INSTITUTE AND FACULTY OF ACTUARIES

EXAMINERS' REPORT

September 2012 examinations

Subject ST1 — Health & Care Specialist Technical

Introduction

The Examiners' Report is written by the Principal Examiner with the aim of helping candidates, both those who are sitting the examination for the first time and using past papers as a revision aid and also those who have previously failed the subject.

The Examiners are charged by Council with examining the published syllabus. The Examiners have access to the Core Reading, which is designed to interpret the syllabus, and will generally base questions around it but are not required to examine the content of Core Reading specifically or exclusively.

For numerical questions the Examiners' preferred approach to the solution is reproduced in this report; other valid approaches are given appropriate credit. For essay-style questions, particularly the open-ended questions in the later subjects, the report may contain more points than the Examiners will expect from a solution that scores full marks.

D C Bowie
Chairman of the Board of Examiners

December 2012

General comments on Subject ST1

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.

It is often helpful to use subheadings when answering long part questions.

Comments on the September 2012 paper

Overall, the paper was towards the more difficult end of the range; however well-prepared candidates scored well across most of the paper. As usual, questions that focussed on knowledge of the Core Reading were well answered by those who had prepared thoroughly. However, questions requiring wider thinking or application of core reading to specific circumstances, such as questions 5(ii) and 7, were less well answered and students should recognise that these are generally the questions which differentiate those students with a good grasp and understanding of the subject. The comments that follow the questions concentrate on areas where candidates could have improved their performance. Candidates approaching the subject for the first time are advised to include these areas in their revision.

1 (i) Writing new products requires the use of capital. This is provided by the owners of the company (normally shareholders). The "risk premium" is the excess return required by the providers of the capital over and above risk-free returns.

It is reasonable to suppose that the owners of an insurance company decide where to invest by comparing the returns offered by different companies relative to the risks that are run. They are able to move their capital from one company to another if they wish. An investor will demand a higher expected rate of return from a risky investment than from a safe investment in order to compensate the investor for the risks of default, commercial failure and so on. Investing in an insurance company is not risk free and therefore investors will demand an expected rate of return equal to the risk-free rate plus a risk premium.

Alternatively product pricing may be done on a "market consistent" basis, i.e. with no risk premium, but this would require the need to make other adjustments for risk.

(ii) First the risk-free rate of return must be set, which needs to be based on an asset that offers a certain return, absolutely free from all risk of default. A suitable proxy can be chosen to represent risk-free assets, such as short term deposits issued by a stable government or swaps.

The key consideration then is to determine what risk premium is appropriate to compensate for the risks of investing in this insurer. The Capital Asset Pricing Model (CAPM) has been widely used by stock market investors to help determine an appropriate risk premium. The idea behind CAPM is that a well-diversified portfolio of shares cancels out the risks of investing in individual shares and leaves only the unavoidable risks of investing in the stock exchange.

The average risk premium that the diversified portfolio of shares has yielded over the risk-free rate, over a period of time, is estimated. The factor to consider next is how risky a particular company's shares are compared with the diversified portfolio. The result of the CAPM is that the proper risk premium for any particular share is in proportion to its Beta.

The CAPM is just one example of how the market might assess the shares of a company – other methods could be used.

Having considered the overall riskiness of the company, it also needs to be born in mind that not all product developments are equally risky. The level of risk premium set would depend on the extent to which risk margins are included within the experience assumptions.

The insurer should view itself as an investor like any other when it considers the riskiness of a new product, as in the long run the profits emerging from the whole company are the profits emerging from the products that it sells.

A change in the mix of business, for example away from old and "safe" contracts towards new and innovative contracts, would change the market's evaluation of the company's riskiness.

The company may use a different risk discount rate according to the specifics of the product and its level of risk.

The following are among the features that can make a product design riskier:

- lack of historical data
- high guarantees
- policyholder options
- overhead costs
- complexity of design
- untested market

The level of statistical risk (i.e. variation about the mean) attaching to the cash flows under a particular contract could be assessed:

- in some situations analytically, by considering the variances of the individual parameter values used
- by using sensitivity analysis with deterministically assessed variations in the parameter values
- by using stochastic models for some, or all, of the parameter values and simulation
- by comparison with any available market data.

In theory, a separate risk discount rate should be applied to each separate component of the cash flows because the statistical risk associated with each component will be different. In reality, it is not easy to assess these risks, and it is even harder to say what effect they should have on the risk discount rate. Therefore broad brush approaches to risk premium setting tend to be used.

Although a bookwork question, many candidates did not score highly, particularly in part (ii) where, generally, too few points were provided for the marks available.

2 (i) Reinsurance will limit exposure to risk. Health and care insurance business has volatile claims patterns and accumulation of risk could materially impact the business results of the insurer. Despite being a large established insurance company it lacks experience of this type of business and so may be uncomfortable about the unpredictability of future claims. It may have a low appetite for risk generally or just in this area. Also, although a large insurer, it may need protection against large individual claims or total claims if it has relatively low levels of free assets available.

Reinsurance can help to smooth results. Although a large established insurer, this may be useful in the early years of expanding into new risk areas.

The need for reinsurance depends on the level of fluctuation acceptable to shareholders and regulators and the expected volume of new health and care insurance business relative to the size of the existing portfolio.

The insurer is expanding into new risk areas where it has little or no expertise. Therefore reinsurance can provide the company with necessary technical expertise, for example:

- product design
- data
- terms and conditions/policy wording/claim definition
- rating/pricing
- underwriting
- claims management
- staff training
- short term business
- income benefits

The insurer may choose to reduce reinsurance later on when its own expertise has grown.

Reinsurance can increase the life insurance company's capacity to accept risk, singly (e.g. large sum assured) or cumulatively (e.g. large number of claims) and this allows the company to obtain diversification benefits more quickly.

It could provide financial assistance to support new business strain, if this is expected to be high or to bolster free assets, if these are not large or to cover development costs.

There may also be potential for tax arbitrage or solvency/capital arbitrage.

Despite being a larger insurer, the company might have to have big margins in its assumptions to allow for the uncertainties involved. Reinsurance will reduce solvency capital requirements.

Reinsurance could improve the company's credit standing/reputation.

The reinsurance might simply offer good value for money.

Most candidates were able to make a credible attempt at this question. The better candidates related their answers to the fact that the insurer in question was a large established company, where relevant.

3 (i) *Unearned premium reserve*

The balance of premiums received in respect of periods of insurance not yet expired. This is often the largest component of the technical provision of a short term health insurer.

Unexpired risk reserve

Reserve in respect of the above unexpired insurance premium where it is felt that the premium basis is inadequate.

Outstanding claims reserve

Reserve in respect of claims notified to the insurer but not yet fully settled.

Incurred but not reported
Reserve in respect of claims that have arisen but that have yet to be notified to the insurer.

Incurred but not enough reported
As above but where it is felt that not all detail has yet been submitted and a provision needs to be established for the remainder.

Equalisation or catastrophe reserves
Reserves where it is felt that the current year is atypical and amounts will have to be held back for abnormal events.

Claims in transit
Reserve in respect of claims reported but not assessed, or not recorded.

(ii) The factors will relate to both changes in the numbers of claims made and individual claim amounts
Advances in medical technology is a significant factor driving medical inflation
Use of more expensive new treatments, medication, equipment and surgical procedures
Changes in recommended medical protocols
Increasing availability of many (formerly complex) treatments, such as coronary by-pass grafting
Changes in hospital capacity, which can impact the likely length of stay as an in-patient for a given procedure
Better diagnostic capabilities resulting in earlier detection of conditions, which may result in higher numbers of claims (which might otherwise have not been renewed or the insured life might even have died)
Higher prevalence of screening programmes, e.g. due to encouragement by medical professionals or national screening campaigns
Rising expectations and higher demand from individuals for newer technologies and treatments
Changes in policy coverage, underwriting procedures, claims management
Changes in cultures may lead to changes in propensities to claim

There may be an increase in the rate of referrals by general practitioners. There may also be increased propensity to claim on employer-provided insurance due to job worries or due to an increased understanding of insurance and insurance products or due to changes in the quality and/or availability of State healthcare provision (e.g. length of waiting lists)

With a growing market for healthcare services, healthcare providers need to be able to maintain growing profit margins. Levels of competition between hospitals and other private medical providers also affects the charges levied as will changes in health care providers. General underlying inflation would also have an impact on the fees charged by providers, particularly inflation of health professionals' salaries and accommodation costs. Health professional's salary inflation will depend to some extent on the supply of such qualified professionals to the employment market.

An ageing population (or portfolio) would impact average medical costs per insured life as would other changes to mix of business in the insurance portfolio or target market e.g. a shift in socio-economic groups covered, location.

Changes in lifestyle factors will also influence claims costs as might changes in regulation or legislation.

Need to consider the impact of selective non-renewals.

Part (i) of this question was generally very well answered with many candidates covering most of the reserves. Many candidates also provided a good description of factors which might drive future claim costs per insured life.

4 (i) The company could provide PMI to only some of its employees. This would cut the costs dramatically but would annoy those who no longer received the benefit, with the risk that they might look for another job.

The company could offer an increase in pay in lieu of providing the health insurance or ask employees to contribute towards the cost.

The company could seek to reduce the level of cover provided under its PMI e.g. by increasing the excess level
or by capping claims
or reducing choice of treatment providers (or other suitable examples)
or removing some of the areas covered
or withdrawing cover for family members/dependents
This would have a smaller impact on the cost but might be more acceptable to the workforce. The risk would be that the staff might not fully understand the change.

The company could move to a budget version of PMI such as major medical expenses or a health cash plan version or an optical/dental plan or a waiting list plan. This would have a greater impact on the level of costs than simply reducing the cover and would be perceived as fair if the same change was made for everyone. However, it is a noticeably reduced benefit for staff, and carries some risk that staff may leave.

The company should certainly shop around to see if it can get a better deal and should also investigate whether there are any product variants that might be advantageous, such as profit sharing.

The underwriting procedure could be tightened up e.g. have full medical underwriting rather than MHD.

It is possible (but unlikely) that if the company is very large it might be feasible to self-insure and still provide the staff with the underlying benefits. This increases the level of risk to the company. This would require more internal administration but reduces the transfer of profit to the insurer and

loses any bulk purchasing power which insurers have with healthcare providers.

The company could try to encourage better lifestyle behaviour in its employees but this would be unlikely to have an immediate effect on the cost of claims.

(ii) The director may be thinking that this has a health benefit to staff and so is in the same sphere as health insurance. This might be well received by some staff i.e. those who like cycling and who do not anticipate claiming on the insurance, especially if there is adequate provision of cycling lanes in the area / showers in the building etc. However, for many staff, cycling will not be feasible, because of the distance they commute, or the need to do the school run, or they are disabled etc. They will not welcome the change. Similarly for those who value the current health insurance benefit highly, which may result in good staff leaving or the employer not being able to recruit good staff so easily.

Need to consider the overall costs; although there may be savings in the long run (capped amounts per staff member, more predictable outgoings, more up-front costs so fewer ongoing costs) there will be initial set up costs (e.g. provisions of showers, bicycle racks etc).

The director may wish to consider whether this could be done alongside one of the options under i) above because a healthier workforce could potentially mean lower premiums.

Cycling may also cause injuries and involve accidents.

It would be useful to look at what other local companies are doing.

Both parts of this question were generally well answered; candidates who came up with a wide range of answers scored more highly than those who came up with several very similar ideas. Several candidates did not understand the different emphasis being made by the dropping of the PMI contract in favour of bicycles.

5 (i) *General*

All the options listed are difficult to price because of lack of data or uncertainty

Competitors will usually have these exclusions so not having them will generally give rise to uncompetitive premiums and lead to anti-selection

AIDS/HIV

Development of AIDS/HIV is often related to lifestyle choices. Therefore it is deemed to have a strong potential element of selection, hence its exclusion. Rapid changes in available treatments/medication may also make it difficult to price. Additionally, there could be long IP claim periods because of reduced immunity

War
Major exposure to the effects of war is generally confined to a small subset of the population (e.g. members of the armed forces). Therefore the exclusion has a limited impact on the normal insured population. Also the government often covers war risks in times of a major war.

There are problems in assessing the likelihood of exposure to war. There could also be an unacceptable exposure to aggregation of claims (e.g. from a nuclear attack on a country).

Alcohol/drug abuse
It may be self-inflicted/done by choice; therefore there is a strong element of selection. It may also be seen to be encouraging irresponsible behaviour if covered.

Recovery/cure is less clear than for more standard medical conditions and cannot be controlled by the insurer

Residing abroad
There will be a loss of claim control by the insurer. Recovery times may potentially be long because the insurer may be unable to provide suitable rehabilitation support overseas. Also, the geographical location of the claimant can be a problem for the insurer. There is also more scope for claimants to manipulate the claim.

Overall, it could be difficult to price because of exposure to different diseases, climate etc.

(ii) *War Risk Factors*
Risk is independent of age and sex
Splitting by "occupation" will be most important e.g. armed forces, aid workers, non combatants/civilians, journalists. Also likely to need to split further, since specific armed forces units will have different potential exposures to active service. At least, split between frontline armed forces / aid workers and armed forces / aid workers in the supply chain.

May also split by territory in which the active service would be expected to take place and the political stability and/or history of war in the territory. Would need to consider both current known wars and potential for future conflicts during the policy term.

Risk would differ between armed forces currently on active service and those who currently are not but may be so during the insured period. Non combatants would need to be split into active conflict zones and elsewhere.

Need a clear definition of war.

Need to consider incidence of claims and duration of claims.

Need to consider different types of disability than for "standard" claims, in particular:

Loss of limbs
Loss of eyesight / hearing
Severe mental trauma (e.g. post traumatic stress syndrome)

Need to consider the disability definition e.g. own occupation v any occupation.

It could be difficult to obtain data on which to price so likely to need large margins. Data based on past conflicts may not be relevant to future experience. Need to consider future trends and developments in warfare e.g. potential increase in biological or nuclear attacks.

Need to consider possible accumulation of risks and cost of capital required.

May need reinsurer and/or consultancy help but may not be able to find a reinsurer willing to take on these risks. Could seek additional data from the government to improve understanding of potential risks. Could consider a coinsurance arrangement with the government to gain such data.

There may be reputational risks involved.

In general, neither part of this question was well answered, with candidates often only providing a few points. Some candidates did not demonstrate awareness that alcohol abuse causes lasting adverse impact on an individual's mortality and morbidity experience (beyond the falling-over-drunk effect). For part (ii) candidates did not always restrict themselves to considering morbidity risk only, which wasted valuable exam time for them. Also, many candidates did not look beyond the armed forces or civilians in the calculation of war risk.

6 (i) To provide financial protection when a person becomes unable to look after him or herself
To finance the provision of care and assistance in old age
To avoid dependence on the loyalty of unpaid care provided by family or friends, particularly in later stages, the level of need may be beyond the ability of the family to provide due to ageing of friends or spouse or the level of skill needed to provide specialised care
To avoid uncertainty as to the role of the State in the future in paying for care
To provide peace of mind to the person to know that there is an independent source of cash that will be triggered when severe incapacity sets in and to provide protection against the uncertain survival duration
To protect inheritance or protect against value of estate falling
Provides inflation protection, if an indemnity product
Provides potentially greater flexibility/choice of care (relative to relying on the state provision)
Advice may be provided
At the time of claim the policyholder may need various levels of care e.g. domestic support such as a nurse or other carer visiting the patient's home

periodically to monitor wellbeing, progressing to live-in care as the claimant becomes more incapacitated.

Alternatively, residential care may be sought in establishments that can provide various levels of care and vigilance

There may also be a need for medical care, where physical (or possibly mental) breakdown requires the intervention and supervision of doctors and nursing staff.

(ii) *Pre-funded contracts:*
Premiums could be regular or single
Premiums may increase
Premiums may be guaranteed or reviewable
Regular premiums may cease at a certain age or once a defined level of disability has been reached
Single premiums may be paid retrospectively e.g. from equity released after sale of a house. These would help meet the affordability need

Benefits are payable when the claim definition is triggered, i.e. the appropriate level of disability is reached e.g. being incapable of performing a number of ADLs or a mental impairment trigger or on an event such as entry into a nursing home

There may be a deferred period e.g. three or twelve months

There may be a waiting period

Unit-linked products would provide additional flexibility

Different levels of benefits may be payable depending on the level of disability

Benefits could be regular payments or a defined lump sum. Regular payments could be guaranteed throughout the annuitant's lifetime (subject to ongoing disability) or subject to a maximum total amount or paid for a maximum period of time. An assistive devices benefit may be included

The benefit may be offered as a rider to a pension policy

The contract could be indemnity based paying for all or a defined proportion of the costs of care throughout the remainder of life or could provide a cash lump sum or annuity to contribute towards the costs of care. This annuity may escalate, e.g. in line with inflation or at a fixed rate. Alternatively, the product could be unit-linked.

Most pre-funded long term care products do not provide a benefit on death, although there may be some partial return of premium on death for single premium products. The most basic products do not offer a surrender benefit

but in some cases a paid-up benefit will be available after premiums have been paid for a minimum period

Immediate needs contracts:
Single premium
Benefit payable immediately and cease on death; the benefit amount could be level or escalate (fixed or inflation-linked). A death benefit may be provided (e.g. capital protection on part of the single premium)

In both cases provides a choice in location of care home

(iii) *Pre-funded:*
Younger person with excess income and few family members wanting to secure their old age at point of retirement

Immediate needs:
Retired person already needing care using lump sum from equity release or pension to ensure their final years are provided for or the family of a retired person already needing care using excess assets to provide certainty about the total cost of their relative's care

This question was generally reasonably answered, although several candidates showed a lack of understanding of immediate needs insurance. It's crucial to understand the basic features of the contracts covered in the core reading, in order to pass ST1.

7 (i) Dental insurance facility
Advantages
As dental costs are lower overseas, the premium will be lower, thus more attractive to potential policyholders. Also this may be a niche market which other insurers are not currently filling. Thus overall there may be a large potential volume of new business which therefore could increase the profits of the company

Disadvantages
However, the company does not appear to sell any dental insurance already so lacks experience so pricing could be difficult

Will need to set up new systems and processes at a cost

The attractiveness may only be temporary e.g. due to changes in future State provision in Actuaria or due to an increase in overseas costs as a result of higher demand

The overseas treatment market may already be adequately catered for by other insurers therefore wouldn't be able to sell a high enough volume to recover development costs etc

The quality of treatment may be in doubt which may lead to reputational issues

Need to consider how this product would be underwritten

The insured will incur substantial travel and accommodation costs

Overall the quality of the treatment and any cost savings (net of travel costs) must be sufficient to justify the inconvenience of travel for treatment, in order to be attractive to potential policyholders

The insurer may have less control over dental costs overseas (an issue if indemnity cover provided) and there is an increased risk of fraud

The dental facility will need to be selected and regularly inspected by the insurer. This adds to the costs

There may be additional currency risk

Higher risk/higher margins/higher capital

Reinsurance may not be available

People may only go overseas for treatment because that's their only option; they would not necessarily buy insurance to get cover overseas but may buy insurance to get domestic cover

(ii) The insurer will need to research which countries provide appropriate dental care and their political and economic stability and then seek out suitable facilities within those countries offering required treatment. These would need to offer an acceptable level of quality of treatment and staff e.g. professional body/qualification/registration/approval

Feedback from previous customers may be reviewed. Feedback may be sought from other sources within the country, e.g. journals, international medical associations

Size/capacity of the facility which may affect waiting times

The treatment would have to be available at a reasonable price with quality accommodation and access to international travel facilities which also have a reasonable cost (e.g. low-cost flights)

The facilities will need to have Actuarian speaking staff and be prepared to work closely with the insurer

Whether willing to offer cover on a capitation basis

(iii) This refers to the capitation basis. Likely claims are forecast on an individual basis. This is charged to the individual as the premium, plus adjustments for expenses and profit.

The risk that this is insufficient to cover treatment is passed to the provider, i.e. the dentist. This is done by giving a proportion of the insurance premium for each person managed to the provider up-front, rather than an amount per claim.

(iv) **Basic market:**
Look at areas of Actuaria where there is a shortage of State-run capacity and obtain estimates of the shortfall in these areas. Look at why people were ineligible for access to State-run dental treatment

Consider the capacity of residents of those areas to pay for overseas private treatment

Expensive procedures:
Assess the potential amount of money to be saved for each different procedure taking into account the offsetting travel costs

Look at market statistics on non take-up of Actuarian recommended treatment

Consider the implications of the current economic climate e.g. if Actuaria is in the lower part of an economic cycle, this could dampen uptake due to reduction in disposable incomes

General:
Assess whether the proposed product is a viable alternative to travelling within Actuaria and the willingness of individuals to overcome the hassle factor of travelling. Assess statistics available on the number of Actuarian residents travelling overseas for dental treatment at present, without insurance

Carry out market research on whether there is a perceived need for insurance in these groups

Consider future State actions

Make sure any data used are accurate and reliable

If any other company offers such a product already, consider their new business statistics and assess the degree to which the insurer can compete with them

Good familiarity with the parts of the core reading relating to dental insurance would have assisted candidates greatly in interpreting this question. Whilst reasonable attempts were made for part (i), in general, many candidates did not give enough points in the later parts to score highly. For example, many candidates did not apply actuarial logic in part (ii) to discuss the insurer's requirements that their insured patients would get good treatment at a fair price. In part (ii) candidates mentioned capitation but did not realise that this was the likely method of non-insurance to be explained in part (iii). Several candidates did not take on board that the proposed insurance was to provide dental treatment overseas rather than in Actuaria for Actuarian residents.

Part (iv) could have been better answered if candidates had laid out their answers dealing with each target market separately and evaluated the market potential in turn.

END OF EXAMINERS' REPORT