INSTITUTE AND FACULTY OF ACTUARIES

EXAMINERS' REPORT

April 2011 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.

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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.

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.

1 (i) Relative merits of the two approaches:

Model points

Save model running time and calculation time (models are also useful if running many times). This may be significant for a very large health and care insurer with a large portfolio of business and saves data storage.

Could potentially be better approach if need to manage problem/missing/inadequate data. However, health and care insurers need to keep a lot of data electronically and should have found cheap and reliable ways to do this.

Output is more manageable and easier to inspect. This can facilitate checking of the output.

For some types of modelling (e.g. new business pricing) model points are the natural choice, since outputs are only required for specimen policies in order to produce a manageable premium rate scale

Full data

Full data is better if data is very heterogeneous.

Outputs obtained using model points are generally less accurate than full data as they do not capture the full features of the data. They may for instance group together bands of ages, which would otherwise affect morbidity experience significantly.

Detailed characteristics of the business may be lost, e.g. a correlation between age, sex and benefit size might be expected for income protection, which could be "smoothed away" if model points are used.

Time spent identifying and validating model points may outweigh the time saved in running the model.

Considering which are the most significant features may be a large piece of work for health and care business where there are many risk and rating factors to allow for.

Some results may have to be highly accurate, meaning that model points would not be appropriate (e.g. statutory reserves)

(ii) The model points chosen must be such as to reflect adequately the distribution of the business being modelled. The number of model points to be used will be a trade off between time saved and accuracy

Need to consider the relevance of particular factors to the experience when deciding on the extent to group by that factor (this would depend on product). The level of heterogeneity within the data set would be relevant.

The model point choice should be validated by running the model on both full data and model points, and calculating the difference. Alternatively, the model points can be used to recalculate the mathematical reserves at a valuation date, and the results can be compared against the full data valuation. Some maximum "error" will be set, and this will help determine how many model points to use.

The usage of the model points will affect the choice – for some purposes some features will be more crucial than others (e.g. for reserving purposes, pricing new business). For example, in pricing, the amount of initial commission paid is important, but this is not important for reserving.

The model points used last time would normally be the starting point. These would then be adapted for known changes in the business mix.

This question was well answered by those students who demonstrated familiarity and confidence with the Core Reading bookwork, and who were also able to think about the issue in a practical context.

2 (i) Keyperson products are taken out by an employer to provide cover if key employees fall sick, become disabled or die
They fall into two categories:
Those designed to provide compensation for loss of profits
Those designed to cover the key employee's salary (to facilitate the temporary recruitment of a replacement)

(ii) *Loss of profits*
Small and family businesses, partnerships
Key people in key jobs e.g. tea taster, perfumer, locum protection
Individual sum assured linked to a proportion of loss of profits (this would need to be defined in some way) or the cost of buying out a partnership.

Employee costs
May be purchased by any company with salary-related employees; for example, to cover senior managers.
Individual sum assured linked to expected cost of recruitment and the cost of training and additional cost of hiring a temporary replacement (e.g. consultant)
In both cases, the amounts would be capitalised over an appropriate period

(iii) *Risk management issues*
Sums assured may be very high; individual underwriting would be required for large sums assured. In particular, there is a need for automatic medical tests at underwriting stage for higher sums assured to detect non-disclosure and a need for robust claims management. Would also need to perform financial underwriting in order to avoid over-insurance.
The level of underwriting required will be very expensive.
Reinsurance contract likely to be required. It might be difficult to obtain reinsurance or the cost may be too high.
Reinsurer's expertise may also be required for pricing and underwriting, particularly if own experience is limited, which is likely given that this is probably low volume business and the individual keypersons are not necessarily typical of the insured population.
It is particularly important to ensure that benefit amounts and payment conditions are well defined.
Diversification could be difficult to achieve.

This question was challenging for many candidates who appeared to be insufficiently familiar with the core reading description of these contracts (candidates are reminded that the glossary does form part of the core reading). Applying common sense did, however, enable candidates to gain marks without being familiar with the theory.

3 *Overall*

Check the information given by the non-executive director.
Determine the likely timescale for the introduction of the test.
Ascertain how accurate the test is thought to be and the cost of the test.
Is the test available in all countries covered?
Engage in debate with the H&C industry and elsewhere.
This may increase demand for PMI, CI and IP products.
Need to check with reinsurer before changing any product coverage.

Underwriting

Need to consider whether the underwriter would be allowed to use the results of the test in underwriting (or whether the proposer would even have to disclose that they had had the test) and whether the insurer would be allowed to require this test to be taken by the proposer for a new policy. If so, the insurer would need to consider how it would deal with the mental anguish involved (or whether it would put people off buying insurance if having the test is a requirement).
Underwriting permissions will vary around the world.

Effect of test

PMI

Need to consider whether the disease is chronic or acute as chronic diseases may be excluded from the PMI cover.
The company should consider whether to add it as a separate benefit in the PMI benefit schedule.
Is the cost of the test covered?
Will a positive result trigger a treatment cost or costs for preventive measures? If so, how much and for how long?
How does the underwriter check for prior conditions – may use a moratorium
May not have a big impact on PMI as this is a short term renewable product

CI

Consider wording of policy in relation to Alzheimer's disease.
Need to ascertain whether Alzheimer's disease is one of the listed critical illnesses for this company's product(s) and to consider the point at which the CI contract pays out.
What proportion of overall claims relate to Alzheimer's disease?
If covered, then need to consider pricing/loading implications if a proposer has a positive result.
If an existing policyholder has a positive result then unlikely to be able to cancel the policy or increase premiums but would have to increase reserves

IP

The considerations are similar to those for CI and PMI if proposers/existing policyholders have a positive result.
Consideration would be needed as to whether a positive result would trigger an immediate claim.
The effect on IP might be less than for CI, since IP tends to be sold to younger policyholders.

Immediate Needs Annuities
There is likely to be no effect since this product is only purchased at the time of care need.

This question was well answered by those candidates who were able to demonstrate their ability to apply their knowledge to an unfamiliar subject. However, many candidates appeared confused as to the difference between pre-funded long term care and immediate needs annuities – this is an important distinction that candidates should be clear on.

4 (i) Data – own experience, insured experience, population data, overseas data
Claim inception and termination rates
Claim cost information: by treatment, per diem, length of stay, medical inflation
Investment performance
Expenses and inflation
Withdrawals
Mix of new business by nature and size of risk and by source
Volumes of new business
Guarantees and options
Competition
Management of insurer
Counterparties in distribution
Counterparties in provision of medical services
Counterparties in reinsurance
Regulation and fiscal developments
Customer service shortcomings/reputational risks
Internal audit failures/fraud
Physical risks including IT recovery
Aggregation and concentration of risk
Catastrophes
Non-disclosure – underwriting at outset versus underwriting at claim stage
Earlier screening/diagnosis
Anti-selection
Liquidity risks

(ii) Obtain appropriate reinsurance arrangements
Deposit back or collateral arrangements to mitigate counterparty default risk
Asset liability matching in terms of nature, term and currency
Cash flow monitoring as a tool to manage liquidity risk
Review actual experience against pricing basis e.g. monitor levels of expenses
Set up a retention team to reduce lapses (or offer loyalty discount)
Service level agreements with outsourcers
Competence assessments for key inhouse staff
Competence assessments for sales staff, distribution channels
Checks on policy data
Surveys on customer service satisfaction
Underwriting as gatekeeper and risk analysis
Claims management – in line with policy conditions and underwriting
Treating customers fairly

Controlling the distribution process
Market research and analysis of likely business volumes and mix
Keeping abreast of regulatory developments
Keeping abreast of market and medical developments
Appropriate product design that meets the needs of customers
Comprehensive and unambiguous policy wording
Appropriate risk and governance structure
Robust management and controls on systems
Well defined investment strategy
Investing in lower risk asset types, e.g. avoiding corporate bonds below a certain credit rating
Comprehensive and relevant management information
Robust policy on appointing third party service providers, including due diligence
Using more than one counterparty (e.g. a number of different reinsurers) to avoid concentration risk
Ensure that senior management understand the risks, risk management policies and their limitations
Regular solvency and capital monitoring
Appropriate commission structure
Independent internal/external review of financial results
Reduce level of guarantees (e.g. have reviewable premiums)
Hold higher levels of capital (e.g. mismatching reserves)
Internal/external audit to reduce fraud
Diversify business portfolio (e.g. by region) to counter aggregation of risk
Budgeting / internal expense controls

This question offered an opportunity for a well-prepared candidate to score highly. The best scores were achieved by considering a wide range of ideas, also noting that the command words used (list, suggest) are not looking for detailed descriptions or discussions. Planning this answer may have been a good use of the reading time for some candidates.

5 (i) Data is required for each claim, both in payment and under consideration.
Data also required for past claims, in order to assess likely duration of current claims.
Each claim should be assigned a unique identifier.
The equivalent information for domestic claims would also be needed, in order to assess the differences – and there may be little data for overseas claims.
Need data on reporting delays to help assess IBNR.

Splits required:
- Country/territory/region
- Age / date of birth
- Sex

Information for each claim:
- Date payment started
- Date payment ended, if applicable
- Reason for claim

Reason for termination of claim
Date of moving in and out of Actuaria, if the claim is only partly overseas

(ii) It is unlikely to be practical to impose exactly the same checks as are done in Actuaria. However, the checks should be consistent with those applied to claimants living within Actuaria so that each group is treated fairly. Could check that the claimant was not dead e.g. from national death records or require self-certification or could carry out spot checks.
The government could require a local doctor in the country where the claimant is currently residing to sign a special benefit note.
Consideration of past experience in Actuaria can establish which incapacities have a relatively quick recovery. Cases with incapacities where there may be a quick recovery should receive a medical questionnaire for completion by the claimant. This should be adjudicated by the normal income benefit assessment panel. Alternatively, it may be possible to arrange a telephone interview.
Compliance is to be encouraged by stopping the payment of benefit for all cases not replying.
An appeals process will be required.
The normal Actuaria guidelines should be followed wherever possible to resolve query cases.
The scrutiny on longer term income benefit cases can then be rolled out to all taking into account information derived from the initial screenings.
If possible, the qualifications and reputation of the permitted signing doctors should be controlled.

(iii) There may be a large number of claimants that need to be investigated. They may be spread over a large number of different countries.
The government will need to go through diplomatic channels to inform the country concerned of its checking on income benefit claimants.
The government may need to hire local medical staff to undertake the screening of existing claimants. There may be language barriers if local staff are used.
In some countries, it may be difficult to ensure that the medical staff are of sufficient quality and probity. In those cases the government may therefore need to bring in its own specialists.
The costs of checking may be higher than the expected benefit saving.
There may be problems in getting access e.g. if living in remote areas.

Candidates who thought about this particular scenario and answered carefully would generally have scored highly. Many candidates answered the question as if there were a commercially provided insurance contract involved – this would have hampered their ability to score well. Reading the question carefully is important, as is reminding oneself frequently of what it says.

6 (i) **Issues specific to the company in Actuaria**
Regulation
Research whether any reserve reduction could be achieved under Actuaria regulations without reinsurance. For example, consider whether the Actuaria

statutory rules would allow company to move from a net premium valuation method to gross premium valuation method, remove excess margins in the valuation assumptions etc.
Look into what reserve reduction could be achieved by reinsurance. In particular, investigate whether there will be restriction on reinsurance reduction if the proportion reinsured exceeds a certain limit.
Look into what capital requirements reduction could be achieved by reinsurance. In particular, whether there will be restriction on reinsurance reduction if the proportion reinsured exceeds a certain limit.
May need to consider statutory capital as well as risk based capital.
Consider any other potential constraints on capital reduction. For example, timing and how quickly a reduction in working capital is required. Also the insurer may need to hold a counterparty default risk reserve for the reinsurance.
Investigate whether there are any restrictions under Actuaria regulation about reinsurance arrangements. For example, any restrictions on intra-group reinsurance or any requirements on minimum credit rating and reinsurance default.
Consider whether Bankonia may copy Actuaria's changes in regulations.

Expenses
If the reinsurance is only in respect of mortality and morbidity risks, residual risks such as expenses will still need to be reserved for locally.
The reinsurance terms should take into account the expenses incurred locally, both acquisition and renewal.
Need to consider how facultative cases will be dealt with e.g. policies with unusually high mortality/morbidity risks.
Consider whether these cases would require additional external reinsurance.
Investigate the potential effects of the reinsurance on the competitive pricing of the policies.
Need to consider the appropriate reinsurance terms and premium rates.
Consider impact on profits within own company.

Administration
Consider the appropriate structure required for the reinsurance (eg treaty rather than facultative) and the appropriate type of reinsurance (eg quota share).
Consider the appropriate proportion of risks to be transferred to the reinsurance subsidiary. May need to model different retention proportions in order to maximise overall benefits.
It may take longer to process claims and more staff may be needed.
There is a risk of reputational damage.

Tax
Consider how the reinsurance premium will be treated with regard to tax.
Consider how commission from reinsurer will be treated with regard to tax.
Investigate the tax implications in terms of the immediate reserve and capital release.

Dividends
Consider the current dividend policy and how the reinsurance may affect future dividend payments and policy.

Systems
Consider what modifications will need to be made to IT systems to maintain the reinsurance records and the modifications that will need to be made to the actuarial & finance systems to allow for the effects of reinsurance

(ii) **Issues specific to the reinsurance subsidiary in Bankonia**

Regulation
Assess the likely level of capital requirements, both statutory and risk based capital. Need to consider whether there is likely to be any need of upfront capital injection.
If the subsidiary does not currently underwrite health and care reinsurance business, there may be need for new expertise/staff in this office and changes to systems.
Investigate whether there are any other health and care accounting issues that need to be considered.

Legal
Need to draft a treaty covering:
− Type of reinsurance
− Retention limits
− Rebate/commission
− Guarantees such as deposit back (if any)
Consider whether the reinsurance subsidiary is authorised to accept inward health and care reinsurance and whether different regulations apply to overseas business. If not, need to consider the process and associated costs of a separate authorisation.
Consider the requirements in respect of any approved persons, e.g. to sign off reserves.
Consider the likelihood of future reinsurance arrangements with the group's other business units. It may not be cost effective only having one health insurance treaty on the books.

Administration
Administration in the reinsurance subsidiary: costs and who it will be done by (reinsurance subsidiary/company in Actuaria/third party administrator).
Need to decide who will be responsible for the valuations and how often valuations will be carried out and what external assistance will be required.
Need to agree the process of transacting reinsurance accounts (premiums & claims) and policy data.
Need to consider the checks to be carried out on the cedant's data.
Comparison of rates, terms and conditions offered by other reinsurers.
Consider the size of the block of business compared to existing business

Dividend
Consider the dividend policy and whether there be any restriction on their payments in Bankonia.

Expenses
Need to set expenses – consider the source of data on which this will be based.
Consider any further reinsurance/retrocession that may be required.
Consider impact on profits within own company.

Tax
Tax position and other fiscal developments in Bankonia. Check how this could affect the profitability of the business; for example, investigate whether there are any tax rules on transfer pricing (i.e. price agreements between related companies).

Profits/Other considerations
Assess the expected profitability of the reinsured business.
Are there any diversification benefits to be achieved given the existing business reinsured?
There may be additional risks arising from currency differentials.
It may be a good opportunity to get the reinsurer started in the PMI market, if this is not already the case, and attract more PMI reinsurance from other external companies.

(iii) **Issues for the Group**
Investigate how the reinsurance arrangement could reduce the overall capital requirement of the group and to maximise the overall profits for the group.
This could be achieved through greater capital efficiency, lower costs, increased sales through more competitive premiums although this could potentially be offset by higher administration expenses of the arrangement, or adverse taxation.
Need to decide how the profits are to be split between the two business units to maximise the return for the group. Also need to consider the timing and size of the emerging profits.
Need to consider the capital support, tax implications and dividend policy from the group's perspective.
Investigate the implications of the arrangement on the group's Embedded Value (EV) and Risk Based Capital (RBC) calculations.
The implications will need to be considered at the glob.l level as well as individual business unit level
Consider the implications of the arrangement on the governance and risk management between the group, the business unit in Actuaria and the reinsurance subsidiary in Bankonia.
Need to consider the potential reaction of market analysts and shareholders and the impact on the share price.
Consider other alternatives to raise capital or reduce capital requirement eg withdraw from PMI in Actuaria.

This was a challenging question, and many candidates struggled to come up with a broad enough range of points. When faced with a question like this with a large number of marks, candidates may be able to bolster their answer by considering widely across which areas of the course may be relevant to the question.

7 (i) (a) Describes a benefit under an insurance policy whereby the insured can choose to continue with the cover provided by a policy under circumstances where the cover would otherwise have ceased. The insured does not have to provide evidence of health at the time of continuation.
Circumstances could include: where the individual has left work and is thus no longer covered by an employer sponsored scheme or where an individual policy has expired.
The terms under which the option is effected are those applicable to a healthy life for the age at the date when the option arises.

(b) Describes the ability to purchase additional cover without further evidence of health.
The option is exercisable on certain life-events, for example, marriage, mortgage increase, birth/adoption of a child
The option will be available at the normal premium rates, in force at the date on which the option is exercised, for a healthy life of the policyholder's age

(c) The ability to reinstate mortality cover after the policy has paid out on a specified disease event.
Applies to accelerated critical illness plan.

(ii) The cost of an option is the value of the extra premium that should, in the light of full underwriting information, have been charged for the additional insurance over the normal premium rate that is charged. Thus there is no cost for a life in good health at time of exercise.
Lives in poor health who exercise the option lead to potentially considerable extra cost. Thus the total expected additional costs of an option depends on the probability that the option will be exercised and the expected mortality/morbidity of the lives who choose to exercise the option.
Mortality/morbidity experience tends to be worse when only a small proportion of eligible lives exercise the option.

(iii) *Conventional method*
Assumes that all lives eligible to take up the option will do so and the mortality/morbidity experience of those who take up the option will be the ultimate experience which corresponds to the select experience that would have been used as a basis if underwriting had been completed as normal when the option was exercised.
The mortality/morbidity basis used is not usually assumed to change over time, so the tables are as per the original policy basis.

North American method
This method requires two additional items in the pricing basis:
a double (or triple) decrement table for lives who have not yet exercised the option, with decrements of death/disability and exercising the option represented by dependent rates of decrement and
a mortality/morbidity table for lives who have exercised the option represented by heavier mortality/morbidity rates

Stochastic modelling
Establish a suitable model to project the future experience of the option - both the numbers effecting the various options and their subsequent claim propensity.
Carry out a large number of simulations to determine the cost distribution and calculate the cost of the option to an acceptable statistical degree of adequacy

(iv) Considerations in choosing which method to use include:
Shouldn't use conventional if there are many possible exercise dates or there are several alternative options to choose from, if 100% take up rate is not reasonable of if ultimate and/or select table is not appropriate.
Would need to assume all options will be on the worst case scenario

The North American method is more complicated than conventional. It can be difficult to estimate the take up rates and the additional morbidity

Stochastic modelling is difficult if there is insufficient computing power/data.
There may be insufficient options to make the time/cost worthwhile.
A more complex method can lead to a risk of spurious accuracy.
If the risk is "symmetric" then little added value.
Stochastic modelling produces confidence intervals.

Other considerations include:
The ability to allow for lapses.
The ability to obtain rates for a new line of business
The special circumstances of the company e.g. size, experience in market

(v) The main risk is of selection against the office by policyholders in poor health, either at the point of purchase or when exercising the option. The cost incurred may be more than the premium charged for the option, it being difficult to estimate the parameters for pricing.
Medical advances may enable greater anti-selection than previously assumed.
The range of CI events covered and hence underwritten may be very different from the situation when the original policy was taken out.
Risk that the options have insufficient impact on sales volumes to justify cost.
Risk that the expenses of offering and reserving for the option are greater than expected when pricing.
Risk of selective withdrawals.

Ways of managing these risks include:
Impose a time limit after the specified event in which to exercise the option.
Only allow options if the original policy was issued at standard rates.
Limit the qualifying events.
Only allow regular (inflation) increases if they were selected at outset and all previous increases have been taken up.
Impose a maximum upper limit on the benefit amount e.g. the additional sum insured cannot exceed the original sum insured.
Carry out initial underwriting assuming that the maximum potential SA will always be reached.

Specify the terms and conditions under which the option can be exercised very clearly in the original policy.
Regularly remind policyholders of their option in order to encourage healthy policyholders to exercise their options. Have a marketing campaign to sell more of the policies.
Monitor the sales levels and stop selling the product or remove the options if the level of sales is insufficient.
Regularly monitor normal rates to ensure they are suitable for the target market.
Regularly monitor the cost of the option to the company in the light of any particular CI's which emerge.
Obtain reinsurance and/or the assistance of the reinsurer in pricing options.
If the experience worsens, set up reserves as soon as possible.
Include margins in the pricing basis.

Quite a few candidates missed out on relatively straightforward bookwork marks in this question, which again showed the benefit of being really familiar with the core reading. In the later parts, tailoring the answer to the specific question will have been a good way to improve scoring. In part (iv) some students did not state which method would be most appropriate to use, as required by the question.

END OF EXAMINERS' REPORT