rather than the employer selecting this benefit for all staff.

This is likely to be based on a published pensioner mortality table, such as PM80.

(ii) **Other assumptions required to calculate the value of new business:**

Expenses

We are not told whether the company has any experience at writing other group business. If it does, then the expense assumption could be determined by looking at the expenses of administering other group products.

However, allowance would have to be made for the different functions involved in administering this particular product.

The expenses of administering a group contract will be different from administering a group of individual term assurances, since only one contract will be written (with the employer) and details of the employees can be taken directly from the employers' payroll system, as opposed to processing individual proposal forms for the term assurances.

In addition, free cover levels will be different and less underwriting may be required on the Group contract.

However, some elements will be similar e.g. the cost of processing a claim.

The company should attempt to estimate the costs involved in administering the product and in the sales and marketing of the product, to determine appropriate assumptions to be used for new business and renewal expenses allowing for development costs and a contribution to life company overheads.

The new business expense may be expressed as a percentage of the premium, whilst the maintenance expenses will probably be expressed as a per policy amount.

An assumption will also be needed for inflation of expenses connected to the payment of spouses / dependants annuities. This will be consistent with interest rates.

Lapse Rates

Assumptions will be needed regarding lapses (of group schemes and possibly downsizing of workforce), especially in the early years, since early withdrawals are likely to be a source of loss to the company (since heavy initial expenses are likely to be recouped over the term of the

contract). Prudent allowance should be made as the market is likely to be very competitive.

Contingency/Profit Margin

The company may wish to include an explicit contingency margin in the pricing basis (in addition to the risk discount rate) to allow for variability in the future claims experience that may occur.

The extent to which this will be necessary depends on whether best estimate or cautious assumptions are being used for, e.g. mortality.

A specific profit target, as specified by the directors, will also be built into the costings.

Commission

Commission should be allowed for as paid. The basis will most probably be dependent on levels generally available in the market. In reality the commission rate may vary by intermediary, so the average expected commission rate could be modelled.

Risk Discount Rate

The company is proprietary so it is likely that the shareholder(s) will require a particular risk discount rate to be used when pricing products.

A higher risk discount rate may be required than when pricing other established products, to allow for the additional risk of launching a brand new product, in a new market where the company has no past experience.

The risk discount rate and the contingency margin should be considered together to ensure that the basis is not overly cautious.

Interest

An assumption for interest earned on positive cashflows (e.g. on the excess of premiums over claims and expenses) and reserves should be allowed for.

In addition, an interest assumption is required to value the pension benefits payable under the pension option.

An interest rate based on long term gilt yields (or slightly higher, if investment is in corporate bonds as opposed to gilts) would be appropriate.

Expected volume of new business

The company will need to estimate the volume of new business (in each of schemes, lives and benefit levels) to ensure that the marketing and development costs can be met.

If volumes of business sold are lower than expected then the marketing and development costs will not be met.

Average policy size/volume of policies

This is required to split the maintenance expenses by policy.

The value of new business may be calculated for sample policy sizes, in which case expected mix of business by policy size would be required.

Reinsurance premiums and commission

If the business written is to be reinsured, then allowance must be made for cashflows to the reinsurer, in the form of premiums, and cashflows from the reinsurer, in the form of reinsurance commission and claim refunds.

If a large proportion of the business is reassured, e.g. by using a quota share treaty, then the value of new business will be sensitive to the level of reinsurance commission received back from the reinsurer.

Conversely, if only a small proportion of the business is reinsured, e.g. by using a surplus treaty with a high retention level, then the value of new business will be less sensitive to the level of reinsurance commission received back from the reinsurer.

Proportions married/with dependents

Population statistics can be used to estimate the proportion married for valuing the spouses pension. Current trends show that the proportion married is decreasing. However, the proportion cohabiting (and therefore financially dependent) is increasing.

Need to ensure that the assumption used is consistent with the definition of "spouse/dependent" in the policy conditions.

Tax

Need to make an allowance based on current and expected future tax position of the life company.