INSTITUTE AND FACULTY OF ACTUARIES

EXAMINERS' REPORT

September 2010 examinations

Subject ST1 — Health and Care
Specialist Technical

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.

T J Birse
Chairman of the Board of Examiners

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General comments

Candidates who approached the questions, especially the more substantial elements of each question, in a methodical and detailed manner were far more likely to satisfy the examiners and receive a pass in the subject. Candidates will gain few marks if they do not address the question asked. The mark allocation for each question part gives an indication of the relative length of answer or number of points to be made to gain full marks. In general each valid point in the answer would normally attract 0.5 marks with the more basic elements e.g. details in a pricing basis such as age and sex, attracting 0.25 marks.

Some candidates wasted time by copying out large parts of the question to head their answer. Answers were easier to mark when they followed a logical sequence; such answers also tended to avoid wasting time by making the same point again later in their solution. It is often helpful to use subheadings when answering long part questions.

Some papers were not clearly marked at the top of each page as to which part of the question was being answered.

Marks may be lost where answers are difficult to read.

Comments on individual questions

Question 1
This was a bookwork based question, and it caused difficulties for those students who did not demonstrate good knowledge of the core reading. However, this question was generally well answered.

Question 2
This question was well answered by many students who clearly had a good grasp of current issues in life insurance, but crucially were also able to think widely about possible reasons.

Question 3
Students who had studied the core reading thoroughly were better able to score highly on this question. Part (ii) demonstrated the importance of sound brainstorming techniques and an ordered approach (to avoid repeating the same points).

Question 4
As described in the more detailed report below, a number of different approaches were acceptable for the calculations in this question. Most students were able to perform the NPV calculations accurately, but some made slips and the DPP calculation proved more challenging.

Question 5
This question provided an opportunity for a good student to think deeply about the scenario presented and put forward meaningful suggestions. The question was fairly challenging, and considering thoroughly the ramifications of the suggestion would have been a good use of a student's reading and planning time.

Question 6

Again, students with an ordered approach had the best chance of scoring highly. Well-prepared students generally performed well on this question.

Question 7

This question was often not well answered. Candidates are expected to apply their knowledge of bookwork to the specifics of the question asked. A list of all distribution channels available for health and care insurance is not an acceptable answer for part (iii).

1 (i) The principles of investment

(a) a company should select investments that are appropriate to the nature, term and currency of the liabilities

(b) the investments should also be selected so as to maximise the overall return on the assets, where overall return includes both income and capital.

The extent to which (a) may be departed from in order to meet (b) will depend, inter alia, on the extent of the company's free assets and the company's appetite for risk

Or equivalently, the company should invest so as to maximise the overall return on the assets, subject to the risk therein being within the financial resources available to it.

(ii) The investment strategy they have been given and the targets originally set for overall return.

The amount of freedom they have been allowed / the riskiness of the strategy undertaken.

The extent to which they have deviated from any benchmark asset allocations they have been given.

The performance of benchmark indices compared with actual investment performance.

The performance of other fund managers with similar briefs

The period over which they are being assessed – short periods may show random deviation (ie luck!).

Whether they have been given any additional constraints, such as liquidity targets or other constraints eg regulatory

Whether any tactical investments have been profitable, and within an acceptable range of "riskiness"

The amount of investment expenses incurred

Size of fund may influence investment strategy

Performance manager's customer service/SLA

Use of appropriate indicator to allow for cashflows

Compare volatility with market volatility

2 (i) **Types of commission**

Indemnity commission means the insurer pays the distributor commission in respect of premiums the insurer has yet to receive

Level annual commission may be paid, where the insurer pays the distributor an amount of money whenever a premium is received

Initial commission is a system between indemnity and level annual commission, where the commission is spread over a limited number of years, e.g. four and there is normally a lesser amount of renewal commission paid for the balance of the policy term.

Commission may be paid in proportion to sum assured (reflecting the insurer's preference for higher sums at risk). Clawback of commission may be put in place so that if a policy lapses, the distributor must repay a proportion of commission already paid.

(ii) **Reasons to stop paying commission**

May be able to sell more of the product due to more attractive premium rates.

There may be a market move away from commission in the territory in which the insurer operates. This might be due to regulatory change or change in tax treatment.
They may be moving to a tied sales force, who they could remunerate via salaries and bonuses.
They may be uncomfortable with the level of risk or capital requirements involved in initial or indemnity commission eg this could be because they are worried about third party default or because it exposes them to higher levels of financial loss on early lapse.
They may feel that paying commission encourages inappropriate sales behaviour, for example, with sales advisers making sales of products offering higher rates of commission
It may simply not want to sell much business, due to capital constraints or inability to tolerate high level of initial strain
They may feel the alternative is more profitable, for example, due to lower lapse rates and/or lower costs.

3 (i) **Analysis of surplus**
To show the financial effect of divergences between the valuation assumptions and the actual experience
To expose which assumptions are the more financially significant
To show the financial effect of writing new business
To provide a check on the valuation data and process, if carried out independently
To identify non-recurring components of surplus thus enabling appropriate decisions to be made about the distribution of surplus
To give information on trends in the experience of the company

Analysis of change in EV
To validate the embedded value calculations, assumptions and data used
To reconcile the embedded values for successive years
To provide management information
To provide detailed information for publication in the company's accounts or those of any parent company, in particular the value of new business taken on by the company

(ii) Increase sales in order to generate higher profits and cover overheads, e.g.:

- Remove unnecessary margins in the pricing basis
- Revise the product features
- Increase marketing or improve the marketing message
- Improve the quality of sales staff/advisors through training
- Review and select more appropriate distribution channels/sales methods

Since higher sales may temporarily worsen the solvency position if product design results in new business strain, the company could revise product design to minimise capital requirements eg by removing guarantees.
Strengthen the pricing basis to increase new business profitability/ need to ensure that the pricing assumptions reflect current experience

Consider increasing reviewable premiums on existing business provided this is expected to net a profit after allowing for lapses
Remove unnecessary margins in the statutory reserving basis
Revise wording and format of sales literature to minimise risk of anti-selection
Revise the mechanics of commission payments and clawback to improve persistency experience or to reduce capital strain
Improve the quality of customer services
Set up a customer retention strategy unit to target profitable business
Review the adequacy of staffing, in terms of numbers
Review the competence/efficiency of staff
Try to find expense efficiencies
Review reinsurance arrangements
Raise capital eg financial reinsurance/securitisation
Review outsourcing arrangements
Review investment strategy/ALM
Revise underwriting processes
Revise claims handling processes
Review capital policy to minimise capital requirements
Improve the systems and data recording processes
Reword policy contracts to remove any hidden mistakes in policy design which have surfaced
Improve tax efficiency
Use results of review to prioritise actions
Merge with another company or sell off part of company
Consider outsourcing eg claims control
Review the reviews of premiums
Stop selling unprofitable business

4 (i) **Net present value**

(a) This is calculated by discounting the profit signature at the risk discount rate. Given a choice between the future cashflows from two different investments, an investor should choose the one with higher net present value. This implies that net present value is the best profit criteria to use, and if any other profit criteria disagrees with it a company should go with the net present value. However, this assumes that there is a perfectly free and efficient capital market and that when two risky investments are compared each is discounted at a risk discount rate appropriate to its riskiness.
NPV is subject to the law of diminishing returns
It says nothing about competition and saleability. As such, one approach is to express net present value in a way which reflects the effort which would be expended in selling a policy, e.g. as a percentage of commission.
Alternatively it could be expressed as a percentage of the present value of the premiums which will be paid under the policy

(b) **Internal rate of return**
This is defined as the rate of return at which the discounted value of the cashflows is zero. All other things being equal, a company should prefer a contract which has a higher internal rate of return. However, the internal rate

of return does not always agree with net present value and the net present value may be more reliable.
If there is more than one change of sign in the stream of profits in the profit signature, there is not generally a unique internal rate of return.
The net present value can be related to useful indicators, such as sales effort or market share, but there is no way to do this with the internal rate of return
If a policy makes profits from the outset then the internal rate of return may not even exist

(c) **Discounted payback period**
This is the policy duration at which the profits which have emerged so far have present value zero. It is the time it takes for the company to recover its initial investment with interest at the risk discount rate.
A company with limited capital might prefer to sell contracts with as short payback period as possible
The discounted payback period may not agree with the net present value as it ignores completely all the cash-flows after the discounted payback period

Some students described the payback period rather than the discounted payback period, which would not have gained full credit.

(ii) A number of different calculation approaches were deemed by the Examiners to be acceptable for this question part, each of which was given full credit:

The net present value (NPV) calculations should be performed by multiplying each cashflow by the appropriate probability in-force and by the appropriate discount factor, and then summing. Discounting should be from each year end, given that the profit cashflows are described as arising at the year end. The probabilities in-force either as at the start of each year (e.g. 1.0 for the first cashflow) or as at the end of each year (e.g. 0.9 for the first cashflow) could have been used, giving NPV = 23.88 or 17.81 respectively.

The present value of future premiums (PVP) calculations could have been performed using the same approach, noting that premiums are payable at the start of the year and therefore should be multiplied by probabilities in-force at the start of each year and discounted by one year less than the profit cashflows above. This approach gives a PVP of 351.59.

Alternatively, some students deduced that the PVP for Product A should be the same as for Product B, given the same probabilities in-force and premium amounts. This approach gives an alternative PVP of 285.62.

Any ratio of NPV/PVP using a combination of the above results was given full credit (5.1%, 6.2%, 6.8%, 8.4%).
The discounted payback period (DPP) calculations required calculation of the cumulative discounted profit to each time period. Under the two approaches acceptable for the NPV calculations, this would give either of the following patterns:

Period	1	2	3	4	5
Cumulative Discounted Profit					
v1	–92.59	–54.01	–22.26	3.47	23.88
v2	–83.33	–49.04	–21.26	0.80	17.81

For either approach, this gives a DPP of 4 years (the first year in which the cumulative discounted profit is positive).

(iii) Product A has the higher Net present value/Present value of future premium ratio.
The discounted payback period for Product B is shorter due to the fact that the initial loss is smaller.
As net present value is normally the best profit criteria to use, Product A is preferable.
However, Product B may be preferred if the company has limited capital to write new business.
Alternatively, full credit was given to those students using the approach in part (ii) that gave a ratio of 5.1%, who commented that the NPV/PVP ratios are the same and hence need to consider the DPP as a possible deciding factor, which would favour Product B.

5 (i) The company would need to investigate the position of competitors in this market and check whether their products have features different from this company which encourage or discourage them from having a cash value
Demand for a cash value may come from

- the insured wishing to spend the cash value on other projects
- the insured's health deteriorating and, as a result, requiring immediate funds, but not to a sufficient degree to be able to make a LTC claim
- may be significant change in state provision which reduces or negates the requirement for personal provision
- may be attractive due to changes in policyholders circumstances

Reserves do accrue under these policies and so a cash value might be justified but only if the insured is *competent* to give a valid agreement to the transaction.
There is also considerable anti-selection risk. Those who perceive themselves as very healthy are more likely to surrender
The level of death benefit within the contract will also need consideration
The impact of a cash value transaction on the position regarding tax will need to be reviewed by the insurance adviser
In addition to the above, for the annual premium version demand for a cash value is also going to come from the insured being unable to afford the premium in full. In this situation, a paid-up policy or a reduced premium with reduction in benefits could be offered
The company may wish to obtain input from reinsurers
The marketing position *and distributor opinion* needs to be considered

Offering surrender values could improve the attractiveness of the product.
Policyholders might also perceive it as unfair that no cash sum is received on surrender, particularly later on in the funding period.
The premium would need to be increased if cash values were offered eg to cover expected losses from early lapses for which initial expenses have not yet been recouped.
The pricing would need to allow for the anti-selective effect although may now attract more healthy lives on average.
Changes in admin systems may be required.
There may be professional guidance/regulatory constraints
Doing this may preempt/mitigate anticipated future legal or regulatory changes.
Can the lump sums be costed so as not to generate losses?
If surrender values are too generous may encourage lapse and re-entry.
Need to consider liquidity requirements/may need more liquid investments
Would also need to take into account the likely strict initial underwriting, which would tend to select healthier lives (i.e. lives which are more likely to lapse)

(ii) Age
Sex
Term/duration
Premium frequency
Premium
Benefit amount
Options
Underwriting status/rated life
Expected mortality during funding period
Expected mortality during claim
Expected morbidity
Expected future renewal expenses
Expected surrender claim expenses
Expected future expense inflation
Future commission
Expected future benefit inflation (if relevant)
Yields on the corresponding existing assets and the yield which it is expected will be obtained on sums to be invested in the future.
Assumptions on take up
Tax
Any profit margin required on surrenders

6 (i) A CI policy with tiered benefits would pay out a lump sum on diagnosis of a covered critical illness. The payment could vary according to the type of illness.
For one or more of the illnesses covered, the payment of the sum insured is linked to the severity of the disease. The payment would be a proportion of the full benefit (dependent on the progress of the disease). Further claims may be lodged if the disease advances. Further payments are made from the balance of the sum assured to reflect the increasing impairment.

The level of severity (and proportions attaching) will be clearly specified in the policy documents using objective medical definitions. There are often four severity levels but some policies may have conditions with up to seven levels. Premiums do not typically reduce with any proportionate claim payment.

(ii) May be deemed more comprehensive and more fair as a benefit is offered at levels of disease progression which would not have triggered payment under a standard critical illness contract. This would also provide a closer fit possibly to medical distress and financial needs, reducing the incentive for anti-selection and reducing the incentive for exaggeration of symptoms at the claim stage.
Multiple claims are possible which enhances policyholder satisfaction and retention.
As a variant of the standard product, it permits the insurer to differentiate itself from its competitors. Thus it may sell more business and generate higher profits.
A large and well established company is likely to have greater influence on the market. Also, as there are no competitor products the insurer may be able to increase margins and hence profits

However, this is a more complex product; there is the risk that consumers would prefer to keep critical illness cover simple. Also, it makes comparisons more difficult with other (tiered or level) critical illness products. This could also reduce its appeal to the financial advisers.
A lot will depend on whether the policyholder has to pay more, less or the same amount in premium.
Need to consider consistency with and impact on existing CI products
There is potential for a higher degree of claims dispute and resulting reputational risk. In particular it is difficult to define the additional stages of disease that trigger benefit. These need to be both legally and medically objective whilst being understandable to the consumer. Weaknesses in definitions can lead to higher claims.
Pricing the business will be complicated, including determining a much greater number of claims assumptions:

- several severity levels
- several transition intensities
- each required for every rating factor.

and not having any credible own experience data to help do this. Also, the underlying incidences and transitions may change frequently in the future.
There will be many overlaps between related illnesses. Pricing and management is also complicated by cross-correlations between illnesses.
The mix of people buying the product likely to be different as there is no competition.
The company may need to include high margins to allow for these uncertainties, which will reduce the attractiveness of the product or they may have to offer only reviewable rates, which also reduces the attractiveness.
Underwriting could be more complex. In particular the bringing forward of potential claims situations is going to increase the importance of any pre-existing conditions and change the seriousness of any material non-disclosure.
The claims manager is going to be faced with considerably more claim forms,

with complex definitions and they may also face significant policyholder (and possible adviser and GP) pressure to "upgrade" to a higher level of benefit.
There are likely to be much higher claims expenses.
The new variant will require systems changes/ staff training.
Need to take into account the total product development costs and whether there will be enough sales to justify the cost.
Need to undertake market research before launching and to bear in mind that future demand could be impacted by other companies following suit launching similar products.
The company is likely to need the assistance of a knowledgeable reinsurer but reinsurance may not be available at an acceptable cost.
As a completely new product to the market, the company is unable to use industry data to help with the launch
Can you sell through existing current distribution channels?
Any regulatory requirements or constraints
Tax treatment in policyholders hands of an income stream as opposed to capital may be different
What are capital requirements for the product?
Is there any better alternative use of the development capital?

7 (i) Allows the practice to secure a replacement and continue to provide services to its customers
To avoid losing customers whose treatment is cancelled
To reduce pressure on the other partners who may have needed to work harder
To avoid the risk to customers of the other partners working on their day off or more than a safe number of hours
Allows a partner to return to work for reduced hours
Finding a suitably qualified replacement at short notice is likely to be expensive
Generally the policy can help to ease the mind of the sick partner and may accelerate their recovery
Compensation for loss of profits
Reduces the risk to the partnership of making a large capital payment through having to bear the costs of the ill-health of a partner or employee (or allays fears)
The short deferred period is useful as it means that benefits are paid sooner

(ii) **Morbidity risk**
Claims inception rates being higher than expected and claims termination rates being lower than expected.
This could be due to model risk, parameter risk, volatility risk or random fluctuation risk especially as this is a small insurer and a small niche product.
Determining suitable rates for the different classes of risk may be difficult eg will the policy cover partners and employees.
Not even the largest practices will merit pricing as a group scheme using its own experience. The small number of employees per scheme means that claims experience can be very volatile.
Statistics may not be available to price contract.
Changes in practice membership due to death, retirement, joiners.

The short deferred period leads to additional morbidity risks.
Difficult to determine an unambiguous definition of a claim inception, recovery and relapse, this will also effect the data collected for pricing etc.
Claim amount risk if the benefits are indemnity ones, or if fixed and linked to inflation, may be higher than expected. A larger than expected volume of claims could also lead to strains on system and staff resources.
The company needs to ensure that it has taken into account in its pricing the specific additional risks related to this type of cover:
Experience likely to be subject to latest germ going around e.g. bird flu due to contact with patients.
Higher risk of accidents due to equipment used and manual nature of work
Need to be fully well to be able to carry out work to the required level of patient safety.
There may be accumulations due to group and occupational risks.
Practice may be inefficient or understaffed, thus increasing stress related illnesses.
The short deferred period and claim payment term could make reinsurance difficult to obtain. If used, the company is exposed to reinsurer default risk.
The company is subject to **anti-selection risk,** which is related to morbidity risk especially if membership if not compulsory for all partners/employees
Risk of non-disclosure
Risk of over-insurance e.g. if partners have their own IP policy as well
Moral hazards e.g. child illness
Difficulty and cost of obtaining certification due to the short deferred period and payment term. However this should be balanced by the professionalism of self employed chiropodists
Maternity or paternity absence would be anti-selection risk, unless excluded
Degree of risk depends on how it is underwritten

Expense risk
Risk of higher than expected expenses
Risk of higher than expected inflation
The short deferred period and claim payment term lead to greater volatility of claim payment expenses, as does the small size of the book

Withdrawal/non-renewal risk
Selective withdrawals could result in higher morbidity experience
Financial risk on withdrawals where asset share is negative
Higher than expected withdrawals can also increase the per policy expenses for remaining business.
If the policy is annually renewable there is the risk that the practice will not renew leading to a financial risk if several claims have been accepted and are in payment.

New business risks
Risk of higher than expected volumes of new business impacting capital and administrative strain. However, as this is a very niche product this is unlikely.
Higher cost than a standard IP product due to the short deferred period may make sales more difficult unless meeting a real need

Risk of lower than expected volumes of new business meaning that fixed expenses are not recovered
Risk of different mix of business than that assumed eg smaller than expected average cases, reducing the expense contribution, geographical area or risk of selling more business at the less profitable rates, if there are cross-subsidies

Other risks
If the policy is not subject to annual renewal there is a risk of not being able to vary the policy rates after particularly poor experience (either of a scheme or of the whole class)
Reputational risk e.g. Pre-existing exclusions may be difficult to enforce
Data errors mean that pricing or reserving may be wrong
Investment performance lower than expected
Corporate bond default risk, if held to back reserves
Actions of competitors, e.g. reducing their premium rates to "steal" the market
Regulatory changes
Tax changes
Fraud (either by staff or policyholders)
Failure of internal systems or controls
Risk of misselling
Because small company, may outsource and hence counterparty risk

(iii) May already have a relationship with an **insurance broker**
Could be sold as a package, possibly alongside other necessary insurance e.g. professional indemnity, employers liability etc.
Brokers are able to deal with complicated products and offer market comparisons but the product would need to have competitive premiums and offer a competitive level of commission
The target market will have relationships with their business bank which may have **tied agents**. Therefore possibly market alongside the chiropodists' business bank account services.
Don't need to be as competitive (similarly with own salesforce)
The company's **own sales force** – may already sell the practice other types of non-healthcare insurance.
The company could undertake **tailored marketing** e.g. through Society of Chiropodists (could have advertising/articles on their website)
May be able to offer discounts
Preferred supplier status
Articles in their magazine
Brand awareness through small gifts with the magazine or through sponsorship (eg brand presence at conferences)
Other forms of **Direct marketing (eg telesales) are** unlikely due to the special nature of the product
Worksite marketing is not an option because of small size of companies

END OF EXAMINERS' REPORT