

EXAMINATION

September 2005

Subject ST2 — Life Insurance Specialist Technical

EXAMINERS' REPORT

Introduction

The attached subject report has been written by the Principal Examiner with the aim of helping candidates. 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.

M Flaherty
Chairman of the Board of Examiners

29 November 2005

1 (i) Why reinsure?

The company would want to reinsure some of its business:

- to reduce its overall retention to limit the impact of any one claim on its profits
- to gain the reinsurer's help with risks it has limited experience of
- to get assistance with underwriting substandard lives

Even though it has written term assurance business for many years, the life insurer may not have written significant volumes of business and hence the company may be concerned about claims fluctuations arising on a small book of business.

It may want the reinsurer to review its underwriting procedures to ensure that they are up to date and reflect the latest techniques being used by other insurers in the market to evaluate individual risks.

The life insurance company may also want specific advice on how to allow for particular risks that appear to be prevalent in its claims book.

However, the life insurer's desire to obtain technical advice from a reinsurer will be limited by the knowledge that reinsuring business also usually involves ceding part of the profits arising on a book of business to the reinsurer and hence overall profitability may be reduced by ceding more of the business to the reinsurer — negating the life insurer's aim.

It may also want catastrophe cover to protect the solvency of the company against extreme events.

In addition reinsurance may be taken out to help mitigate new business strain.

For example, by using financing reinsurance

The insurer may be able to take advantage of legislative advantages if the reinsurer is offshore which may enable an arrangement to allow both companies to enhance profits.

There may be tax advantages from taking out reinsurance.

(ii) Reinsure a greater proportion of its new term assurance business

The company may need to reinsure a greater proportion in order to get additional data or other support from the reinsurer.

The insurer is particularly likely to seek the reinsurer's advice if its term assurance rates have moved out of line with other providers in the market, since the life insurer will want to understand how it can write the business on competitive and profitable terms.

This is particularly an issue given that the term assurance market is usually very price sensitive/competitive and offers low levels of profit.

Recent claims experience may have deteriorated and the life insurance company may want a reinsurer's advice on why this is.

It may equally be concerned about potential impacts to future experience from for example the incidence of a new disease.

Alternatively it may require more reinsurance as its attitude to risk has changed

The life insurance company's solvency position may have deteriorated recently so that it needs to protect its solvency position more than it did in the past from adverse claims experience.

The life insurance company may have recently been taken over by a larger insurance group and it may be a requirement of that insurance group to cede a larger proportion of business to a reinsurer to ensure that underwriting results are smooth, with neither large profits nor losses arising on this line of business.

Another reason may be that the nature of the business written has changed

It may be writing business in new markets for example Group business or in overseas markets

It may have added new benefits to products, for example Critical Illness cover

For example the insurer may be using a new sales channel or targeting business at a new consumer segment.

The life insurance company may be accepting larger individual case sizes, in terms of sums assured, than was the case in the past and it may wish to pass a greater proportion of these risks on to a reinsurer to protect it from large claim fluctuations arising due to one or two large claims.

The volume of business may have increased such that the insurer needs more help with financing new business strain

There may have been changes in local regulations that allow the company to reduce the amount of solvency capital it is required to hold as a result of reinsuring some of its business, encouraging it to reassure more.

It may also be the case that the solvency or tax regulations have changed which improve the attractiveness of reinsurance.

Finally, it may be that reinsurance rates have improved and reinsurance is now cheaper and so more attractive.

- 2** (i) Accuracy of policy and other data
Variations in
 Mortality experience
 Underwriting standards not consistent with premium assumptions
 Investment Performance
 Expenses
 Inflation
 Withdrawals
 New Business mix or volume
The cost of Guarantees and Options
Impact of actions of competition
Actions of staff and Directors (e.g. misselling)
Failure of systems and controls (including new business processing, claims handling, policy servicing)
Counterparty failure (e.g. reinsurer, issuer of corporate bonds)
Liquidity of assets held
Legal, regulatory or fiscal changes
Fraud from employees, customers or intermediaries
Aggregation or concentration of risk
- (ii) If too much business is sold there is likely to be a higher capital strain than expected
- This may lead to solvency problems
- In addition too much business may lead to operational difficulties. The customer service operation may not be able to cope with higher than expected demands and this may lead to a reduction in service standards
- This may lead to an increase in surrenders or policies not being taken up which causes a loss in embedded value
- It may also lead to bad publicity or strained relationships with distributors which may adversely impact future sales and therefore profits
- If too little business is sold then the lower income would not cover expenses incurred as expected
- This would lead to lower profitability than expected on business written as more expenses would need to be spread over fewer policies
- In addition variations in business mix may be a source of risk.

Different products may have different levels of profitability. If the mix is different to expected it is possible that the average profitability will be reduced

In addition the capital requirements will differ for different products. If a higher proportion of capital intensive products are sold than expected then this may lead to solvency problems

Changes in mix may also impact on the company's operations as it may not have sufficient expertise to cope with growth in volumes of certain business

The mix of business within a particular product can also be a risk. For example if average premium size is lower than expected this may lead to lower profitability

There is also risk that business is lower "quality" than expected and surrenders are higher than expected

This may be due to differences in the socio economic group of customers

This may also be due to problems with its underwriting

Similarly it may be due to differences in the mix by distributor.

There is also a risk that commission paid is not clawed back on surrender of policies due to the practice of distributors

Actions of competitors may introduce risks through changes in their premiums or charges influencing the volume or mix of business achieved.

In addition market movements may introduce risk to the profitability of new business for some products, for example Annuities

3 (i) The requirements depend on the purpose for which the model would be used.

The model must be valid and fit for purpose.

It should be rigorous.

It should be well documented. (audit trail)

The model points must adequately reflect the distribution of the business being modelled.

The parameters must allow for the features of the business that could significantly affect the advice being given.

The inputs to the parameter values should be appropriate to the business being modelled and take into account the special features of the company and the business/economic environment in which it's operating.

The outputs should be capable of independent verification for reasonability.

The output should be capable of being communicated to the recipients of the advice.

The model should not be too complicated so that the results are too difficult to interpret or communicate.

The model should not take too long or be too expensive to run.
Some level of controls and consistency checking should be built into the model.

- (ii) For the 10th anniversary guarantee to have a modelled cost there needs to be a cash flow generated from the guarantee biting.

This will occur if the model produces a fund value at the 10th anniversary that is lower than the original premium

The deterministic model will project forward the fund position based on an expected level of investment returns

With this policy the fund value starts at a level greater than the premium.

The fund value then grows at the expected rate that is consistent with the assets backing the unit funds.

This is likely to exceed any fund decreases each month as the charge is deducted, but any commercial charge is likely to be lower than the rise in asset values.

This means that the fund will rise overall.

As a result the fund value at the 10th anniversary will be higher than the original premium and so there will be no cash flow generated as a result of the guarantee.

The cost of the guarantee as derived by the models will therefore be zero

However, in reality there is a risk that investment values will fall over the ten year period and the fund at the 10th anniversary is lower than the guarantee level

In such cases the company would have to pay the shortfall to any policyholder who surrenders.

The cost derived by the deterministic model is therefore clearly inappropriate

- (iii) A stochastic model runs many different investment scenarios, where the future investment returns are governed by a probability distribution function.

Some of those investment scenarios will show poor investment performance, where the fund value falls below the original premium level.

In these scenarios the cost of the money back guarantee will result in a negative cash flow to the company.

The company would run many simulations and the cost of the guarantee determined by the model will be the average shortfall over all simulations

As a result, the company will recognise the need to charge a higher annual management charge for offering the guarantee

The stochastic model is clearly superior in that it can correctly determine the need for such a charge

- 4** (i) The model will show projections of future cashflows arising on this portfolio of business.

The key cashflows will be annuity payments and expenses.

The projected cashflows must be discounted at an appropriate investment return in order to value them on a market consistent basis.

The projections may be performed on individual policy data.

However, since the portfolio is large, the company may instead decide to use data grouped into model points.

Data grouping would introduce an additional level of approximation. The decision as to whether to use grouped or individual data is likely to depend upon the purpose of the calculation, and therefore the required degree of accuracy.

The same consideration applies to the choice of projection period frequency, e.g. whether to use monthly or annual cashflows.

Given the relative simplicity of the cashflows in this case, the company is likely to choose a deterministic projection approach.

An alternative approach would be for the company to use a stochastic model, introducing variability into any or all of the investment return, inflation or mortality assumptions.

- (ii) Assumptions will be required for mortality, expenses, expense inflation and investment return.

There is unlikely to be a highly liquid active market for mortality risk, so it is not possible to determine a unique and objective market consistent mortality assumption.

Instead, the mortality assumption is likely to be set by reference to industry statistics, internal experience investigations and information from reinsurers.

The assumption should include appropriate allowance for future mortality improvements.

The expense assumption might be determined by reference to expense agreements available in the market, for example from third party administration companies, as well as from industry statistics and features specific to the company's own experience.

If the liabilities or cashflows were to be traded in an open market, then potential purchasers might require a margin to reflect the risk that mortality and expense assumptions prove to be incorrect.

The future annuity payments are known amounts, after allowing for mortality as assumed. They are therefore equivalent to the maturity proceeds of a series of zero coupon bonds of matching terms.

The appropriate discount rate in order to obtain a market consistent valuation is therefore the market yield on such bonds.

These yields are likely to vary by term.

The payments are for guaranteed amounts, and hence the yields should be "risk free".

The country in which this company operates is highly developed, which suggests that its government fixed interest bond issues might be close to "risk free".

The yield on these bonds can therefore be used as a proxy for "risk free" yields, although it might be necessary to make adjustments if there are specific market issues such as supply and demand mismatches.

Similarly, the expected expense cashflows might be valued by discounting at the yields available on index-linked government bonds.

However it may be appropriate to adjust these yields if expense inflation is expected to differ from the index inflation.

Alternatively the expense cashflows could include inflation, and these would then be discounted at the normal risk free yield. The inflation assumption would be set by reference to a comparison of market yields on index-linked and fixed government bonds, adjusted if necessary as above.

5 Maturity Payouts

Once reversionary bonus is declared it must be paid on death or maturity

Higher levels of reversionary bonus therefore increase the guarantees under a policy

Since the company will invest a significant proportion of assets in equities, which have a volatile return, the underlying asset share is likely to be volatile

This is particularly true for a single premium policy

A high level of reversionary bonus will therefore increase the risk that, at maturity, the guaranteed benefits might exceed asset share

If investment values fall, the company would therefore be exposed to having to pay more than asset share, with a consequent reduction in its free assets

The company could charge for the guarantees or pay less than asset shares at other times to meet the cost over time but this does not remove the short term risk

This could be a particular problem for this company since it has limited free assets

The risk is particularly great if the business is sold in tranches since a large proportion of the business will mature on the same date so the company will be very exposed to market conditions on that date

The amount of terminal bonus is determined when the insured event occurs and is not guaranteed in advance. Having a high proportion of benefits paid in the form of terminal bonus is therefore consistent with investing a high proportion of assets in equities since, in theory, terminal bonus can be reduced to match any fall in asset share

In practice, policyholder reasonable expectations, arising from marketing literature may limit the extent to which terminal bonus can be reduced but it is still more flexible than reversionary bonus

Reserves

It is normal for reversionary bonus to form part of the supervisory reserves, but for no reserve to be held for terminal bonus. This means that a higher proportion of reversionary bonus will increase the statutory reserves that the company needs to hold

These reserves are unlikely to be sensitive to changes in the market value of the assets held

Since the company invests a significant proportion in volatile assets, this could significantly increase the statutory reserves and reduce the free assets of the company

Again, this could be a problem for this company since it has limited free assets

General

So, for a company with limited free assets that intends to invest a significant proportion in equities, low reversionary bonus and high terminal bonus appears appropriate

However, the company also needs to consider competitive pressures. If most companies have a high reversionary bonus then this might be a requirement in order to generate sufficient sales to justify launching the product

The company should also consider the target market and its requirements. It may be a certain level of guarantees are expected or there are levels of smoothing that are desirable

Since it is a proprietary company, the needs of shareholders would be considered. Shareholders may prefer bonus to be paid sooner

In addition shareholders may benefit from a higher distributions if paid through reversionary bonus if based on a share of total surplus on a strong reserving basis

Shareholders may be willing to inject more capital into the company to allow higher reversionary bonus as long as the return generated on this capital for these shareholders is high enough

Finally the company would need to consider what access it had to alternative sources of capital which may mitigate the risk of having to draw down further capital from shareholders

6 (i) Principles:

Reserves should be sufficient to ensure liabilities can be met as they fall due.

Reserves should be calculated for both unit and non unit reserves.

Reserves should include suitable valuation of all liabilities including

- allowing for any options available to policyholder
- allowing for any guaranteed benefits
- expenses with allowance for inflation and allowing for closure to new business if higher
- allowance for an appropriate margin for adverse deviation of relevant factors
- suitably prudent assumptions

The method of calculation should be such as to recognise profit in an appropriate way over duration of policy.

It should not be subject to discontinuities arising from arbitrary changes in basis.

Reserves calculated should also be set to avoid future valuation strain.

(ii) **Assumptions**

Mortality

Not key assumption,
but required to value additional death benefit over unit reserve
Based on recent mortality experience of life office or use industry
experience

Expenses

Renewal expense — expected expenses to be incurred in admin of product

Assumptions would be set prudently based on analysis of recent
experience
Allow for the inflation since recent experience
Termination expense on claim, although this may be included in the
general renewal expenses
Allow for the impact of surrenders if this increases reserves

Switch expenses

Expense of switch
Number of switches per annum based on recent experience

Investment Expenses

Average annual management charge — probably based on current
funds under management.
Investment expenses/charges incurred — use recent experience or
known

Renewal commission allow for as paid

Rate of interest used for discounting non unit cashflows

Based on assets used to back sterling reserves.
Not a critical assumption given sterling reserves are likely to be small

Unit growth rate

Linked to rate of interest — potential to depend on current fund
Needs to be set prudently

Inflation

Used for inflating expenses and switch charge.

Given a large proportion of expenses are likely to be salary related then a salary inflation rate may be appropriate for renewal expenses

Tax

Net down assumptions for tax using rates as paid

Consistency

Assumptions need to be consistent with each other

For example valuation rate of interest and unit growth assumption

7 (i) Expense Analysis

Need to agree period to which expense analysis will relate.

The company would use data from its recent expense analysis

Need to subdivide data into:

Direct expenses: Expenses that depend on volume of NB or level of in force

Overheads: Balance of expenses — e.g. those that relate to general mgt and service depts not directly involved in NB or policy servicing

Expenses of company can be split into “cells”:

- whole business of life company
- whole business of a particular accounting fund
- each main product line of the company

These could be further subdivided into regular and single premium business, paid up policies etc

In addition would want to split expenses into initial, renewal, termination and investment expenses

Need to ensure that “cells” are not too small otherwise analysis will become unreliable.

The main costs are Salary and Salary related

Expenses would be split by department/function.

Identify those departments that are directly involved in servicing policies, and those that are overheads

Those departments that are obviously linked to a particular product can be allocated to that product line — Life Servicing.

Would need to split time by process undertaken — e.g. policy servicing, policy set up or claim settlement

Where a function works on a variety of processes/products then the expenses can be split using a timesheet analysis

Those departments that are identified as pure overheads (e.g. HR, Legal, Accounting, Actuarial Valuation) can be split pragmatically across other departments

e.g. HR could be split in proportion to number of staff in each direct area.

Property Costs

Property costs that relate to buildings occupied by the life company can be split by floor space occupied across all departments, and then expenses allocated as per salaries above

Computer Costs

Allocate to departments by computer usage

Costs of purchasing new computers could be amortised over useful lifetime and then added to ongoing computer costs

Investment Costs

Directly allocated to investment expenses

Split directly by product line based on funds under management

One off capital costs

Amortise over expected useful lifetime and treat as part of overheads and spread by department

Items that are treated as an asset of long term fund will not be amortised. Instead there will be a charge (e.g. notional rent) made to departments and allocated as per salary expenses

Exceptional Items that are unlikely to recur will be excluded from the analysis

Having split all expenses of the company will be able to come up with total expenses by product line and within product line the expenses will be split into initial, renewal, termination and investment expenses.

Expenses would need to be inflated from the period of investigation to the period for which they will be used

They may also be adjusted for any known changes in expense levels, eg benefits from recent cost saving programmes

These would then need to be converted into allowances per policy using:

Average number of policies in force over analysis period (for renewal expenses)

The number of new business policies may not be relevant for statutory valuations.

However if zillmerisation of initial expenses was being used then assumptions would be needed.

Average number of claims over analysis period (for termination expenses)

Investment expenses are likely to be expressed as a percentage of funds under management so that they can be treated as a deduction from earned investment return.

(ii) Finance Director's suggestion

There is some merit in the suggestion as the costs involved would indeed be less

If the business written and processes involved have not changed much in five years then the old analysis may be appropriate

However, a recent expense analysis can be used for many other purposes e.g. pricing assumptions to ensure future business is profitable or assessing the economic value of the company.

Over five years it is likely there have been changes since the previous investigation that may invalidate it —

Business mix may have changed, thus overheads need to be split in a different way

Technology improvements may mean less costs involved in servicing

New products may have been introduced that require different types of expense (underwriting, claim handling expenses)

Need to clarify if inflation increase is appropriate for the company expenses

Analysis of surplus and profit may not be valid if expense assumptions do not closely reflect actual expenses

Performing a more accurate expense analysis may allow reserves to be released. These may have been caused by past margins in expense or inflation assumptions which were deemed necessary due to lack of confidence in the data.

In addition there is a need to consider professional guidance and legislation which may require the company to have recent analysis for calculating supervisory returns.

END OF EXAMINERS' REPORT