INSTITUTE AND FACULTY OF ACTUARIES

EXAMINERS' REPORT

September 2010 examinations

Subject CA1 — Actuarial Risk Management
Paper One

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

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 examiners therefore look for candidates to apply answers to the specific situation 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. On the other hand, detailed specialist knowledge is not required nor is very detailed development of particular points.

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. This also enables candidates to use the later parts of questions to generate ideas for answers to the earlier parts. Time management is important so that candidates give answers to all questions that are roughly proportionate to the number of marks available.

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.

1 (i) It will make the benefits available clear to the beneficiaries.

It may be used as a means of attempting to improve the security of non-State provision.

It should ensure that the beneficiaries are not misled, either intentionally or unintentionally.

Any salary growth or inflation assumptions should be made clear.

Poor disclosure may lead to the beneficiaries gaining false expectations of their future benefits i.e. need to manage expectations.

Well designed information can help to encourage individuals to make non-State benefit provision.

Beneficiaries may realise they need to make additional provision at an early stage.

This will reduce the need for provision from the State at a later stage.

Add consistency to format of statement of benefits

(ii) Benefit entitlements at normal retirement age
…on early retirement
…on leaving service

Member information e.g. marital status, date of birth, service, salary etc (relevant information for the calculation)

Death benefits that will be payable to the scheme member's beneficiaries i.e. their partner and any dependent children etc

The contribution the member is required to pay

The risks involved e.g. assumptions not met, investment strategy

Information regarding the funding position

Options/guarantees that would require member to make decisions

The treatment of entitlements in the event of insolvency

Contact details e.g. for complaints

For a standard bookwork question this was not answered as well as it could have been

2 Monitoring the experience is a fundamental part of the actuarial control cycle.

The long-term nature of many types of insurance contracts means that the final profit from a tranche of business cannot be determined until all have gone off the books.

Waiting until this happens before the terms under which the next tranche of policies are written can be determined is clearly impractical.

To monitor the progress of the business it is necessary to monitor the actual versus expected experience on a regular basis.

A provider will want to analyse the surplus arising over a year or a longer period of time in order to show the financial effect of divergences between actual and expected experience. This will also expose the assumptions that are most financially significant.

The actual experience of a provider should be monitored to check whether the method and assumptions adopted for financing the benefits continue to be appropriate and, if not, what changes should be made in order to achieve the desired level of profit. For example, pricing and reserving.
The experience will be monitored so as to:

- update assumptions as to future experience
- monitor any adverse trends in experience so as to take corrective actions
- provide management information

Analysing the financial experience will:

- Show the financial effect of writing new business over the period.
- Validate the calculations and assumptions used.
- Provide a check on the valuation data and process, if carried out independently.
- Identify non-recurring components of surplus, thus enabling appropriate decisions to be made about the distribution of surplus.
- Reconcile the values for successive years.
- Provide data for use in executive remuneration schemes.
- Provide detailed information for publication in the provider' accounts.
- To demonstrate that the variance in the financial effect of the individual levers is a complete description of the variance in the total financial effect.
- Variance in expenses.
- Help with monitoring investments.
- Assessment of effectiveness of risk management systems.

Most candidates scored fairly well, but better candidates focussed on the "why" as per the question.

3 (i) To correct perceived market inefficiencies and to promote efficient and orderly markets

To protect consumers of financial products.

This is particularly important due to the asymmetry of information between the product provider and the end customer

To maintain confidence in the financial system.

This is very important due to the dangers of problems in one area spreading to other parts of the system and the damage that would be done by a systemic financial collapse.

To prevent systemic collapse or loss of confidence it is not necessary to guarantee the solvency of every financial institution but merely to ensure that the failure of one participant does not threaten the whole system

To help reduce financial crime

Financial markets have become more globalised and regulators are coordinating their activities on an international basis

(ii) The costs of regulation are likely to outweigh the benefits

It may be considered that the market knows best.

This may be appropriate in markets where only professionals operate

There is effective self-regulation e.g. where a voluntary code of conduct may be followed.

It could also be used for commodity products with guaranteed benefits that are sold only on price, such as term assurance.

The product could be a new product and regulations are yet to catch up

(iii) In statutory regulation the government sets out the rules and polices them

This has the advantage that it should be less open to abuse than the alternatives and may command a higher degree of public confidence

It will be independent from the industry it is regulating. This should mean that it will take into account the views of third parties as well as those of the industry it is regulating

The regulatory body may be able to be run efficiently if, for example, economies of scale can be achieved through grouping its activities by function rather than type of business

It may be less likely to inhibit new entrants to a market

The disadvantages of statutory regulation are that it can be more costly and inflexible than self- regulation

It may be considered that the market participants themselves are in the best position to devise and run the regulatory system as they have the greatest knowledge of the market i.e. statutory regulation may not be effective at preventing inappropriate behaviour

Market participants may also have the greatest incentive to achieve the optimal cost benefit ratio. Outsiders may impose rules that are unnecessarily costly and may not achieve the desired aim

Statutory regulation may not be able to respond rapidly to changes in market needs

Attempts by government to improve market efficiency can fail and financial services regulation may be best developed by the market

Most candidates scored fairly well, but better candidates tailored their answers to the question.

4 (i) In general, if all the features including conditions, premiums and benefits are clearly set out, the insurance company could reasonably claim that the policy is fair since all information is readily available.

However, this may depend on how and where the information is set out. If it could be argued that the average policyholder would have difficulty in accessing (e.g. terms available from another source) or understanding the relevant information, then unfairness may arise.

The policy renews automatically and so there is little to remind the insured as to what they are covered for and in what circumstances.

This requires the insured to act pro-actively to ensure that the policy and benefit levels remain appropriate e.g. if mortgage payments change regularly it may be too much of a hassle to also update the policy regularly.

This is exacerbated because the policy is not linked to a particular mortgage product. The insured may not appreciate that changes in mortgage payments may require a review of this policy.

The policyholder may be eligible for benefits when the policy is taken out – assuming that the proposal form clearly asks for employment status.

However they may not be when a claim is made. E.g. if they change status and become self employed, is it clear that they will need to take action at their own initiative.

There could be considerable ambiguity about what constitutes involuntary unemployment (or indeed sickness). The way the insurance company interprets these conditions (e.g. pre-existing conditions) could be viewed as unfair.

The policyholders mortgage outgo could increase (e.g. as a result of a re-mortgage). Unless they requested a change in benefit levels, they may end up being under-insured.

In addition, the insurance company may have a maximum level of benefit (in the range of specified options) that the policyholder only becomes aware of once they try to exceed it. So cover may be restricted if interest rates rise.

Similarly, if mortgage outgo were to reduce, the policyholder may not be aware that they were over-insured and would not be able to receive all the benefits they are paying for.

The link to actual mortgage payments during a claim period could be viewed as unfair. Since benefits could fall if interest rates fell but they wouldn't rise if interest rates rose.

The lack of policyholder communication means that it is more likely that a policyholder forgets or delays to make a claim i.e. unaware of the policy or when they can claim.

No back-dating of claims could mean a loss of benefits that the policyholder was entitled to.

Requiring written confirmation in an electronic age could be viewed as unfair as it could lead to delays in claim processing.

In particular, the insurance company may not receive notification of a change in required benefit levels until the policyholder tries to claim. It appears that no confirmation is given when benefit levels change.

The maximum term of 24 months could be viewed as unfair to those with long-term illnesses – again not being aware of the restriction could be the main issue.

(ii) Possible changes could include:

Making the policy wording and terms and conditions clearer. In particular, emphasising the potential problems in (i) so that the policyholder is aware of their responsibilities and what they need to do.

Regular (at least annual) communication with policyholders.

This could set out (remind the policyholder) what the premium level and benefit cover is for the following the year – even if it hasn't changed.

Including a question and answer leaflet or decision tree with this communication could help the policyholder determine whether or not the policy or benefit level is still appropriate. For example, ask about changes in mortgage payments or employment status.

Emphasise the importance of speedy communication should circumstances change. Set out clearly how to communicate with the insurance company and allow phone or e-mail notification (if not already covered). Provide confirmation of communication received and actions taken.

Allow claims to be back-dated to the date of occurrence.

Don't reduce benefits once payments have started or link to mortgage payment.

Link maximum benefit levels to mortgage amounts covered rather than outgo.

Those who took a logical approach and went through the question step by step scored well; although weaker candidates tended to repeat points from part (i) in part (ii).

5 (i) In normal circumstances, payments on a sale of units can be met from liquid assets held in the fund or from cash-flows arising from purchases of units.

There would be no need to realise any of the property assets.

However, in extremis, there could be a significant net outflow of cash if a large number of units were being sold over a short period of time.

In such circumstances, realisation of underlying assets would be needed as existing liquid assets would not be sufficient.

Direct property assets are very unmarketable and they can take a long time to sell. In these circumstances, the sale of the property could affect the unit price and hence would affect other policyholders unfairly.

Assuming that the fund cannot borrow to meet the payments, cash will not be immediately available and hence a delay until sales of assets are completed is needed.

(ii) (a) The starting point for the choice of property assets will be the fund's governing documentation i.e. what is the fund being advertised as.

The brief could be wide (e.g. any property assets anywhere the managers deem appropriate)…

…or more narrow e.g. target certain sectors, locations (e.g. overseas) types (leaseholds, developments etc.), sizes, direct or indirect.

These criteria may be driven by what investors want (or what the managers think they want). In particular the choice may depend on whether the fund is targeted at individuals or institutions.

In any event, given that the fund is large, it would be expected (other things being equal) to hold most of its assets in direct property rather than in property company shares.

Property company shares would be more liquid and give exposure to different activities such as property development

The large size would also enable the fund to diversify within and between categories of properties – unless a narrower brief were specified.

The fund's investment managers may have particular expertise in certain areas and this could drive exposure.

(b) The proportion of liquid assets held will depend on the risk appetite of the fund managers.

In particular, the view taken over the seriousness of the issues raised in (i). Holding more liquid assets so as to try to ensure that repayments can always be met is likely to reduce investment returns and hence the attractiveness of the fund.

The higher the risk of large numbers of net repayments over a short period of time, the greater the need for liquid assets.

Such demand for repayments could rise if the outlook for the property sector was poor or if there were internal problems with the management company leading to a loss of investor confidence.

There will be a particular need to be aware of the size of individual large holdings, or an accumulation of small holdings that are under the influence of a few investors or advisors.

The management company may have the resources and desire to provide any extra liquidity needed by buying and holding units itself (subject to regulation).

The definition of extreme may be relevant. If delays in payment can be easily justified, the risks involved in low levels of liquidity may be less.

Likewise, if the sale price can also be deferred i.e. payment based on the value of property when sold not on the value implicit in the unit price when the unit is "sold", the liquidity risk is less.

If the fund holds a significant proportion of assets in the form of property company shares then these shares being easier to sell may provide some liquidity. However, capital values may be volatile and so care will be needed if relying on them.

To allow opportunity to invest in new property assets – this will require large amounts of liquidity.

(iii) The mangers have broadly two choices:

They can increase the proportion of liquid assets held in the fund. Or they could maintain the existing proportions and accept the extra risk implicit in not being able to defer repayments.

Increasing liquidity by holding more cash (or short bonds etc.) is likely to reduce future investment returns.

If instead, more property company shares were held, fund volatility would increase and there would be no guarantee that shares could be sold for the cash needed.

In addition, the extra level of management charges (from the funds the fund invests in) would be expected to reduce returns. *If holding shares was the panacea then why not hold them in the first place and forget about direct assets?*

An alternative would be to vary the level of liquidity with market conditions. If the outlook for property looks poor, then repayments may be expected to increase. So increasing the levels of liquidity in such circumstances may improve actual returns in the short run. Effectively treat "cash" as an alternative asset category. However, trying to guess the markets in this way may pose additional risks.

Accepting extra risk may mean that the management company has to meet any repayments itself (e.g. by buying units). It is then exposed to the property market. Hence if it can't finance the cost of meeting repayments or if the property market gets worse, the solvency of the management company and hence the existence of the fund is at risk.

These extra risks may depend on the terms of the regulations. In particular, what is the normal settlement period for a property fund and are there any loopholes or exclusions ie the regulations may not be as draconian as they first appear.

In any event, the fund may choose to hold direct properties that are easier to sell. This may mean that higher return investments are not held.

Furthermore, if sales were needed, the fund may accept a lower price for a quick sale so lowering returns.

Also, the management company may try to compensate for its risk exposure by increasing management charges. This would lead to lower returns to unit holders.

The guarantee may alter the nature and behaviour of unit holders. Previously, investors may have accepted the long-term nature of the investment and so been prepared to sit out falls in the property market. Now they may take a more short term view and so be more active sellers. This could increase the need for liquidity.

Many candidates went into too detailed a discussion on property in general rather than answering the question set. In part (iii), better candidates commented on risk issues from the fund manager's perspective.

6 (i) Project strategy should be clearly worked out and written down

The project strategy document should include:

- the aims of the project and a clear identification of the objectives of the project
- statements on how these objectives will be met
- the acceptable quality standards for meeting the objectives
- the risk management policy i.e. the areas of risk that could affect the viability of the project and alternative strategies for dealing with areas of risk
- the project sponsor's role
- the role of any third parties e.g. consultants employed
- the financial and economic objectives
- details of the expected cost of the project and the financing policy
- the policy for dealing with legal issues
- the technical policy
- a structured breakdown of the work to be completed under the project
- the key milestones for reviewing the project
- the information technology policy
- the communications policy
- dealing with conflicts of interest

(ii) The project owner is the sponsor (i.e. is responsible for the budget and objectives) and generally works within the insurance company in a permanent role

Hence the project owner has a vested interest in the outcome of the project and will be responsible for using the project outcome in the business as usual environment i.e. after completion of the project

The project manager leads the team implementing the project

The project manager needs to be able to drive the project forward and hence needs to be able to establish direction, decide on action, organise resources and motivate the project team.

The project manager may be an external consultant/contractor or be assigned to the project for the implementation

i.e. the project manager role is temporary and lasts for the duration of the project only

The project owner will be involved in some of the project management issues as the project owner will have key requirements

However, a successful project outcome requires the right balance to be struck between the owner as the project sponsor and operator and the project implementation specialists

Hence project owners should concentrate on the agreed milestone review points…

…to ensure that they are properly scheduled and that the project is fully reviewed each time it reaches a milestone review point.

(iii) The implementation will require a **project definition** to be produced in a timely and cost effective manner, with minimal changes occurring later in the project.

This will enable the regulations to be implemented successfully and ensure the needs of the company are met.

The implementation is likely to take a significant period of time and hence the project will need to be fully planned and monitored during the implementation.

As this project is very large, the **planning process** will be complicated and is key to the successful implementation of the new regulations

The actuarial control cycle forms a good basis for the management of this project and can be used to create the project plan

The following steps can be used to derive the project plan:

- Understand requirements and understand the new regulations
- Identify stakeholders in each area that is affected
- Understand current process and gaps that need to be filled – gap analysis
- Interview key stakeholders as part of this process
- Review results of gap analysis and discuss with management and project owner
- Document requirements based on gap analysis

- Estimate requirements to fill gaps and implement requirements in terms of the time required, resources required and the total cost
- Document the plan at a detailed level

This can be done using specialised software given the size of the project

Key statistics can be used to **track the progress** of the project – these need to be defined and documented

It is important that key specialists are involved in this process and their input is used to help plan the project

The regulations will need to be monitored to ensure that they do not change during the implementation period

The project will have a number of work streams which may have interdependencies.

Hence the critical path needs to be defined and monitored to ensure that there are no unnecessary delays in the implementation of the project.

A thorough **risk analysis** will need to be performed and options to manage or mitigate the risks will be required.

For example, there is the risk that the project does not meet the implementation deadline which could have regulatory implications

Or that any new valuation systems required do not work properly

Hence the software and systems should be thoroughly tested at all stages of the project.

Technical and design changes should be avoided once implementation has begun.

Design parameters should be broad enough to give the developers some freedom of approach and to avoid the need for subsequent changes.

Strict change control management should be implemented.

However, there should be checks on the project manager to ensure the plan is met.

The plan should include a master schedule that covers all people working on the implementation including both those internal to the project and external suppliers e.g. consultants or advisors.

The project will require a number of different professionals (actuaries, accountants, lawyers, systems analysts etc.) and external suppliers to work together.

It is vital that setting the standards of performance required from the parties involved is undertaken early in the life of the project, as these will have a major impact on the whole project.

The written strategy should be shared with the key individuals who will bear the responsibility for implementation of the project.

Where appropriate the end users of the project's output should be involved throughout the process.

The team should have a strong leadership and management to ensure that the right things are done at the right time to make the project a success.

It is important that all the team members are committed to the success of the project and that the project leaders provide support.

Major project interfaces and potential conflicts need to be managed

Examples include those between:
- designers and builders
- specifiers and implementers
- project owners and project managers

At these milestone review points, critical questions on all aspects of the project should be raised by all those involved in the project.

In some cases, to get an unbiased view of progress, it may be appropriate for an independent party to carry out the milestone reviews.

Clear communication to all parties throughout the project

(iv) The progress of the project needs to be monitored and reported to both the project owner (and key stakeholders) as well as the regulator

The regulator will be interested in progress compared to the new requirements of the regulations

The project owner will be interested in this and also progress against the budget

A reporting template should be designed to meet each purpose and agreed with each of the project owner and the regulator

The project owner's template could include the regulator's template and supplementary information as required

The tools for planning, monitoring and reporting on the progress of a project should:

- be user friendly

- allow technical, financial and other issues to be tracked
- enable final outcomes to be predicted reliably

The reporting process should enable the project manager to check that the deadline is achievable and implement measures to meet the deadline as needed

(v) Examples could include:

- Monitoring the cost of the project by comparing the amount spent against the budget
- Compare the results of any new models required against previous results
- Compare the outcome of each new process against the requirements of the new regulations
- Review the progress of the project against the project plan to ensure the project stays on track
- Use status indicator (e.g. RAG (red-amber-green) status) to track activities within the project plan and identify key areas to focus on
- Identify critical path to ensure focus of the project is on key tasks

Part (i) was straightforward for those candidates who were familiar with the bookwork. In a question with many parts, better candidates had planned their answers so did not repeat themselves and made points appropriate to each part.

7 (i) Premium payable = cost of claims + loading for expenses and contingencies.

Given the short time period, (and current low rates) interest/discounting can be ignored (or allowed in other margins).

$$\text{Cost of claims} = \$10\text{m } (0.01 + 0.5 \times 0.02 + 0.05 \times 0.4) = \$400{,}000$$

The contingency margin could be quite high due to the low chance of a potentially huge loss and/or a concentration risk if the insurer writes a lot of similar business e.g. due to bad weather, piracy or crime. Say 25%, so expected premium = \$400,000 × 1.25 = \$500,000.

(ii) The expected profit = expected revenue – expected costs.

The purchase cost of \$7m will not change.

The neutral no change position would show expected revenue of \$9.6m (after allowing for the expected losses in (i)) and expected costs of \$0.5.

Ignoring that expected expenses might be a little lower in the scenario where all goods are lost.

Hence, the expected profit would be \$2.1m assuming no change in value of goods or expenses
Now need to calculate expected additional revenue and expenses:

Additional revenue = \$10m $(0.2 \times 0.25 - 0.3 \times 0.15)$
= \$50,000

But, need to allow for potential for losses during journey as per (i), hence expected additional revenue
= \$50,000 - \$50,000 x $(0.01 + 0.5 \times 0.02 + 0.05 \times 0.4)$
= \$48,000

Additional expenses: \$500,000 $(0.4 \times 0.25 - 0.2 \times 0.2)$
= \$30,000

Therefore expected profit = 2.1m + 48,000 – 30,000 = \$2.118m

(iii) The delay will cause an increase in costs for example wages to seamen, charges to ports and say repairs due to bad weather damage

If the proceeds of any sale are used to cover financing costs of purchase, then these costs may also rise.

It is possible that insurance could have been taken out to cover these delay risks and consequent costs. But even if this were the case, there could be a lot of dispute surrounding the cause and extent of the delay e.g. whether it is actually covered if the merchant or his employees were to blame or were negligent.

However, the main implication will concern the forward contract and the need to supply goods that are still in transit.

In principle, the merchant will have to buy the goods in the open market and deliver them to the agreed location.

There will therefore be a profit or a loss v the money the merchant receives from the writer. However, the merchant is still exposed to any price movements from the settling of the forward until he ultimately sells the goods. So any net profit (or loss) realised now could change to his ultimate benefit or detriment. In effect he is back to square one with a risk that the price of his goods falls before he can get them to market.

The buy and supply process may not be that straightforward. It depends on the nature of the goods and on the other party.

If the goods are tradable resources e.g. oil or coal say, then in practice they can be supplied. If they are manufactured or non-standard say toys or TV sets then there is more of a problem.

In a conventional contract, the supply clause is often a technicality since in practice to close out the forward, the original "buyer" sells to the original writer at the prevailing price i.e. the goods don't actually have to change hands if the contract can be closed out. But this does depend on the size of the market in these forwards are they standard or unique ie is it amenable to speculative traders and/or market makers.

If not, it is possible that the writer does actually want the goods eg a retailer of toys, TV sets

In these circumstances, the merchant may have to default since he can't meet the obligations under the forward.

Then, not only will the merchant be exposed to price volatility, there will probably be legal action, incurring expenses, sanctions from the authorities and/or reputational damage.

You still have the problem that the goods are on the way and you are exposed to the uncertainty of the price you will receive when they arrive. Thus the merchant may consider taking out a new forward contract.

Parts (i) and (ii) were generally answered reasonably well, good candidates explained their approach. In part (iii) most candidates made some sensible points relevant to the specifics of the question, though few scored very highly.

END OF EXAMINERS' REPORT