Subject CA1 — Actuarial Risk Management
Paper One

EXAMINERS' REPORT

April 2009

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

July 2009

General comments

As the title of the course suggests, this subject examines applications in practical situations of the core actuarial techniques and concepts. 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 main weakness that candidates show is an inability to answer the question that the examiners asked, having read the question carefully. Too many candidates write around the subject matter of the question in more general fashion, and gain few marks. Good candidates demonstrate that they have used the planning time well – an attempt to get a logical flow is a big advantage in making points clearly and without repetition.

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 in the solutions that follow.

1 The defined benefit scheme should select investments that are appropriate to the:

- Nature of the liabilities, usually pension on retirement with other benefits, and liabilities are generally guaranteed in terms of an index but may be related to salary and/or inflation.

- Term of the liabilities, generally long term, particularly for deferred pensions.

- Currency of the liabilities (normally domestic).

- Uncertainty of liabilities: linked to longevity for pensions in payment and future pensions.

- Liquidity requirements of the scheme.

- Sponsor's appetite for risk: generally driven by company's desire to secure benefits and manage liability; trustees may have low appetite for risk.

Subject to the considerations above, the fund should aim to maximise the overall return on the assets (considering both income and capital gains): higher returns may enable higher benefits to be paid, or lower contributions from the sponsoring employer.

It will also need to take into account the size of the scheme, its funding position, its taxation position and its rules/regulations.

Most recognised the core bookwork and so scored quite well. However not that many developed it properly. Given the relatively high number of marks and a specific context of a defined benefit scheme, candidates should have realised elaboration was needed on the basic issues. Many just repeated the general point e.g. term is important without being specific.

Too many went away from strategy to look at tactical issues i.e. stock or sector selection and relative return, which was looking at it from the wrong perspective. It was fine to use particular assets to briefly illustrate the point but not as the focus of a discussion.

2 The fund will need to consider the following factors:

- Do they have the cash to loan?

- Is the loan appropriate to the fund's investment objectives?

- The rate of return being offered compared to the return from government and corporate bonds of similar term.

- Existing capital structure of the company.

- Whether the debt will be secured on specific assets.

- Whether this debt will be subordinate to other debt owed by the company.

- The purpose of the loan.

- The tax treatment of the loan.

- Any supervisory or regulatory issues (and whether this is allowed under the trust deed/rules) surrounding a loan of this nature. For example, is it allowed for a pension fund to lend money directly? Will the loan be admissible as an asset for regulatory purposes? Any ethical issues?

- Marketability of the loan.

- Existing holdings of corporate debt within the fund and whether this will cause a concentration of risk.

- Whether the term of the loan matches the liabilities of the fund.

- Whether fixed repayments match the liabilities or whether inflation-proofing is required.

- Cost of administering debt.

- Is it the sponsoring employer that the loan is to be made to?

A detailed analysis of the company will need to be carried out, looking at information both in the public arena such as financial statements, and also:

- Business plans
- Management/character of the company
- Product
- Outlook for the sector and the market
- Competitive position

The fund should consider whether better terms could be obtained through negotiation.

If the fund managers have insufficient knowledge, consultants should be employed to perform the analysis and negotiation. The costs of this should be considered.

There is a section in the core reading about what to consider when making a loan – linked to the canons of lending. However, this is a situation with a specific context. Many candidates failed to tailor the general bookwork to this example and so scored relatively poorly. Some aspects of the bookwork were valid but many weren't.

Most candidates mentioned the management and character of the company but few considered any of the other factors involved in analysis of the company. For example, while "ability to repay" is very relevant, the real consideration is how to assess it - ability is not a fact that you could look up.

3 (i) It is necessary to project items such as the revenue account and balance sheet to see the expected profits.

The results of the initial product pricing models can be combined to build a complete model of the provider's future revenue accounts. It is important in building such a model to ensure that the elements of the revenue account are self-consistent in their own right. Assumptions will be required relating to premiums, investment income, death claims, lapses etc, although it is not sufficient to project these independently. One needs to build in expense allowances, both per policy and global, depending on levels of business.

One will also need to have assumptions around the likelihood of the guarantees biting — a stochastic model may be required for this.

The model will be developed by multiplying the profit test results by the expected number of bonds to be sold in each fund in each future year. Then for each future year the number of bonds still in force from previous years needs to be added. This will then give a model that can be used to build up the expected future progress of the business as shown by the revenue accounts.

Assess the sensitivity of the outcomes to the assumptions made.

(ii) Commission — the commission that was needed to sell the business was higher than expected.

Persistency — the lapses of the bond have been greater than expected, particularly after the 3rd year anniversary as the early exit charges are no longer applicable; this is a particular concern if the commission terms are high as the business will not have recouped its outgoings in the first 5 years
Withdrawals — regular or partial withdrawals may have been taken which would reduce the amount of AMC that the business would have received
Investment Returns — the risks of poor investment primarily lie with the policyholder for the equity and fixed interest fund and therefore will not have contributed to the deficit. However if the returns are lower than expected this will affect the AMC.

Mortality — this will only be an issue if the fund value at the time of death is lower than the original premium; if this is the case then higher than expected mortality would be a problem.

Guarantees biting on the guaranteed fund — if investment returns have been poor then if people have left on the anniversary the provider will have to pay the difference.

Expenses — the expense of setting up the policy was greater than expected.

Ongoing Expenses — the expense of administering the policy was greater than expected.

Inflation — if inflation is greater than expected then real returns on the AMC will be lower, and expenses higher.

Levels of business — if this is lower than expected or a different mix then the fixed cost base may not have been covered and hence contributed to the loss

(iii) Could try and control expenses — particularly the ongoing expenses — perhaps automating processes.

Reduce the commission levels for the new business — however this may reduce the new business coming through.

Look into the lapse experience and try to retain more policies — this is particularly important as the AMC is the only way the business makes money and therefore need the policyholders to stay as long as possible.

Increase the AMC or introduce initial charge — this is likely to reduce the level of business.

Charge more AMC for the guaranteed fund or just give the guarantees on particular anniversary dates (say 5^{th} or 10^{th} anniversary) to pay for the extra costs of running this fund.

The guaranteed fund could invest in less risky assets (cash and fixed interest) to ensure it is always greater than the original premium paid.

Extend the early exit charges to ensure that commission and extra allocation charges are recouped.

Consider selling through different channels where lower commission could be paid to sell the business.

Stop selling the product or reduce the number of funds available.

Increase sales (perhaps by changing design) to cover fixed costs
All of these changes need to be done with the competition in mind

In part (i), as usual with modelling questions, most candidates did reasonably well by looking at core bookwork but not many developed the specific nuances – a description of the cashflows and the significant issues a model would need to cover in this example. The better candidates did recognise the implications of guarantees in the context of stochastic analysis, and highlighted what matters most, such as expenses.

Part (ii) generally was done pretty well with good discussions on expenses and withdrawals. Mortality and investment return was handled less well, the link with profit was often not made: for example, many commented that the provider carried an investment risk but didn't explain why (e.g. could be a reason for poor sales).

There was a wide range of marks on part (iii). The better candidates focused on specific charges, expenses and guarantees, and considered proposals for reducing lapses and *increasing sales (and their implications). Others just talked in generalities (review, analyse or study) or stated aspirations (improve investment management). Too many candidates talked about increasing premiums – the implication being that the benefit was being undercharged – whereas of course there is no benefit being "purchased", just accumulated premiums.*

Many suggested that losses were arising because the model was wrong (perhaps true). But then to say "change the model and everything will be fine" misses the point that real world actions are needed to increase revenue or reduce costs.

4 (i) Stability of profits: more excess of loss protection may result in more stable results and stability of profits will affect ability to pay stable dividends

Management and shareholders' attitude to risk: the size of the company's free reserves and the extent to which these can withstand adverse large loss experience

The potential for accumulation of claims:

- Concentration — the company would want to limit the exposure it would have to any particular area so could transfer the risk of a percentage of the business
- Catastrophe — a major catastrophe would cause major losses to the provider and hence risk transfer would help mitigate the risks

Statutory solvency: how will changing the risk transfer protection impact any statutory solvency position?

Company strategy: is the company expecting to expand its business

Technical assistance: does the company need to have technical help

Market reputation: how will investors, analysts, brokers and customers react?

Security status: a counterparty with better security may charge more for the cover

Value for money of arrangements available in the market, their type and cost

(ii) DISCOUNTED COVERS — these provide full cover without the immediate need to finance the full undiscounted liability.

INTEGRATED RISK COVERS — typically arranged between insurers and reinsurers. They can be used as a substitute for debt or equity in the investment portfolio of the original insurer. They are used to avoid buying excessive cover, to smooth results, and to lock into attractive terms.

SECURITISATION — this is the transfer of insurance risk to the banking and capital markets. Insurance risk is not correlated with market risk and so there is benefit to investors.

POST LOSS FUNDING — this guarantees that in exchange for a commitment fee funding will be provided on the occurrence of a specific loss. The funding is often on a loan on pre-arranged terms or equity.

INSURANCE DERIVATIVES — e.g. catastrophe or weather options
SWAPS — Organisations with matching, but negatively correlated risk can swap packages of risk so that each organisation has a greater risk diversification.

The company can also use the following tools to aid the management of risk:

- Improved underwriting prior to acceptance of risk – this ensures a fair price is paid for the risk.

- Improved claims control procedures – these mitigate the consequences of a risk event that has occurred and should guard against fraudulent or excessive claims. Must ensure costs do not outweigh benefits.

- Good management control systems to reduce the company's exposure to risk.

(iii) Provision of cover might not be available
Stabilisation of results
Cheaper
Tax advantages
Greater security of payment
Management of solvency margins
More effective provision of risk management e.g. diversification
As a source of capital

(iv) **First approach**

- Parent company would determine its overall risk appetite and divide this up amongst the business units.

- Just as each business unit has its own management team to run its business the business unit management team manages the risks of the business within the risk appetite they have been allocated.

- As a risk analysis involves allocation of capital to support the risks retained by each business unit this approach is likely to mean that the group is not making the best use of its capital.

- Makes no allowance for diversification.

- A crude approach to allow for diversification would be to simply allow the risk appetites allocated to the business units to add up to 130% or 150% of the group's overall risk appetite.

Second approach

- Establish group risk management function as a major activity at enterprise level.

- Group can impose similar risk assessments procedures on various business units which will enable the results from various models to be combined into a risk assessment model at entity level.

- In turn this will give the group management insight into the areas with resulting undiversified risk exposures where the risks need to be transferred or capital set against them. It will also show where not enough risk has been taken on.

- This will be an important feed into the business planning and capital allocation cycles.

Part (i) was generally poorly done with a lot of answers that talked around the issues without really getting to the circumstances of the question. There was no need for lengthy discussion about the nature of risks and how to assess them which is a bit tangential to the point here concerning controlling risks and their effects. Not many candidates looked explicitly at property factors especially when considering concentration, catastrophe and profit stability.

In part (ii) most candidates outlined the main options, though some became confused in detailed descriptions.

Part (iii) was generally well answered.

There was a wide range of marks on part (iv). Some did not distinguish clearly between their two proposed approaches. Only the better candidates discussed the pros and cons.

5 (i) Consideration would need to be given to the scale of the operations and the vehicle to be used. The corporation could attempt to cover the whole country from the start. Alternatively, they may decide to focus on certain areas of the country. Perhaps they would concentrate on large urban areas or on areas of the country that are closer to developed countries culturally or economically.

They may decide to develop a small number of high profile flagship sites rather have a relatively large number of small sites.

They may decide to develop new sites using their own resources, i.e. an independent venture established from scratch. Alternatively, they may try to purchase a domestic company (if one exists and if allowed by regulation) that operates in their market. In this case, they will need to decide whether to maintain any existing brand names or use their own. Ultimately the aim may be transform such operations so that they resemble operations in other countries in terms of products and management techniques.

If these options are not practical, they may decide to set-up joint ventures with local companies e.g. suppliers, retailers or property companies. This may mean that they are investing in a business rather than having total control over it.

(ii) The factors will depend on the nature of the operations set up, since the particular risks will vary under each alternative.

However, at the heart of any option, the core issue will be to assess the factors that could have significant impact on profitability — level and volatility.

This will primarily depend on the demand for the products they intend to sell. Assuming that they intend to bring out similar products to those sold elsewhere (this is the business that they know) they need to study the suitability of those products for this market and consider how they need to be adapted.

The type of food sold may not be popular e.g. if large sections of the population are vegetarians or traditional foods have dominant positions or religion could be a factor if products from certain animals are forbidden.

There may not be the same culture of eating out that exists in developed countries, and traditional societies may have codes of behaviour that are incompatible with the corporation's normal business model. To this end, careful consideration will need to be given to the target market it may not be the same as in other countries. In particular, sections of the population with sufficient disposable income will need to be identified and targeted.

Pricing will need to take into account the level of affluence in the country and the price of alternatives. A broad decision will be needed as to whether to aim for a slightly upmarket image or to go for a cheaper mass-market policy.

Consideration will need to be given to the availability and cost of raw materials. Do they exist in the country or will they have to be imported? Can the corporation use existing suppliers or will they need to establish new relationships?

A careful analysis of other expected costs will be needed. The most significant are likely to relate to labour and property (rent or construction). The availability of a labour force with the necessary skills will be an issue.

Will also need to know whether there is any competition.

Taxation both in relation to the point of sale or on profits (especially on those taken out of the country) will be an issue.

Compliance with local regulations and customs e.g. employment or planning law and advertising could incur a cost or delays due to bureaucracy. Selling food may imply that health and safety considerations come into play.

The political situation will need to be analysed in particular the attitude to foreign companies and restrictions on their operations. A view will be needed on future stability and whether changes in regime could cause a problem.

Linked to this will be attitude of the population at large to "global" influences. Are such restaurants likely to be focal targets of popular disaffection?

If the corporation is buying an existing company, in addition to the above, a full assessment of that company including management and financial structure will be needed in order to assess a fair price to pay.

Likewise, the strength and reputation of any partners in joint ventures must be analysed. Any contracts should be thoroughly checked in relation to the legal system of the country.

It will also be necessary to consider currency risks.

(iii) Avoid the risk — e.g. look at risky location profiles and avoid
Reduce the risk — e.g. lower the scale
Reduce uncertainty — e.g. thorough market research
Transfer risk — e.g. franchising
Insure the risk — e.g. against disruption to supplies
Sharing risk — e.g. joint venture

Part (i) was answered reasonably well, though some candidate duplicated their answers for part (ii)

In part (ii), few candidates commented on how the choice in (i) has an effect. A standard bookwork answer on risk assessment was not expected. Better candidates gave a practical discussion about actual aspects of this project that will need to be considered. But many answers lacked planning or logical structure – rather than rushing in on long questions, candidates need to assess what is important and start from the beginning and develop. The question specifically did not ask for discussion of financing and raising capital.

Part (iii) scored highly on average because the list was accurately produced. However, weaker candidates did not score highly on the examples, perhaps because they had not answered (ii) well so could not link back to a point they had already articulated.

6 (i) Economic growth may have slowed down and the country may be in recession.

Reducing interest rates should encourage investment spending by companies especially if there is an increase in confidence. This should lead to increased employment levels. There is likely to be a lag between the timing of the investment and any increase in growth.

There should also be an increase in the level of consumer spending. This may be due to:

- increased income due to a reduction in debt servicing costs
- lower borrowing costs making borrowing more attractive
- lower savings rate making savings less attractive

This should provide growth in the short term but this may take time if consumer confidence is very low.

If interest rates are reduced, international investors will be less likely to deposit money in that country. The exchange rate will therefore be likely to fall. The lower exchange rate should increase the competitiveness of exports although the costs of any imported materials used will increase which reduce the benefit. The lower exchange rate should also increase the relative competitiveness of domestically produced goods, but will increase the costs of imports which can lead to increased inflation (supply side).

Lower real interest rates mean an increased quantity of money is demanded which is met by an increase in the money supply. This can lead to inflation. Low real interest rates can also lead to inflationary pressures by increasing demand. Inflation will need to be monitored to ensure it stays within any target range.

Interest rates may also be reduced if the rate of inflation is lower than desired or to restore confidence in the property market.

They may also be reduced to decrease the exchange rate.

There may be pressure from the government to reduce rates for political reasons.

There may be a global tendency to reduce rates and the central bank wants to keep currency/trading balance unchanged.

(ii) **Government bonds**

The yields on short term bonds are closely related to returns on money market instruments so a reduction in short term interest rates will almost certainly boost prices of short bonds. However, investors in long bonds may interpret a cut in interest rates as a sign of monetary easing, with potentially inflationary consequences over the longer term. So the yield on long bonds might decline by a smaller amount, or even rise.

A lower exchange rate will affect the demand from overseas investors. It will also alter the relative attractiveness of domestic and overseas bonds for local investors. This is likely to increase the price of bonds.

Index-linked bonds will be influenced by real interest rates. The reduction in short term interest rates may lead to an expectation of increased inflation or uncertainty over inflation. This is likely to increase the relative attraction of these bonds and so should increase the price.

Corporate bonds

The factors affecting government bonds will also apply to corporate bonds.

If the change in interest rates is viewed as likely to lead to economic growth then this should increase corporate profitability and so reduce the risks of corporate bonds relative to government bonds. This should reduce the yield margin of corporate over government debt. The margin will also be influenced by the availability and price of government bonds.

Equities

Low real interest rates should help to stimulate economic activity, increase the level of corporate profitability, and hence raise the general level of the equity market. Also, the rate of return required by investors should be lower, so the present value of the future dividends will be higher.

Any inflationary fears would tend to increase the relative level of the equity market at the expense of the bond market.

If the exchange rate weakens, exports will become more competitive but imports will be more expensive. The effect on equity markets will depend on the proportion of profits earned abroad. It will also lead to improvement of any overseas earnings in domestic currency terms.

Property

Lower interest rates stimulating economic growth should lead to an increase in demand for commercial and industrial premises as levels of employment rise.

Increasing the supply of property takes time and so property prices can increase rapidly (subject to sufficient confidence).
Lower short term interest rates should reduce the cost of borrowing and this may lead to an increase in property prices.

If expectations of future inflation rise, institutional investment in property may also rise, as property has traditionally provided a good hedge against inflation.

Where overseas investors are significant purchasers of property the exchange rate will have an effect on demand levels.

Given the topicality of part (i) and its fundamental importance, unsurprisingly most candidates scored very well and the answers were often thorough and well reasoned. The distinction between good and bad answers often related to structure and argument. The weaker candidates didn't explain or justify the jargon, and gave disjointed answers that did not cover wider issues such as politics and the international position. The stronger candidates took an issue at a time and showed how the cut would achieve the objective, in sufficient range and detail for the marks available.

Part (ii) was disappointing, with answers often not argued or developed fully. Some candidates tried to jump straight to prices or yields without giving the rationale. It is much easier to consider what the cut directly implies and work from that rather than working backwards from a conclusion.

Not that many distinguished between long and short bonds and very few considered index-linked bonds. The real assets were often dealt with better, though many looked at residential property only and didn't consider exchange rate effects. Few candidates considered changes in demand from overseas investors.

Some candidates confused controlling inflation with reducing it. Others created problems for themselves by drilling too far into second order effects that are hard to predict, rather than commenting on more direct consequences.

END OF EXAMINERS' REPORT