INSTITUTE AND FACULTY OF ACTUARIES

EXAMINERS' REPORT

April 2011 examinations

Subject SA1 — Health and Care Specialist Applications

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

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.

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

1 (i) **PMI**

Typically this would include:
Medication and fees for investigations into chronic diseases
Cash alternatives if general state provision is used
Access to private out-of-hours GP/doctor and/or telephone helpline
Alternative treatments e.g. homeopathy, acupuncture
Dependants' benefits
Cover for treatments whilst out of home country
Indemnify the costs of the following:
- Hospital costs
- Private ambulance
- Repatriation
- Recuperative care

Income Protection

This would typically pay a regular income during periods of incapacity. The income level is known at the outset.

Critical Illness

This would typically provide a lump sum which would be payable if the policyholder suffers one of the defined conditions. The core conditions are cancer, heart attack and stroke. Additional conditions might be coronary artery by-pass surgery, kidney failure, major organ transplant, multiple sclerosis, AIDS/HIV contracted by blood transfusion, AIDS/HIV contracted during occupation, Alzheimer's disease, blindness, coma, deafness, heart valve replacement or repair, loss of limbs etc.
Benefit may be paid on contracting a terminal illness or becoming TPD

It is unlikely that long term care products would be offered in this situation.

This question part was relatively straightforward and consequently was generally well answered, although some answers were far too detailed for the number of marks on offer.

(ii) **Number of claims**

Compared to standard policies it is likely that there will be more claims, especially if free healthcare is not available on tour or if healthcare is not be available in an individual's home country or is of a higher standard on tour.
Pre authorisation may not be possible.

Delays in treatment will lead to payments under the IP part of the policy and pressure to pay out from orchestra.
There may be an accumulation of risk due to extensive travel, potential terrorist attack, exposure to unfamiliar germs etc. There is also a greater risk of occupational illnesses e.g. RSI, being overseas rather than at home and due to being on tour e.g. poor diet, stress.
There are potential risks in dealing with high profile claims, for example, reputational risk if a claim from a high profile individual is declined.

Size of claims
Claims are likely to be greater due to the higher level of health required.
If treatment takes place overseas the company is unlikely to have preferred supplier deals in place and there may well be a lack of contact with suppliers
Speedy treatments may be required which may be more expensive or require more administration.

Profitability and marketability
Is the insurer likely to sell enough to make the required profit? In particular the insurer will need to decide whether the costs of tailoring existing products to meet the needs of the orchestra will be recouped.
Will the insurer be the preferred supplier?
Does the insurer even want to tender? In particular, does the business fit with the existing brand or ethos? There could be a competitive tender process but unlikely to be aware of competitors' rates.
Are there other providers, and if so do they make a profit from this type of group cover?
Does the insurer think it will be able to offer similar cover to other orchestras?
Will offering this cover provide other benefits to the insurer? For example, it may be able to generate free publicity but this could be offset by the risk of bad publicity.

Pricing
Can suitable data to price the product be obtained e.g. from reinsurers or consultants?
Depending on group size the pricing for IP and PMI is likely to depend on the scheme's experience. This is a new scheme to this insurer so there are no data for credibility factor. Due to the niche nature of this product there will be a greater risk in determining the expected experience of a similar scheme in order to set the basic unit rate. It will be more difficult to allow for the profile of this scheme e.g. age, sex, occupation profile. The insurer will need to determine the appropriate rate for each category of scheme member. There will be a greater need to incorporate margins in final premiums, to reflect approximations/unknowns.
The members of the orchestra are the assets of the orchestra. They have a variety of different, high level of skills. There will need to be different rates, exclusions etc for those playing different instruments and for non-playing members.
The key concern is that if a performer is unable to play they will still have to be paid but a replacement will have to be found and paid; there may be

significant costs in this. The inability to play may be sudden and of short duration. Inability to play for a rehearsal may also lead to additional costs.
The period of cover may vary depending on the individual contract length.
There will also be a range of salary levels. The definition of pre-disability income will need to be considered. Income is likely to fluctuate, rehearsal rates may differ from performance rates. Will income include income from private work or teaching? There may be a greater potential for moral hazard; however, this is likely to be balanced by a professional desire to perform if possible.
The definition of disability for IP will have a significant impact on the length of the claim and its cost,
There will be a need to individually consider definitions of disability as inability to perform will not correspond to normal illnesses. Similarly, a disabled performer may still be able to perform e.g. a percussionist.
IP may need to offer cover against disfigurement

Determining the deferred period
The insurer will want to avoid very short claims but will have to meet the needs of the orchestra.
Does the orchestra already provide some sick pay? If not, there may be an argument for a very short deferred period which will add to the risks e.g. potential difficulty in obtaining certification, especially as this could be overseas, difficulty in producing an unambiguous definition of a claim inception.
Pre-existing exclusions may be difficult to enforce.

Underwriting
Forms of underwriting/screening are likely to be limited. Can this be managed (pre-existing condition exclusion)? Due to large risks there may need to be exclusions and/or no free cover limit.

Morbidity/Mortality
Unless the insurer has detailed exposure data it is difficult to carry out a detailed claims analysis.

Fee basis
What level of fee will this broker require? How reputable is the broker and does the insurer want to do business with them?
The insurer could consider whether this broker (or others) could be used to market similar arrangements to other orchestras

Group size
Will membership be voluntary or compulsory? How will orchestra membership be defined? Members of the orchestra may be normally resident in different countries.
How will coverage be defined, for example would non-playing supporters, conductors, guest stars be covered? How would soloists and others be treated?
Need to consider any interaction/overlap with existing travel cover or sick pay arrangements.

Legal issues
Who holds policy – individuals or orchestra managers
Are the members employees or freelance?
What is the position of members playing in the state orchestra who are not citizens of that state?

Administration issues
Will the premium be paid by the individuals? If so, will it be collected by the orchestra?

Lapse/withdrawal assumptions
Need to consider persistency of any similar schemes, including frequency of joiners/leavers.

Expenses
Forecast volumes will be needed for premium loading purposes.
Adjust to allow for anticipated differences e.g. the increased time in administering this product and in managing claims, the increased expenses of sale, underwriting, new business processing, the increased annual administration costs, regulation costs. Managing overseas claim authorization, treatment and payment will be more expensive.
Reinsurance may be more difficult or costly to obtain.

Other risks
Greater accumulation of risk impacting on capital and reserves.
Currency risk if treatment is overseas.
Need to ensure that if the product is changed from existing ones, then it will still need to be consistent with ABI statements of good practice, professional guidance etc.
Need to consider whether there are any issues relating to taxation, particularly on profit repatriation.

This question required application of SA1 principles to a non-standard risk. It was reasonably well tackled by the better candidates, who were able to generate a wide range of different points and who tailored them to the specific situation described in the question. In answering this kind of question it is often useful to set out the considerations under sub-headings.

(iii) Take out suitable reinsurance/coinsurance.
As well as transferring risk, the reinsurer can also provide technical assistance with pricing and underwriting, that also helps to reduce risk.
Profit share with the orchestra.
Apply different terms and conditions to the different classes of scheme member.
Ensure the morbidity data is relevant to the circumstances of the orchestra, the European country and countries to be visited rather than using standard UK data and adjust for the class of scheme member.
Obtain the orchestra itinerary and adjust to allow for risks in the countries to be visited and for risks relevant to the amount and type of travel anticipated.

Study the instruments in use by the orchestra and obtain data on any specific occupational illnesses with which they are linked, paying particular attention to those not used by UK orchestras. Investigate the level of fitness/health required for individual instruments and hence the effect on players' incapacity.
Require scheme membership to be compulsory to reduce selection risks.
Define membership carefully to exclude guest stars, short term members etc.
Pre-existing condition exclusions.
Carry out full individual underwriting of the high risk member classes and have a low or no free cover limit.
Have a plain English questionnaire / application form.
Have clear, well-communicated terms and conditions.
Apply strong claims management processes.

CI:
Restrict the conditions covered
Limit the benefit amounts
Allow for reassessment of seriousness of the illness
Limit TPD to any occupation
Limit GIOs/continuation options/renewability options

IP:
Extend deferred period
Strengthen definition of disability
Allow for independent assessment of level of disfigurement
Reduce expiry age
Remove any escalation of benefit
Reduce percentage of salary / replacement ratio
Restrict the definitions of income.
Increase exclusions e.g. no cover whilst abroad
Limit the benefit payable per person if individual, or per annum if group
Offer rehabilitation/partial benefit if able to do some work e.g .if able to play for a lower standard orchestra, if can give master classes, if still able to teach music or compose at any level or work as a conductor or in an advisory capacity
Offer IP on own occupational definition for a short time (6 months) and thereafter use any occupation or Activities of Daily Living (ADLs)

PMI:
Restrict choice of hospitals
Reduce upper limits
Introduce excesses
Provide fixed benefits, not indemnity
Pre-authorise claims
Require NHS or equivalent treatment if available within a defined time
Eliminate aspects of cover: e.g. recuperation, out-patients, alternative treatments
Increase exclusions e.g. exclude treatment abroad
Limit the PMI per person, per annum

The better candidates were able to generate a wide range of different suggestions here. Noting that the command word is "Suggest", it was not necessary to describe each possible approach in a lot of detail.

2 (i) **Assets**

In Pillar 1, only assets that are admissible may be taken into account for valuation purposes. For assets other than gilts, the admissibility rules specify maximum amounts that can be taken into account. However, for Pillar 2 the admissibility rules do not apply so inadmissible assets can be added back in.
For Pillar 1 the value attributed to assets must be in line with the FSA valuation of asset rules, a main principle of which is that investments traded on a stock exchange should be valued at bid price. For Pillar 2 all assets would be included at a "realistic" or market value, which may differ from the Pillar 1 rules for some types of asset.
In Pillar 2, the company may also include an asset relating to the value of the business in force (VIF). This is the present value of the release of the prudential margins within the Pillar 1 reserves and would be calculated on a market consistent basis.

Liabilities

Pillar 1 mathematical reserves for each of the product types written by the insurer

- Reserves for expected future claims (less premiums)
- Outstanding claims reserves
- Claims in payment reserves
- IBNR reserves
- Expense reserves

These will be calculated on a prudent basis and in line with the other Pillar 1 liability valuation regulations as set out in INSPRU.
The balance sheet also needs to include current liabilities, such as tax payments due.
For Pillar 2, the company may choose to recalculate and present these reserves on a realistic basis - in which case there would be no VIF asset.

Capital Requirements

Capital requirements represent the amount of capital that the regulator requires a company to hold in excess of the basic liabilities, and will be based on the risks undertaken by the insurer.
Under Pillar 1, this will be based on a formula approach.
As this is a large insurer, the minimum BCRR will not be relevant.
The capital requirements therefore comprise the sum of the long term insurance capital requirement (LTICR), which is defined as the sum of insurance death, health, expense and market risk capital components, which are calculated as specified percentages of the underlying reserves and the resilience capital requirement (RCR), which is calculated by applying a series of specified market risk scenarios to the assets backing the liabilities. The RCR is then defined as the capital shortfall arising in the assets as result of these specified scenarios

Under Pillar 2 the capital requirements comprise only the Individual Capital Assessment (ICA) which, in contrast, is a complex calculation based on the company's own methodology, recognising all of the risks to which the company is exposed and calibrated to a prescribed probability of solvency, i.e. 99.5% chance of remaining solvent over a year, or equivalent. It will also take into account the amount of diversification that exists between these risks and interactions between them that could lead to the need to hold additional capital.

The risks considered within the ICA would include

- morbidity risk, particularly on critical illness and income protection
- mortality risk on immediate needs annuities
- investment risk, particularly on pre-funded long term care
- counterparty risk, e.g. if the insurer uses reinsurance

If the company has been given an ICG by the FSA, it should also include this in its balance sheet

Surplus Assets

The surplus assets would be determined as the excess of assets over liabilities and capital requirements.

This question was directly based on information contained in the Core Reading, but was not well answered by a significant proportion of students. A large number of candidates did not appear to understand the difference between a balance sheet and a profit and loss account, or a set of regulatory returns, and consequently did not score well. Reporting and regulation is a growth area for actuaries, and an understanding of these concepts is an important requirement for SA1.

(ii) To estimate solvency, project the items listed in (i) from the last point at which the solvency balance sheets were valued formally. This should be done approximately. A spreadsheet model may be a manageable and transparent tool. The model will need to project both Pillar 1 and Pillar 2 separately and assess which is the most onerous.

Assets

In order to project these forwards, they will need to be split into broad asset type. There may be short term gilts backing the reserves for the immediate annuities, including index-linked for any escalating benefits and expense reserves. There may be riskier assets backing the pre-funded long term care, even such as equities. There may also be moderately risky assets held, to improve diversification and increase returns, perhaps backing the critical illness and income protection reserves. There will also be cash-type assets held to meet ongoing outgo, such as commission payments and claim payments

Free assets may be invested in equities and corporate bonds

These asset categories can then be projected using general market indices for example, UK equity assets can be projected using the FTSE 100 index and the value of overseas assets can be estimated using current exchange rates and an overseas index, etc. Cash can be rolled forward using knowledge of recent interest rates.

The value of bonds should be adjusted according to material changes in yields.

Any large investment trades may have a marked impact on the value, so the company needs to make sure the investment team make it part of their process to inform whoever is doing this.
In the Pillar 2 calculations, the value of business in force (VIF) will also need to be projected forwards. This will need to allow for new business and the unwinding of the discount rate and need to make any adjustments required for significant other changes in experience, e.g. in investment yields. These could, for example, be estimated using sensitivities from embedded value calculations.

Net new money
Changes in the amount of cash held will be trickiest to estimate. Depending on how large and well established the insurer is, it's possible that the net new money is quite stable, and a set amount per day/month can be allowed for. Alternatively, this could be broken down into component parts and projected separately (and this might help later on).
Expected investment income can be estimated using knowledge of assets held although care is required to ensure that the index used is consistent with the income assumption used.
Premium income from new business can be estimated from the business plan and regular premium income from existing business can be estimated using cashflow data from a recent embedded value calculation.
Claims outgo can be estimated using cashflows used in the most recent calculation of the VIF.
Expense outgo can be estimated from the business plan, and should be kept fairly constant.
Any large one off or unusual items should be allowed for, particularly where they may not correspond with the plans, for example, very large expense outgo (such as a new underwriting system or office) or selling and setting up a massive group scheme.

Liabilities
Starting with the reserves on a given date, the reserves can be projected forwards. This projection should make allowance for claims paid but noting that the change in reserves will be related to but not equal to the cash outgo identified in the net new money calculation and should also allow for lapses, which may need to incorporate assumptions relating to the terms of the lapsed policies in order to identify the amount of the release in reserve.
Reserves should be increased to allow for new business (using the same source as the premium cashflows) and to allow for "unwinding of the discount rate" – i.e. the fact that the cashflows are getting closer
Many of the reserves may be assumed to remain constant over relatively short periods.
Reserves will vary with yields on the assets backing the reserves - this should follow from the asset calculations and an approximation, or "rule of thumb" could be used.
Any large one off items affecting the reserves should be allowed for (such as the large group scheme mentioned above).
Any significant experience investigations may affect the size of the reserves – so incorporate the output from any impact assessments carried out, for

example, a new view of morbidity assumptions may increase or decrease the reserves.

Capital requirements
The model would also need to project the capital requirements based on the changes in the underlying elements of the balance sheet. For example the LTICR may be proxied by assuming that its ratio to the mathematical reserves remains unchanged. Others, particularly the ICA, may be more complex to project as they need to take into account any significant changes in the risks undertaken. For example, if there were a new large group scheme, this could affect the amount of morbidity risk and the amount of diversification and if there were a significant change in reinsurance, this would affect the amount of counterparty risk. There may be changes in economic outlook, e.g. stockmarket volatility, that need to be reflected.
The company should also project its ICG, perhaps assuming that it remains the same percentage of the ICA.

Other considerations
Will need to "true up" when actual data is available, to keep the estimation as accurate as possible.
There is a need to strike a balance between accuracy and timeliness.
Depending on the size of the company, and the maturity of the book, some items may not be material.
Some companies may be consistently either Pillar 1 or Pillar 2, and so it may not be necessary to model both.
The projection from the last known point should be best estimate – as the finance director wants to know what the true solvency position is most likely to be.
If there has been a significant movement may need to pay particular attention to the projection – in particular, the usual rules of thumb may no longer apply; for example if there has been a significant movement in investment market conditions, or an epidemic leading to heavy claims.

This question was poorly answered by many students. It required candidates to build a model from first principles, which many candidates found difficult. The better candidates were able to achieve a reasonable mark by considering the items listed in the question sequentially, and making sensible, practical suggestions for each of them.

(iii) The actuarial function holder has statutory responsibilities to notify senior management and the Board. Notification to the FSA will also be required. However, the company may wish to double check and firm up on the results before taking drastic action.
The company would wish to put in place any available management actions, which may include investment activities, e.g. moving to lower risk assets or improving asset/liability matching or introducing hedging techniques.
It might be able to improve asset hypothecation or reduce its margins; for example if it is Pillar 1 that has caused the apparently insolvency, there may be scope to release prudential margins from the reserves to regain solvency but still stay within an acceptable range

If the above actions are not sufficient to regain solvency, the company may have to seek extra capital or funding (e.g. securitisation). It may also have to stop selling certain types of business temporarily (products with high new business strain)
If it is a genuine breach that cannot be avoided through management actions, there will be different FSA related actions needed depending on what level of capital requirements are breached.
For a breach of the Guarantee Fund (BCRR) requirements the insurer must notify the FSA, submit a scheme of operations and a plan for restoration within 14 days.
For a breach of the Minimum Capital Requirement it must notify the FSA, submit a scheme of operations and a plan for restoration within 28 days
For a breach of the Capital Resources Requirement it must notify the FSA and submit a plan for restoration within 28 days
For Individual Capital Guidance, it must inform the FSA as soon as practicable if capital resources fall below the ICG
Once an acceptable plan has been submitted to the FSA, it must be implemented by the insurer.
The insurer would also need to investigate thoroughly exactly what has caused it and put into place more robust mitigating actions in order to avoid this happening again in future

This question part was well answered by those candidates who were familiar with the detail of the bookwork, and who were able to apply it to the given situation to generate a good range of "real world" implications.

END OF EXAMINERS' REPORT