Subject CA1 — Core Applications Concepts
Paper Two

EXAMINERS' REPORT

April 2008

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.

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Chairman of the Board of Examiners

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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.

Comments for individual questions are given after each of the solutions that follow.

1 (i) The principles of investment are that:

- A provider should select investments that are appropriate to the nature, term and currency of the liabilities and the provider's appetite for risk.

- Subject to the above, the investments should also be selected so as to maximise the overall return on the assets, where overall return includes both income and capital.

(ii) Investment objectives will normally be stated with reference to both assets and liabilities.

The method for setting an investment strategy in respect of such objectives should take into account the variation in the assets simultaneously with the variation in the liabilities. This can be done by constructing an appropriate model to project the asset proceeds and liability outgo into the future.

The outcome of a particular investment strategy is examined with the model and compared with the investment objectives. The investment strategy is adjusted in the light of the results obtained and the process repeated until the optimum strategy is reached.

Modelling can either be deterministic or stochastic. A deterministic model is based on a set of specific assumptions about the future. These can be varied to model a series of different possibilities in what is known as "scenario modelling".

In a stochastic model the random nature of some of the model parameters is allowed for. The output of a stochastic model is a distribution of possible outcomes of the particular strategy adopted. Most practical stochastic modelling is carried out using simulation, but simple stochastic models can be constructed using analytic techniques and the results calculated as well defined distribution functions.

Comments: Part (i) has been asked once a year for the last four years and the answer is the same every time. Even so a surprisingly large number of candidates failed to reproduce the standard answer and lost two "free" marks. Most candidates realised that part (ii) was also looking for a piece of bookwork, but very few identified what the examiners were seeking.

2 A long-term sickness insurance contract enables individuals to provide an income for themselves and their dependants during periods of incapacity due to accident or illness. Such contracts typically terminate at retirement age. The group equivalent can be used by an employer to provide a sick-pay scheme for employees.

It is important to bear in mind the external environment when framing actuarial advice:

The company will need to consider if there is any legislation affecting this product - for example, data protection requirements or discrimination legislation for age, gender or disability.

Regulations may influence the type of financial product most suited to a consumer's needs when there are a number of otherwise acceptable products.

The regulation of the sales process for different types of product may influence the types of product that are brought to market by product providers. Requirements for detailed explanation to consumers of any complexities may mean that some products are not marketed however suitable they might be for consumers' needs.

It will be necessary to consider the benefits the state provides for long-term sickness. These may be at a low level which may only be sufficient to keep individuals just out of poverty. Many individuals will want to have a higher level of benefit.

It will also be necessary to consider any benefits provided to an individual by their employer to ensure that the product gives an appropriate total level of coverage for the individual during periods of incapacity.

The tax treatment of benefits can also have an impact on the needs of individuals. It will be necessary to consider how this benefit will be taxed.

Competitive advantage and commercial requirements will need to be taken into account - a balance will need to be struck between designing a standard product that can be competitively priced and an innovative product that may be potentially more expensive.

The company will require finance to launch a product and therefore the ability of the company to raise capital may affect the development of the product.

It will be necessary to consider the position of this business in the underwriting cycle and also whether there will be any cross subsidies involved.

The position in the economic cycle will also be relevant – for example, if there is a downturn in the general economic cycle there would generally be a smaller market for this insurance.

Changing social trends can have an impact on financial products, and the company will need to consider whether they will affect this business - for example, through lower levels of state benefits or through an increased level of income leading to an increased demand for this product.

Changing medical and healthcare trends may also have an impact on this business – for example, through increased incidence of certain diseases or decreased impact of others.

Lifestyle considerations may also influence demand for this business – for example, any shift to healthier lifestyles for the working population may decrease the perceived need for this insurance.

Technological changes will also be relevant. For example, in the extent to which technology enables incapacitated individuals to perform other jobs.

The company will need to consider the effect of the internet in selling business. They must bear in mind that many of their competitors may be using this method even if they do not decide to do so themselves.

Comments: This question was answered well. There were many good answers that applied the core bookwork features to the particular product. Most successful candidates remembered the general headings that have to be considered under external environment, and therefore produced a well-structured answer that was easy to mark. Candidates who didn't restrict their comments to external factors wrote for no marks.

3 (i) Market risk – the assets that the scheme invests in may not deliver the expected return, and the company will have to make up the shortfall. Asset/liability matching is a subset of market risk. The bulk of the benefits are fixed in real terms, increasing only with inflation. Only a small proportion increases with salaries. High exposure to equity risks in these circumstances will increase market risk.

Credit risk – to the extent that the scheme invests in non-guaranteed assets, whether equities or debt, there is a risk that the issuer will default on payments. Where a third party holds certain assets owned by the scheme, failure of the counterparty can affect the asset proceeds, or more usually how easy it is to access the assets.

Business risk – the scheme may have insufficient provisions established to meet the costs relating to the pensioners and deferred pensioners. Excess costs will fall on the scheme sponsor. This might be the case, for example, if future longevity has been underestimated. The costs of administering the scheme, either in-house or with a third party, might be greater than anticipated.

External risk - the government may impose a regulatory change such as changes in solvency requirements or tax changes, which may lead to additional burdens on the company through matching requirements, compensation schemes etc.

Operational risks – these relate to inadequate or failed people, processes and systems. Operational risk might include having inadequate plans to recover the operation of the scheme after a fire or other external event; fraud; holding inadequate data to enable benefits to be calculated accurately, etc.

(ii) **Advantages of transferring risks**

The company may be contributing only in respect of increases in salaries on the historic service of what is now a small number of individuals. The contribution rate, and the actual amount of contributions is unlikely to be high.

Emergence of any of the risks above that affect pensioners or deferred pensioners may involve a large amount of money. This could lead to very volatile contributions, particularly if expressed as a percentage of salaries of the small number of active members. Depending on accounting regulations this could also lead to volatility in the company's disclosed profits.

Transferring risks will require an immediate cash outflow, but future volatility will be greatly reduced. Record keeping for a large number of people that the company is not particularly involved with will be removed.

Running the pension scheme is not the company's core activity, and currently the potential financial consequences if risks emerge are such that management time must be diverted to the scheme.

Benefits for the members are only guaranteed to the extent of the employer's covenant and any statutory support scheme. On transfer to an insurance company, particularly in a regulated environment, the guarantees for scheme members will be greater and more valuable. (But there is a cost to this – see disadvantages).

Disadvantages of transferring risks

The main disadvantages of transferring the risks is that the premium required by the insurance company will probably be greater than the assets held by the scheme in respect of the transferring members.

This is likely to be because:

- The additional guarantees given to members will probably involve matching more closely with fixed interest and index linked stocks. The potential additional return from equity investment will disappear.

- The scheme will be funded on a best estimate basis, possibly with a degree of prudence. When the insurance company sets the premium required, the risk of the employer needing to make additional contributions will be factored into the price up-front. By transferring the risks the scheme loses any potential upside if the risks do not materialise – for example, for mortality experience.

The insurance company will include risk and profit margins in its price.

Thus the employer will need to make a one-off payment to benefit from the risk transfer.

If the company is considering transferring all risks then a disadvantage is that the company may not get a good price for all of them; it may therefore decide to transfer only those risks where it is able to get a good price.

Diseconomies of scale will come into play for the remaining active members – there will be much higher costs of investment and administration, and there may possibly be investment restrictions.

Comments: The better candidates thought about the types of risk and produced a logical, well structured answer for part (i) that optimised mark-gaining potential. In part (ii), many candidates did not consider the cost of transferring the pension benefits to the insurance company (and how these costs would compare with the assets currently held). Thus there were comments about "release of funds" and 'surplus' rather than the additional costs that would have to be met. Many candidates thought that either the employer, or the current active members, would be particularly concerned about former employees – most companies are no longer so paternalistic.

4 (i) Cancellation cover, for any of a set number of reasons

Damage or loss of
- Wedding attire
- Wedding rings
- Wedding presents, etc

Loss of deposits on financial failure of any supplier prior to the wedding

Non appearance or inadequacy of pre-booked
- Photographs/video
- Marquees, or other venue
- Transport
- Flowers
- Cake/catering
- Entertainment

Legal expenses

Public liability

Comments: Credit was given for other sensible alternative examples within the general categories above.

(ii) The supermarket will have a lot of outlets with a lot of customers passing through, and it will be used to employing marketing and presentational techniques to boost sales.

The supermarket may attract customers who wouldn't normally buy from the insurance company. Particularly as the policy may be something of an impulse purchase that wouldn't otherwise have been considered.

Supermarkets tend to have strong brands. Customers may trust a supermarket more than an insurance company. This could boost sales. The supermarket may have efficient systems (e.g. lower paid "sales" staff). This could reduce expenses to the insurance company.

The insurance company will gain access to data on a wide range of potential customers. This could be useful in cross-selling other products.

(iii) Rating factors are the items the insurer will use in order to distinguish premium rates for different levels of risks.

The insurer needs to consider which factors will cause the chance of a claim to vary. This may be something of a subjective exercise since detailed claims data may not exist. Even if it does, the insurer may not have access to it.

Note the cover will be indemnity cover, covering the amount of loss at the time the event occurs.

Hence the most significant and quantifiably variable risks may relate to cancellation and liability costs. Claims for other perils may be more uniform across the insured population.

Age could be a discriminating factor with younger people being more likely to claim.

Certain areas of the country may be more prone to claims – for example, urban versus rural.

Some measure of income or social class could be a discriminating factor. Higher income groups may be less prone to a claim.

The chance of a claim could vary depending on whether it is a first or subsequent marriage, with first marriages being more likely to give rise to claims. To a degree this factor is linked to age.

However, it is likely that such differences will have a minimal impact on risk. Trying to set a lot of different rates may add to complexity and reduce marketability.

There would usually be exclusions or special premiums within the policy for certain risks. For example, a special premium if the wedding is to be held abroad or in an unusual location.

The insurer may provide a menu where the insured can choose which risks they wish to be covered. Premium rates would vary depending on the risks chosen.

Alternatively, the insured may be able to choose from various tiers where the sums insured for each peril vary. Premium rates would vary across tiers, primarily due to the lower impact of per policy expenses on larger premium policies.

Comments: Parts (i) and (ii) were generally well answered. They required application of some actuarial principles, and a great deal of common sense and general knowledge to a real life situation. In part (iii) common sense started breaking down. Candidates produced long lists of possible rating factors, but failed to realise that the premium for the risk would be relatively small – claim values might reach one or two thousand pounds, but rarely ten thousand pounds. Hence the risk premium would be small and the amount that could be spent on underwriting would also be small. A practical approach is therefore needed.

5 (i) (a) Self-insurance is defined as the retention of risk, as distinct from obtaining insurance cover.

(b) In principle, self-insurance may appear attractive because insurance companies will aim to make profits after allowing for their expenses and the cost of claims.

For some risks, the cost of any claims could be trivial in the context of the business. In these cases insurance will be deemed unnecessary. In other cases, the cost of claims could be significant but the amounts and timing of claims may be predictable. The main risks of self-insurance may be related to unpredictable and volatile costs.

If a business can plan accurately for its outgoings, insurance may not be needed.

(ii) In order to calculate premiums, the insurance company will need to estimate the future cost of claims. They will need information that helps them quantify future claim rates and the average expected claim size.

Given the different types of units, it is likely that rates would vary between units. It is also possible that the retailer would only wish to insure some of the units, for example, those subject to the greatest potential volatility in claim amounts. Therefore data would be needed on an individual unit basis.

The insurance company would expect the retailer to provide the relevant historical loss data over a sufficient period, say the last five years. The insurance company may be able to check this company data by looking at claim rates for similar units it currently insures.

The most important factor will be location, both general location – for example postcode, and specific location – for example, on a main road or a side street, in a well-lit area, or close to a police station, etc.

The nature of the business will have an influence:

- what they sell
- how valuable is the stock

- how the stock is displayed
- where reserve stock is kept
- what security procedures exist around the stock
- what are the opening hours – in particular do they open at night.
- How many staff are on duty. Single staffed units are more vulnerable.
- The amount of cash left on the premises during working hours or overnight
- How regularly cash is banked or collected by secure vehicles.

Information on current security measures and procedures would also be considered.

(iii) The measures to be taken will be additional to those the insurance company would normally expect any retailer to adopt.

The premises should be secure when closed. For example, several layers of protective gates and doors etc should be used, and all potential entrances including windows should be blocked or covered by strong shutters.

Security systems should be used and be seen to be in use. If possible, any security feed should be capable of continuous monitoring. Some form of radio link with other retailers and local police with channels being always open would help. Other initiatives by groups of retailers such as employing security staff may help.

The security of the stock should also be considered – for example, security tagging of stock, if applicable.

As a lot of cash will be involved, cash handling procedures will be important. Tills should be inaccessible to customers and money in tills should be kept to a minimum. No cash should be kept overnight, and during the day most cash should be held in secure safes. Keys or combinations should be held/known by as few people as is practical.

Staff fraud could be an issue. The retailer should be able to demonstrate that it vets staff carefully and monitors them during work as far as the law will allow.

Consider whether it is practical to move towards cashless transactions such as credit and debit cards.

Marks were given for other sensible distinct examples of security measures.

Comments: Many candidates failed to define self insurance correctly, but nevertheless the question was done well. Some candidates discussed the type of policy and excesses rather than general premium setting information. Most candidates had a very good knowledge of security measures, and presumably a similarly good knowledge of how to get round them (hopefully not from practical experience!).

6 (i) Sources of risk include:

- The risk that a borrower is unable or unwilling to make payments required under the mortgage agreement. (Credit risk) If they do default, then there is the risk that the value of the security taken (the property) doesn't cover the loan.

- The risk of borrowing short and lending long. (Mismatching risk)

- The risk that the borrower has an inability to meet payments when they fall due because of inadequate cash or other liquid assets. (Liquidity risk)

- The exposure to a high level of risk in any sector. (Concentration risk)

- The risk that there is no market into which to sell these products, having invested in development and marketing. (Business risk)

For residential mortgages early repayment of the outstanding mortgage is a source of risk as the lender may be exposed to the risk of having to bear any costs of cancelling the deal.

(ii) (a) The impact of the central bank increasing short term interest rates is to discourage investment spending by firms and reduce the level of consumer spending. Thus increasing the short term interest rates will reduce the rate of economic growth in the short-term.

Increasing short-term interest rates will increase demand for the domestic currency and tends to increase the exchange rate. This will increase the relative cost of exports and reduce the relative cost of imports.

Increasing short-term interest rates will increase the cost of servicing unsecured personal debt, this is combined with an increase in mortgage payments.

Higher short-term interest rates and higher exchange rates will reduce economic activity and change inflation expectations. In the short term, if companies can pass on extra borrowing costs in prices, inflation will increase. If the slowdown in the economy is prolonged, inflation will reduce. This is likely to have an impact on employment levels, increasing unemployment.

(b) The level of credit risk faced by the regional bank will increase from both those who have become unemployed and those in employment because both will be less able to make the payments under the mortgage agreement. There is an increased likelihood that borrowers will fall behind with their mortgage payments.

The level of liquidity risk will also increase as borrowers may be unable to sell their property to repay borrowing. Forced sales, including repossessions may lead to property prices falling. In turn falling property prices can cause an increase in credit risk as the outstanding mortgage may exceed the property value.

The level of bad debts faced by the bank will increase and this will impact the bank's profitability. Volumes of future business may decrease, as the bank may introduce more stringent lending requirements, and people may have less money available.

A regional bank has higher concentration risk as its residential mortgages are in a particular region and that region may be more adversely impacted by the economic changes than the economy as a whole.

The bank may not be able to increase the rates on all its portfolio, for example, there may be both fixed rate mortgages and variable rate mortgages in the portfolio.

(iii) To determine the price to pay for the securitisation the investor should evaluate the risks relative to a risk free investment, such as a government bond of the same term. The investor should then allow for the fact that these mortgages have a higher risk profile and the credit risk is higher.

The investor should investigate the initial lending criteria used to evaluate the credit risk profile – for example, whether lending criteria included affordability considerations and how strictly they were applied.

The investor should also investigate the economic exposures within the particular region. The focus will be to identify whether there are particular risks within the region. For example:

- Is the region in economic decline? – for example, due to a declining regional industry
- Does it have a higher economic sensitivity to economic changes, including interest rates?
- The local demographics – are the mortgagees concentrated within a particular area within the region?
- Are the mortgagees exposed to a particular employer, for example a major regional employer?

It will also be necessary to consider the nature of the mortgages – whether they are interest only or repayment mortgages. Repayment mortgages will be more secure as the ratio of loan to property value will be reducing over time.

The difference between the higher risk mortgage rates and other mortgage rates is a factor. If the difference is large, then when the borrowers' financial position changes so that they become eligible for mortgages charging lower rates then there is both a pre-payment risk and the risk that the credit risk in the portfolio will tend to deteriorate, due to better risks re-mortgaging to better deals.

The size of the mortgage portfolio will also influence the concentration risk.

The transparency of assets may be an issue, in that the investor may not be able to immediately tell what they are getting within this investment.

Comments: This was a highly topical question when it was set in the autumn of 2007, and remained topical up to the date of the exam. Parts (i) and (ii) were answered reasonably well, although in part (ii) very few candidates commented on the effects on employment levels, or made an argument for what might happen to inflation (either up or down is possible). In part (iii), many candidates did not answer the question, writing generically about how to securitise and not the considerations in the context of the question, in particular the additional risks. There was a lack of focus on the regional aspects of the bank's position.

7 (i) A written strategy for a project should include:

- The aims of the project
- The issues necessary for the implementation of the project
- The areas of risk that could affect the viability of the project
- Alternative strategies for dealing with areas of risk.

(ii) (a) The expected cost of the competition will be influenced by the following factors:

The expenses of setting up the competition which will include any specialist consultants' time, the cost of any launch events, media coverage and publicity, and the costs of adjudication.

The prize money paid out if the competition is successfully won, plus any money paid out for runners up, or for the closest competitor if the competition is not won outright.

The amount on offer as the prize may need to be large to generate the publicity and entrants to the competition. This needs to be balanced against the likelihood of it being paid out.

The opportunity cost if other means of achieving objective – i.e.: direct investment.

Ongoing expenses and costs of administration depend on the timescale of the competition, which in turn affects the likelihood of there being a winner and the prize money being paid out.

(b) The private foundation may simply guarantee to pay out the prize money in the event of a winner.

Additionally or alternatively, there may be opportunities for corporate sponsorship, or investment by the existing industry.
Entrants could be required to pay a nominal fee to enter the competition and cover the costs associated with registration – this would also encourage only serious competitors.

Donations may also be invited from other individuals or foundations.

There may be suitable competitions already running – it may be more efficient to simply sponsor these.

The expenses of running the competition may be handled separately to the prize money.

A fund may need to be established to ensure that the competition runs successfully over its lifetime and has sufficient funds available for its expenses.

There may be tax advantages for certain financing methods depending on the charitable status of the foundation.

Due to the likely financing structure, there may be little possibility of traditional insurance or reinsurance.

(iii) Consider the areas a written strategy should consider for this project, other than expected cost and the financing policy:

Identification of the objectives of the project

The project objective is to inspire a future generation of ultra-efficient vehicles. Will the launch of such a competition achieve this objective? If managed successfully, the launch of a high profile competition could generate research, investment, and publicity in this area.

How the objectives will be met and acceptable quality standards

To meet the objectives there may be quantitative targets to be achieved, such as the number of teams entering the competition, or in areas such as investment, or more qualitative targets such as the level of media coverage.

This could be achieved independently of whether the competition was won or not.

The role of the project sponsor

The private foundation is the project sponsor, and their role will need to be agreed.

Depending upon the make-up of the foundation, there may be individuals in the foundation who have a keen interest in this area and would like to have a greater public role in this project, or alternatively the foundation may be happy to simply fund the prize money.

There may also be political constraints to be considered both within and outside the private foundation.

The role of any third parties, and the communications and IT policies

The organisation and launch of such a competition is a specialist area. The foundation may need to work with consultants or others who have been involved in such competitions, or equivalent global projects before.

They will also need to work with experts in this automotive field to draft the criteria by which the competition will be judged.

The external communications policy is critical to the success of the objective, as the competition must be high profile globally to both tempt sufficient entrants to the competition to make it successful from a marketing point of view, as well as educating the general public and inspiring the next generation of efficient vehicles.

A high cash prize will help here, as would high profile sponsorship.

The use of information technology will be important to the launch and administration of the competition to ensure smooth administration, media coverage and public involvement.

The financial and economic objectives, and the risk management policy

If this is an altruistic move by the private foundation, the financial objective may not be to generate a monetary return on the investment, but rather to achieve a global benefit by increasing vehicle efficiency.

Alternatively, the foundation may benefit in other ways by achievement of the objective – for example, through licensing technology, synergy or compatibility with other projects etc.

There will need to be a balance between the efficiency advances set out in the criteria for winning the competition, the likelihood of the competition criteria being met, and the amount of the prize money being offered.

If the financial prize will only be awarded on the criteria being met, the immediate financial risks may be limited to the expenses of setting up and running the competition – in effect the competition structure passes the risks of investment to the entrants of the competition.

However, risks of loss of reputation or bad publicity may be relevant to the foundation.

Consider analysis of all risks to the objective and options for mitigation.

The policy for dealing with legal issues

Competition rules will need to be carefully worded to avoid disputes. It will be necessary to ensure that the criteria are clear and cover all required areas, such as efficiency, commercial viability, safety, performance, capacity etc.

Consideration will also need to be given to any other legal risks, for example confidentiality or non-disclosure requirements during adjudication, where entrants are using patented technologies.

The technical policy

For the competition to be equitable, the technical aspects of the criteria must be established absolutely at the start of the competition. These cannot be amended partway through the competition – although there may be room for clarification of some aspects.

Key milestones for project review

The timescales for the phases of the project – launch, tests, deadlines etc. – should be established. Key milestones should be in place to review the project – for example, monitoring entries to ensure the competition is set to achieve the objective.

A breakdown of the work to be completed

A structured breakdown of the work to be completed under the project should also be established, involving assessment of feasibility, competition financing, technical consultation, launch, administration, and media/communications.

Comments: The number of marks for part (i) should have given candidates a clue that it was a short and therefore high level list that was sought. In the rest of the question the candidates that scored well were those with well structured, thought out answers. Many answers reflected a repetition of bookwork rather than the specific situation of the question, although keeping to the structure of the bookwork leads to a well-structured answer.

END OF EXAMINERS' REPORT