Faculty of Actuaries **Institute of Actuaries**

EXAMINATION

April 2006

Subject CA1 — Core Applications Concepts

Paper 2
(Liabilities and Asset Liability Management)

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

June 2006

Comments

Individual comments are shown after each question, after each part question and within the solutions where relevant.

General comments

As the title of the course suggests, this subject examines applications of the core techniques and considers broad actuarial concepts in practical situations. To perform well in this subject requires good general business awareness and the ability to use common sense in the situations posed, as much as learning the content of the core reading.

The notes that follow are not to be interpreted as model solutions. Although they contain the majority of the points that the examiners were looking for, they also contain more than even the best prepared candidate could be expected to write in the time allowed in the examination room.

In this exam sitting there was a large number of candidates sitting paper 2 only. In the transitional arrangements, there is only one further sitting where the two papers can be taken separately. It seems likely that the single paper candidates concentrated their efforts on this subject, and were rewarded with a much higher pass rate than those taking both papers

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1 A general insurance company might model its claims experience in order to:

- determine appropriate premium rates
- determine the provisions needed for commitments in respect of existing policies.
- construct asset / liability models
- select rating factors for future product design
- demonstrate the estimated effect of changing the level of cover by changing the level of excess or the effect of reinsurance, or to measure the effect of other scenarios for risk management purposes
- assist in decision making by estimating the likely variability of claims experience.
- update assumptions for future experience
- monitor any adverse trends in experience so as to take corrective actions
- provide management information for financial planning
- assess profitability of different lines of business
- comply with regulatory requirements
- estimate the impact on reserves of any latent claims — for example, from long-tailed business

Comments on question 1: *This was a relatively straightforward question testing knowledge of the syllabus and was answered well by most candidates. Several candidates did not consider setting premium rates to be a key use of claims analyses — it is in fact the most important use. Inadequate premiums means real losses; inadequate reserving means mis-stated profits between years.*

2 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. 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, in particular products with greater options and/or guarantees. Capital can also be used in merger and acquisition activity.

Comments on question 2: *A straightforward bookwork question answered well by the majority of candidates.*

3 (a) A notional rent would be determined, based on market data of similar properties. The rent would be allocated as initial expenses. It could be allocated to policy types in proportion to commissions generated.

If the staff in the office also carried out policy servicing activities, part of the rent should be allocated to renewal expenses. Apportionment would depend on the exact nature of the activities undertaken, but would most likely be as a per policy expense.

(b) The capital cost would be amortised over the expected useful lifetime of the system purchased. The amortised cost would be allocated to renewal expenses, and it would be specifically allocated to annuity business.

(c) The capital cost would be amortised over the expected useful lifetime of the system purchased. The amortised cost would be allocated across all policy types and between initial, renewal, and claims either in proportion to salary costs or staff numbers.

(d) The capital cost might be treated as a revenue item, since the impact is effectively amortised by the regular replacement programme. Alternatively it might be amortised over the length of time the vehicle will be kept, allowing for any residual value that might be obtained at the end of the period.

The cost would be allocated across policy types and between initial renewal and claim expenses as an addition to the salary costs of the individuals or departments involved.

Comments on question 3: *A surprisingly large number of candidates ignored the fact that all the instances except the last were significant sums that would distort results if the entire cost were taken to profit in a single year. Even more candidates failed to realise that the property purchased would be a balance sheet asset that would be more likely to appreciate in value than need amortisation. Those that approached this question methodically and considered each case separately, looking for the differences between them, scored well. Examiners are unlikely to ask a four-part question where the answers to all four parts are the same.*

4 (i) The expert witness must give impartial advice, resisting pressures from either party, and taking account of any legislation or professional guidance.

If the divorce is acrimonious then the director may have a preference for assumptions that understate the value of these pension rights. The counter-party in the divorce case may have a preference for assumptions that overstate the value of the pension rights.

Assumptions will be necessary for economic and demographic items:

- mortality/longevity
- future salary increases
- future investment returns
- future inflation
- future discretionary increases

Best estimate assumptions should be the starting point. The assumptions used in previous divorce cases would also be considered for consistency.

These assumptions may have to be adjusted to be appropriate to the case under consideration. It would be necessary to take account of the probability of payment of the accrued benefits, and consider the relative weight to be given to the length of the marriage and the period of service in the scheme.

It will be necessary to determine that the overall value resulting from the combination of assumptions is appropriate. This permits small variations from best estimate to be used in some assumptions, provided that variations in the opposite direction are used in other assumptions.

The significance of the accrued final salary benefits to the director's other assets and thus the overall financial settlement must be assessed.

For a director, there may be special pension arrangements or benefit promises for these final salary benefits, which may mean that the accrued benefits are significant.

(ii) **Advantages**

The figures given in the accounts will be independent of the parties involved in the divorce case. They are freely and immediately available to all involved.

The accounting figures will aim to represent the realistic cost of the accruing benefits.

Disadvantages

The latest accounting disclosures will generally not give the value of the accrued benefits at the date required for the divorce case, as additional benefits will have accrued.

The figures in the accounts may be prepared in line with a statutory methodology, which may not be appropriate. Accounting standards may not use a best-estimate basis – for example, they may require a prudent basis.

The latest accounts may be unaudited and subject to revision.

Comments on question 4: *Part (i) is an example of a common type of question where a standard piece of work is considered in an unusual context. To score well, candidates needed to consider the context — an expert witness for a director's divorce case — which would generate applicable and valid points. Weaker candidates went no further than considering the assumptions that would be used in valuing the benefits, irrespective of context, and so lost many marks. Part (ii) was answered reasonably well by most candidates.*

5 (i) Costs for the different categories may have escalated differently over the period. For example, staff costs may have escalated differently as claims management activities are carried out by clerical and professional staff and vehicle repairs are carried out by manual workers.

Claims volumes may have fallen and no action been taken on claims department staffing.

The mix of claims may have changed, with a greater proportion of either large or small claims. For example, claims expenses, as a percentage of claims, may be greater for larger claims. Small claims may be admitted with negligible investigation, large claims will involve professional loss adjusters.

The company is likely to have fixed limits for various levels of claims management — e.g. only involve loss adjusters for claims above £1,000. If these amounts have not been increased in line with inflation, then a greater proportion of claims will have been categorised as "larger" and incurred higher expenses.

The feature may actually be a sign of a successful claims management approach. By spending more on claims management, fraudulent and excessive claims have been eliminated. Thus claims management costs as a proportion of claims may have increased, but the overall claims ratio (claims, including management costs, as a proportion of premium income) may have reduced.

*There were a number of other possibilities for which credit was also given. In order to be awarded marks, the arguments made needed to answer the question of a **steadily increasing** proportion over the last five years, not random fluctuations.*

(ii) The company can review any fixed limits for levels of claims management in line with inflation. It could also increase limits in excess of inflation, or change the structure in some other way to reduce claims management costs. However this type of action may increase fraudulent or overstated claims, and thus increase rather than reduce overall costs.

The company may have statistical data relating fraudulent claims to the level of claims management — but it may be out of date or not exist. The company would have to keep a close watch on costs and be prepared to reverse the position if necessary.

Claims department staffing levels and/or the efficiency of staff could be reviewed.

Operational improvements for efficiency could be introduced.

Sensible possible actions relating to the candidate's answers in part (i) were also awarded marks.

(iii) Independent garages may over-estimate the costs of repairs in order to increase their own profits.

With a subsidiary chain of garages, multiple estimates will not be required, and loss adjusters will generally not be used. Estimates for smaller claims will be accepted without question.

Independent garages may agree to doing additional repairs not caused by the incident and including them in the claim. The management controls available if the garages were a subsidiary chain could prevent these abuses and reduce costs.

A large chain of garages may achieve economies of scale.

A subsidiary chain of garages can either be non-profit making, or can pass any profits to the insurer through dividends.

(iv) Does the chain of garages have nationwide coverage, or what arrangements can be made in uncovered areas?

Will any disclosure of this claims practice in advance be required, and if so will it affect sales volumes or customer satisfaction.

Will the practice impact vehicles' warranties or manufacturers' recommendations?

Will the garages be able to cope with the additional workload?

Apart from these specific items, the insurer will have to assess the acquisition as it would any other equity-type investment (as they will effectively be buying shares in the garage chain).

It would have to review profitability, operational methods, staff contracts and costs. It would also have to consider premises costs and the capital requirements of holding stocks of parts and equipment.

All these assessments would use past data from the garages, adjusted for the changed circumstances and the additional work generated. Consideration would be given to the actions (and reactions) of competitors.

The insurer would need to consider whether the benefits justify the costs involved, particularly bearing in mind that running garages is not a core activity for an insurance company.

Comments on question 5:

Most candidates were able to have a reasonable attempt at part (i) of the question — almost any sensible suggestion was awarded marks. However, the stronger candidates were distinguished here by the clarity of their discussions in part (i), which lead directly into clearer and therefore higher scoring answers for part (ii).

In part (iii), most candidates considered how the suggested approach would tackle some of the possible real life problems with the existing approach and scored reasonably well here. However in part (iv), many candidates seemed to struggle. This part of the question called for consideration of the situation from a practical perspective. Surprisingly few discussed the specific geographical and workload issues, focussing on the more generic considerations of competitors, tax issues, and cost-benefit questions.

6 (i) The principal aims of regulation of a financial market are:

- to maintain confidence in the financial system
- to protect consumers of financial products
- to promote efficient and orderly markets
- to correct perceived market inefficiencies
- to help reduce financial crime

(ii) There may be problems with the existing voluntary code of conduct.

The existing system may be ineffective or may have broken down due to rogue operators refusing to comply with the code of conduct

The existing system may be out of date with the current financial markets leading to a lack of public confidence in it.

Introducing regulation of the financial markets may encourage development of the market and the economy, attract foreign investment, and maintain the future economic welfare of individuals in the nation.

This may fit in with the government's plans or comply with international standards as a prerequisite for joining an international organisation.

(iii) (a) **Self-regulation**

A self-regulatory system is organised and operated by the participants in a particular market without government intervention.

The advantages are:

- it may be easier to persuade the firms and individuals to co-operate with a self-regulatory organisation than with a government bureaucracy. especially given the firms and individuals in this market currently subscribe to a voluntary code of conduct

- the system is implemented by the people with the greatest knowledge of the market, who also have the greatest incentive to achieve the maximum cost benefit ratio

- the system should be able to respond rapidly to changes in market needs.

The disadvantages are:

- the closeness of the regulator to the industry it is regulating may mean the regulator accepts the industry's point of view, possibly leading to a weaker regime than is acceptable

- there might be low public confidence in the system, which may be a particular concern if there is low confidence in the existing voluntary code of conduct

- market participants may be relatively scarce and inexperienced.

- self-regulatory organisations may inhibit new entrants to a market.

(b) **Statutory regulation**

In statutory regulation the government sets out the rules and polices them.

The advantages are:

- it may command a higher degree of public confidence due to government involvement

- it is more easily enforceable and less open to abuse than the alternatives, which may promote further development of the market

- it may be run efficiently if economies of scale can be achieved through grouping its activities by function rather than type of business

The disadvantages are:

- it can be more costly and inflexible than self-regulation both for the government and for the companies involved, which may increase taxes and charges for the consumers involved

- the government may impose rules that are ill devised and do not achieve the desired aim, especially since it has not had any experience of regulating the financial markets

- consumers may actually take less responsibility themselves for their own decisions

Comments on question 6:

In part (ii), the weaker candidates did not consider the context of the question and what the change would introduce compared with the starting point. Instead they focussed on the positive aspects of regulation. Stronger candidates used the context to score well. Reading the question is vital (as ever!).

Part (iii) was answered reasonably well by most candidates. Again, the higher scoring candidates used the context of the question to generate points relevant to the introduction of regulation, not just comparing the types of regulation in abstract.

7 (i) The principles of investment can be stated as follows:

A provider should select investments that are appropriate to the nature, tern and currency of the liabilities.

Subject to the above, the investments should also be selected so as to maximise the overall return on the assets, subject to an appropriate level of risk.

(ii) Liability outgo = benefits + expenses – income

The liability outgo can be estimated over the future lifetime of the scheme, allowing for the probability that payments will fall due to be paid and for uncertainty about the amount of the payment.

For liabilities guaranteed in money terms try to invest in assets that provide a flow of income/capital to match the liability outgo.

For liabilities guaranteed in indexed terms (index may be national price/earnings index, or a specific one such as the employer's pay awards), again, try to match if there exist assets whose returns are linked to the relevant index.

Discretionary liabilities give more freedom to pursue maximum returns, subject to members' reasonable expectations.

Investment-linked liabilities may be linked to the actual performance of the fund, or may consider only the fund in respect of certain categories of membership — for example, considering the performance of the funds in respect of active members by first removing the assets held in respect of pensioners and deferred pensioners liabilities.

Investment-linked liabilities may simply link to a market index, or may link to the actual individuals' choice of funds in a DC scheme, allowing for lifestyle considerations.

In all cases it may be possible to match the investments or deliberately choose to mismatch the investments to seek higher returns.

Expenses are likely to be indexed to prices/inflation in some way.

Future income is an asset that will need to be taken into account appropriately, allowing for its nature.

(iii) Regulatory authorities may impose:

- restrictions on the types of assets that a fund can invest in
- restrictions on the quality of assets that a fund can invest in
- requirements to hold certain types of assets
- requirements to hold above a minimum (or below a maximum) proportion of certain assets (e.g. a minimum proportion in government stock)
- restrictions on the maximum exposure to single counterparty/issuer
- restrictions on the amount of self investment
- requirements to match by currency
- restrictions on the amount of mismatching permitted
- requirements to hold a mismatching reserve
- requirements on the sponsor to take professional investment advice
- restrictions on custodianship of assets
- restrictions on the type of assets that can be taken into account for statutory valuations (e.g. funding requirements)

- restrictions on the amount of any asset type that can be taken into account

(iv) First choose an appropriate time period over which to assess the experience.

Identify the data needed for the assessment:

- investment performance stats should be readily available
- both actual investment performance, as well as market statistics
- need details of significant liability movements for comparison purposes (for example, details of a major redundancy programme).

Measure the fund's investment performance against the investment managers' objectives. Compare asset and liability gains and losses; assess the deviations from what was expected and how this compares with the sponsor's risk tolerance.

Decide how to use the results of the assessment. Consider whether the period studied is representative and/or indicates any trends and how to feed the results back into the process. Consider whether to take corrective action if experience is adverse, or to review the objectives of the investment managers

Comments on question 7:

A methodical approach was called for in part (ii), with practical considerations of matching. Candidates who divided the liabilities by the nature of the member (active, pensioner, deferred) rather than the nature of the liability, started off in the wrong direction and generally struggled to get back on course. Very few candidates considered the effects of expenses and income.

Part (iii) was answered reasonably well by most candidates, with the stronger candidates able to generate most of the possible controls.

Part (iv) was a standard actuarial control cycle question. Those who approached it considering the control cycle process scored fairly well. However, a surprising number of candidates instead wrote down all they knew about dealing with investment experience - the answers in these cases did not cover the breadth of description required and so lost straightforward marks.

8 (i) One objective of HR strategy is to reward each employee according to their contribution. The benefits package should therefore deliver value to each employee and aim to attract and retain staff.

A fixed benefit package will be of different value to different employees; for example, a spouse's pension is worth more to someone who is married.

A flexible benefits scheme gives employees the option to tailor their benefit package to their own needs. This can be achieved by buying more benefits and reducing cash pay (or selling benefits and increasing cash), thereby possibly paying less tax. Usually employees have the option of adjusting their package each year so an individual can change their package over time as their circumstances change.

The employer does not have to pay for benefits that employees do not value, and the package can be made attractive to different groups within the workforce.

Annual enrolment reminds employees of the value of the benefits they receive. The system increases the visibility of what the employer spends on benefits, so increasing employee appreciation.

New benefits can be introduced at little or no cost to the employer.

(ii) *Any two sensible examples were given marks, for example:*

With a lump sum death benefit: employees could increase cover after they receive a diagnosis of terminal illness. Mitigation: restrict how much cover can be increased at each renewal.

With private medical care: employees could take this up when they have something that needs treatment. Mitigation: exclude pre-existing conditions.

(iii) The majority of the retail market may be single-trip policies, the flex scheme will offer annual cover, so comparison needs to be with the annual policies in the retail portfolio.

Employees pay premiums from monthly salary as opposed to annually in advance. There is a risk that premiums may be lapsed (employee moves job, or dies), after the main holiday has been taken.

Employees likely to be limited in amount of holiday they take. This is different from the retail market, which may include retired people with time for many holidays.

This company's employees may not be typical in their lifestyle and holiday choices, which may be higher/lower risk than retail.

Employees may holiday together, leading to a concentration of risk.

Employees will only be able to purchase at start of the flex year, even if they don't plan to take a holiday for several months, and so present a lower risk than retail customers who may purchase just before they book/take a holiday.

As employees, they may be healthier/younger/older than purchasers of annual policies, so present lower (or higher) risk of needing medical care.

(iv) The main purposes for which reinsurance is arranged are as follows:

- limitation of exposure to risk, either single event or cumulative events, or diversifying regional or portfolio concentration
- avoidance of large single losses (e.g. liability claim)
- smoothing of results
- availability of expertise for new risks, unusual risks, or new territories
- increasing capacity to accept risk either singly or cumulatively
- financial assistance for new business strain, merger/acquisitions, or bolstering free assets

(v) Consider the risks with this business line:

Travel insurance may be subject to concentration e.g. tsunami, airport closure, and reinsurance may offer ways of both diversifying this risk and of resolving liquidity issues.

Consider the extent to which Company A writes other uncorrelated risks:

If Company A only writes single trip rather than annual cover, then reinsurer expertise may be beneficial.

Need to assess the types of reinsurance available and compare potential levels of recovery against the cost, considering a range of potential outcomes.
Take into account the likely volumes of business, Company A's capital resources, and the size of Company A.

Consider alternative forms of risk transfer, and assess whether reinsurance terms are attractive in relation to these.

Comments on question 8:

This question is really two separate questions considering different aspects of the course and, if tackled as such, is not as onerous as its length may have suggested at first glance.

Flexible benefits schemes in the context of human resource strategy are discussed in the core reading. Given this, a surprising number of candidates gave relatively poor answers to part (i), sketching out points rather than explaining them fully. In part (ii), candidates who read the question and gave example of selection against the employer scored well. However, a number of examples merely considered aspects of moral hazard.

Performance on part (iii) was patchy: stronger candidates used the differences between the single trip cover and the annual cover to generate multiple valid points about the difference in risk from which they scored reasonably well.

Most candidates answered part (v) poorly. The majority did not answer the question in context, simply considering reinsurance in abstract terms. Generally there was little consideration of the risks of the business-line in question or any other risks with Company A.

END OF EXAMINERS' REPORT