Subject ST1 — Health and Care Specialist Technical

EXAMINERS' REPORT

April 2008

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.

M A Stocker
Chairman of the Board of Examiners

June 2008

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. There was often a lack of sufficient detail in the answers. 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.

Candidates should also recognise that whilst reinsurance can play a valuable role in the UK health insurance market, reinsurance is not a panacea for all evils.

Comments on individual questions

Question 2

Candidates often lost marks in part (iii) through not defining the terms used in their formulae, as asked for in the question.

Question 5

This was not a straightforward question and many candidates did not score well. In part (ii) several candidates stated that an annuity paid to an impaired life would be more costly to the company than the same annuity payable to a standard life of the same age and gender. The answers to part (iii) were generally very poor, although credit was given for any reasonable descriptions of the appropriateness of the various approaches and for suggested medical conditions which might be appropriate for each approach.

Question 6

Several candidates lost marks here by giving a detailed description of the various types of reinsurance which might be used for income protection business which is not what the question was asking for.

Question 7

Some candidates lost marks in part (ii) by not linking their answers to the objectives set out in part (i).

1 (i) Reasons for excluding explicitly certain causes of disability from the cover of healthcare insurance contracts include:

- To avoid anti-selection – e.g. exclude existing conditions. Exclusion effectively replaces questions on the underwriting form. Waiting period for cancer claims under a CI policy – again allows underwriting to be reduced
- Moral hazard – because of insurance people may be reckless in their behaviour so, for example, disability that results from self-inflicted injury, failure to follow medical advice might be excluded,
- Special risk that is difficult to price – e.g. may exclude disability as a result of participation in a professional sporting event.
- Cost is likely to be difficult to price because of lack of data – e.g. under a CI plan the cancer cover will exclude skin cancer. A lot of skin cancer is not reported and so published statistics will underestimate the risk. Is there a need for a payment on the diagnosis of skin cancer?
- Cost too high – e.g. a typical IP plan has a deferred period of at least 28 days; this excludes short term claims as a way of reducing the cost.
- Cost is uncertain in the future – uncertain risk like AIDS, war, terrorism.
- It may be unlawful to provide a benefit, for example, if the policyholder is disabled as a result of committing an illegal act (e.g. committing a terrorist act).
- Payment received from elsewhere – may exclude claims for which the policyholder is already receiving compensation (say from an employer or through a structured settlement).

(ii) Possible exclusions include

- War, terrorism, acts of violence, civil unrest
- Self-inflicted injury or attempted suicide
- Drugs
- Alcohol
- Hazardous past-times or sports
- Aerial activity other than as a fare-paying passenger
- Criminal acts
- Failure to seek or follow medical advice
- Pregnancy
- AIDS/HIV
- Cosmetic surgery
- Accident and emergency treatment
- Pre-existing conditions
- Experimental treatments
- Chronic conditions under PMI
- Preventative treatments
- Treatments not occurring during the insured period
- Effects of exposure to radiation

2 (i) **North American method**

- Double decrement table for lives who have not yet exercised the option
- Decrements include death/disability and exercising the option
- Table (of heavier mortality/morbidity) for lives who have exercised the option

Conventional method

Assumes that

- All lives eligible to take up the option will do so
- The mortality/morbidity experience of those who take up the option will be the Ultimate experience

(ii) **North American method**

- Often difficult to obtain sufficient data to estimate all the decrement rates
- No direct experience for new line of business
- Difficult to estimate take-up rates

Conventional method

- Not possible to use when there are many possible exercise dates
- Not possible to use if there are several alternative options to choose from
- Is 100% take up rate reasonable?
- Question over the appropriateness of using ultimate rates
- More simple to use than North American method

(iii) **North American method**

Assumptions

- premiums are payable annually in advance
- premiums payable in the extended period are on the same basis as the original contract
- policyholder is aged x now
- original policy term is 10 years
- a triple decrement table used for lives who have not yet exercised the option with decrements of mortality/disability and exercising the option
- a mortality/disability table is needed for lives who have exercised the option
- assurance and annuity factors based on mortality/morbidity for lives who have exercised the option represented by A' and a'
- the proportion of those who take up the option is P

Present value of benefits in the extended period:

- for new policyholders: $S * A^{1}_{[x+10]:\overline{10}|}$
- for those who exercise the option = $S * A'^{1}_{x+10:\overline{10}|}$

So present value of premiums in the extended period for those who exercise the option =

$$S * \frac{A^{1}_{[x+10]:\overline{10}|} * \ddot{a}'_{x+10:\overline{10}|}}{\ddot{a}_{[x+10]:\overline{10}|}}.$$

Cost of the option at expiry of the original term =

$$S * \left[A'^{1}_{x+10:\overline{10}|} - \frac{A^{1}_{[x+10]:\overline{10}|} * \ddot{a}'_{x+10:\overline{10}|}}{\ddot{a}_{[x+10]:\overline{10}|}} \right].$$

The proportion of those who take up the option is P.

Option premium payable in addition to the premium of the original policy:

$$\frac{\frac{D_{x+10}}{D_{[x]}} * P * S * \left[A'^{1}_{x+10:\overline{10}|} - \frac{A^{1}_{[x+10]:\overline{10}|} * \ddot{a}'_{x+10:\overline{10}|}}{\ddot{a}_{[x+10]:\overline{10}|}} \right]}{\ddot{a}_{[x]:\overline{10}|}}$$

Conventional method

- the mortality/morbidity basis used is assumed not to change over time
- so the only data required are the select and ultimate mortality/morbidity tables used in original pricing basis

Present value of benefits in the extended period:

- for new policyholders: $S * A^{1}_{[x+10]:\overline{10}|}$
- for those who exercise the option: $S * A^{1}_{x+10:\overline{10}|}$

So present value of premiums in the extended period for those who exercise the option =

$$S * \frac{A^{1}_{[x+10]:\overline{10}|} * \ddot{a}_{x+10:\overline{10}|}}{\ddot{a}_{[x+10]:\overline{10}|}}$$

So cost of the option at expiry of the original term =

$$S * \left[A^{1}_{x+10:\overline{10}|} - \frac{A^{1}_{[x+10]:\overline{10}|} * \ddot{a}_{x+10:\overline{10}|}}{\ddot{a}_{[x+10]:\overline{10}|}} \right].$$

Option premium payable in addition to the premium of the original policy =

$$\frac{\frac{D_{x+10}}{D_{[x]}} * S * \left[A^{\ 1}_{x+10:\overline{10}|} - \frac{A^{\ 1}_{[x+10]:\overline{10}|}}{\ddot{a}_{[x+10]:\overline{10}|}} * \ddot{a}_{x+10:\overline{10}|} \right]}{\ddot{a}_{[x]:\overline{10}|}}.$$

3 (i)

- Maximum amount if all the risks are assumed to be fully correlated
- Sum all the capital requirement together = 1.5 + 2 + 5 + 1 + 3 = £12.5m
- Minimum amount if all the risks are assumed to be fully independent
- Square root of the sum of the squares of the capital requirement = $\sqrt{(1.5^2 + 2^2 + 5^{2\,+}\, 1^2 + 3^2)}$ = £6.4m

(ii) (a) All fully independent

	Market	Default	Insurance	Persistency	Operational
Market	1	0	0	0	0
Default	0	1	0	0	0
Insurance	0	0	1	0	0
Persistency	0	0	0	1	0
Operational	0	0	0	0	1

(b) All fully correlated

	Market	Default	Insurance	Persistency	Operational
Market	1	1	1	1	1
Default	1	1	1	1	1
Insurance	1	1	1	1	1
Persistency	1	1	1	1	1
Operational	1	1	1	1	1

(iii)

	Market	Default	Insurance	Persistency	Operational
Market	1.5×1×1.5	1.5×0.25×2	1.5×0.25×5	1.5×0.25×1	1.5×0.25×3
Default	2×0.25×1.5	2×1×2	2×0.3×5	2×0×1	2×0.3×3
Insurance	5×0.25×1.5	5×0.3×2	5×1×5	5×0.25×1	5×0.25×3
Persistency	1×0.25×1.5	1×0×2	1×0.25×5	1×1×1	1×0.5×3
Operational	3×0.25×1.5	3×0.3×2	3×0.25×5	3×0.5×1	3×1×3

	Market	Default	Insurance	Persistency	Operational	Sum
Market	2.25	0.75	1.875	0.375	1.125	6.375
Default	0.75	4	3	0	1.8	9.55
Insurance	1.875	3	25	1.25	3.75	34.875
Persistency	0.375	0	1.25	1	1.5	4.125
Operational	1.125	1.8	3.75	1.5	9	17.175

Sum (Sum) = £72.1m
Square root (72.1) = £8.49m

(iv) May regulate

- Volume of business
- Geographical location in which new business can be written
- Premium rates
- Pricing assumptions
- Commission structure
- Underwriting standard
- Type of business
- Product design
- Policy conditions
- Investment strategy/types of asset can be held
- Claims process
- Corporate governance
- Disclosure of financial positions
- Sales method/distribution channels
- Marketing methods/materials
- Treating customers fairly
- Fact finding of customers
- Quality of advice given to customers
- Minimum level of disclosure at point of sale
- Internal audit
- Independent review by external advisors
- Risk management framework
- Use of reinsurance (e.g. constraints on credit rating/location of reinsurer)
- IT systems and controls
- Mismatching reserves

The regulator may
- Approve/authorise individuals
- Approve/authorise firms
- Impose regulatory reporting requirements
- Require custodian for asset

4 (i) A case assessor would firstly consider the medical specialist's report (this might be a consultant or a surgeon).
This would provide information on the likely treatment of the medical condition for which the claim is being made.
The cost of similar procedures carried out previously (possibly by same surgeon/consultant in same hospital) would be investigated (allowing for levels of medical costs inflation if the information available is not current).
Hospital (medical centre) to be used – may have special arrangements or limits on payments.
Name of surgeon, consultant or other medical principal.
These will indicate the cost of the procedure itself
and the likely inpatient duration for accommodation costs.
The feasibility and cost of repatriation if the policyholder were taken ill abroad might also be investigated.

Would also need to know:
Policy coverage (full indemnity, any excess, limits, recuperation benefit etc.)
This would give information on the potential amounts of claim to which the insurer is exposed.
Age,
sex and
past claims history of claimant may have some bearing
Reinsurance considerations if calculating net

(ii) Additional reserves that might be considered for PMU business include:
- Unearned premium reserve (UPR)
- Incurred But Not Reported Reserve (IBNR)
- Incurred But Not Enough Reported Reserve (IBNER)
- Catastrophe Reserve
- Reserve for Claims in Transit (Reported, but not assessed or on the system)
- Claims Equalisation Reserve
- Unexpired Risk Reserve (URR)
- Additional Unexpired Risk Reserve (AURR)
- Premium Deficiency Reserves
- Guarantees/Options Reserve
- Claims Expense Reserve
- Other Expense Reserve
- Mismatching Reserve
- Contingency Reserve

(iii)

- Seasonality of claims
- Changes in underlying medical inflation trends
- Changes in underlying provider cost inflation
- Changes in the mix of business over time
- Medical advances affecting diagnosis/claim rates
- Medical advances affecting average cost of claims
- Single high-cost claims e.g. cancer claims
- Catastrophes, e.g. flu pandemics
- Options
- Guarantees
- Impact of reinsurance
- Economic/social environment
- Changes in state provision
- Product changes/changes in policy conditions
- Margins for uncertainty
- Effects of regulation
- Underwriting standards
- Claims management processes
- Purpose of reserves

5 (i) The underwriting process would be less intrusive to the prospective policyholder (e.g. the need to provide medical data, undergo tests, answer intrusive questions).
Makes purchase/commencement of policy quicker.
Possibly better annuity rates because of lower expenses.
More transparency.

By changing address I can vary my benefit – is that fair?
Benefit does not vary by state of health – is that fair? A person entering a care home will be in poor health or disabled.

(ii) Significant savings in the cost of the underwriting process if this method was adopted.
Easier sale as no underwriting.
No problem of checking medical data.

Anti-selection – the insurer will tend to pick up the better lives, especially if a rival insurer continues to underwrite on a case by case basis, producing less mortality profit for the insurer.
This variation in health status is not sufficiently allowed for in geographical rating.

The regulator may object.

Administration and underwriting systems will need to be changed.

(iii) (a)

- assumes that the impairment at outset will continue
- likely to be more suitable for the least severe medical conditions
- this approach is simplistic
- may not be appropriate at older ages as similar medical conditions may also affect a significant proportion of the standard annuitants

Possible medical conditions include

- diabetes
- hypertension
- Alzheimer's disease

(b)

- the loading is higher for younger ages
- likely to be more suitable for the more severe medical conditions
- but not the most severe types of medical condition
- medical conditions could include the less aggressive types of cancer
- or those that could be detected at an early stage

Possible medical conditions include

- prostate cancer
- breast cancer

(c)

- assumes high risk of mortality at outset will return to ultimate levels over time – suggest "kill or cure" type of medical condition
- likely to be suitable for the most severe medical conditions
- it is expected that a significant number of lives will die in the early years following diagnosis
- which leads to the additional loading to the portfolio reduce rapidly over time
- medical conditions could include the most aggressive types of cancer

Possible medical conditions include

- Stomach cancer
- Lung cancer
- Liver cancer
- Ovary cancer
- Leukaemia
- Stroke
- Organ transplants
- Replacement kidneys

6 (i) **Reinsurance contracts**

Scope: dates of commencement and (if appropriate) termination of arrangement
Type of treaty: original terms or risk premium, quota share or surplus or other
Scope: names of contracts to be included (different IP contracts)
Scope: territories of sale to be covered, residence of insured
Scope: maximum and minimum ages at entry/expiry to apply
Scope: maximum and minimum amounts of premium/sums insured to be covered
Scope: total maximum capacity
Scope: underwriting – limits on degree of policyholder impairment or occupational class to apply for automatic treaty inclusion
Underwriting authority: limits on premium size, benefit size which can be accepted without reference to reinsurer
Details of retentions and methods of calculation of sum reinsured and reinsurance commission
Rules for indexation of limits and other amounts
Administration requirements: frequency of accounts submission, detail of information, methods of submission, transmission of payments
Details of profit calculation (if appropriate) and method of sharing
Requirement of reinsurer inspection of insurer files
Alternative for facultative treatment of cases outside treaty scope
Service agreement (can be two-way) including response times
Arbitration agreement (in the event of dispute)
Legal jurisdiction of treaty
Procedure for changes to treaty terms (e.g. terminations)
Reviewable/guaranteed premiums
Appendices with schedules of premium rates (office or risk premium)
Signatures of persons capable of committing both parties
Availability and conditions of use of reinsurer software
Details of any financing reinsurance
Claims management and acceptance procedures

(ii) It is likely that XYZ would wish to review and amend the retention limits.
As it is a much larger company, it is likely that retention limits would be increased.
Similarly there may be a reduced need for financing arrangements.
XYZ may need additional finance (e.g. for solvency purposes or to fund a takeover)
If XYZ wishes to pursue international markets then the scope of treaty would need to be extended to cover overseas territories.
Retention limits may stay low for this new international business to reflect the lack of experience in this market.
XYZ might also wish to agree different general administration arrangements with the reinsurer.
XYZ may wish to renegotiate risk premium and higher volume limits.

7 (i) Protecting the nation's health – leading to improved productivity and growing GDP
Subsidising the poor – helping those unable to help themselves
Balancing the budget
Social culture / Political promises

(ii) Both protect nation's health – own occupation seems a better fit to ensuring productivity.
Subsidising the poor – benefit recognises that those with more severe incapacities will require higher levels of benefits.
Balancing the budget – depends on the detail, how much more benefit? What is the probability of being more severely incapacitated? Likely to be overall reduction though.
Social culture / political promise – again more socially acceptable to pay more to severely incapacitated individual but more people will now get less which might go against social expectations or political promises made in the past.
Lower benefits may encourage quicker return to work and hence help increase GDP.
Overall reduction may be inconsistent with political ideals.

(iii) Demand for products
Expect to increase as State paying less.
Expected to vary by product.
IP likely to be more demand as linked to employment.
May need to change/increase systems to deal with anticipated increase in volume of business and changes in lives covered.

Claims experience
The change in the replacement ratio will impact on IP.

Impact on product design
Changes in CI products unlikely but may consider changing definitions to be consistent with severe definition.
Changes in IP products are likely to be required to reflect the changes in benefits.

Existing IP claimants
May have to pay out more on existing policies if benefits are defined with a state benefit offset, and may not be able to increase prices/charges to cover this additional cost.

(iv) Model points should be set that reflect the expected future profile of new business.
Then the company needs to project its expected future cashflows, e.g. premiums, expenses, claims.
The cashflow projections should also take into account supervisory reserving requirements.

Also need to project forwards the expected levels of state benefit offset.

Due to the government proposal, this will require investigation and analysis of incapacitation rates based on ADLs as well as on "own occupation" tests.
The company will have to clarify or estimate the "significantly higher benefit" proposed for severely incapacitated lives.

A set of assumptions will be required to perform the profit test investigation; the starting point is likely to be best estimate.

Morbidity
Perform an analysis of own company experience over a suitable recent period 3–5 years may be suitable depending on volume of data – credible but homogeneous.
Split analysis into major different risk groups e.g. male/female, smoker/non-smoker, location.
Adjust data for other possible influences which will affect its immediate usage e.g. past changes in underwriting standards or claims management.
Allow for possible changes in base experience because of change in state provision – e.g. may take on different types of lives
Compare actual v expected
Compare own data with that from other sources over the same time period such as:

- Consultants' data
- Data from reinsurers
- Published tables based on insurance experience
- Population figures and government health statistics

Assess the adjustment needed to relate any published data, which may not be underwritten, to the particular circumstances of the company, its products and target market.
Analyse trends in experience by age, sex, by smoker status.
For IP, analyse claim inception and claim termination rates. If data permits, investigate by occupational classes and deferred period.
Investigate the availability and cost of reinsurance arrangement of various sorts e.g. risk premium, original terms.
May base premium terms on reinsurance rates, subject to the above analysis.
Need to investigate potential impact of AIDS/HIV
Need to include reserving basis among pricing assumptions, affecting cash flows.
Will probably use adjustments to a standard table, the adjustments derived from the above analysis.
Need to allow for deterioration also.

Mortality
Similar analysis to that for morbidity.
For IP, need to split pre-claim and in-claim mortality

Investment
Assess level of potential investment return on the assets backing this portfolio.
Include net of direct investment expenses.

Expenses
Start with company's most recent in-house expense analysis.
Inflate from experience investigation to date of use.
Allow for trends if this is an annual exercise.
Allow separately for acquisition (sales, marketing and underwriting), servicing and claims costs.
Claims costs will be split between initial claim validation and ongoing claim maintenance.
Split policy costs into those that are premium related and those that are per-policy.
Need to understand the extent to which specific one-off costs (e.g. establishment overheads) and expected additional costs (e.g. regulation) are to be costed against individual policies.
Degree of detail will depend on size of company and volume of expense information.
Inflation may need to be split between manpower costs, future equipment costs and others.
Projected inflation may possibly be measured as difference between government fixed-interest and index-linked securities.
Adopt consistency of assumptions between investment returns and expense inflation.
Allow for anticipated changes in new business volumes for spreading fixed costs.

Commission
Commission as paid. Load directly into premium basis.
May need some adjustment if there are volume-related overrides – thus dependent on new business forecasts.

Lapses
Analyse experience for IP products by duration.
Ensure appropriate to the distribution channel.
Further adjustment may be needed if past period of data collection was influenced by unusual economic circumstances, or any other abnormal historic situation.

Tax
Make suitable assumptions as to the insurer's current and future tax position.
Options and guarantees

Reinsurance costs

Profit
Include company profit criteria, commensurate with underlying risk of venture — risk discount rate, PVFP, pay back period.
Possibly increase risk loading in RDR to allow for greater uncertainty about the experience following the state benefit changes.

The premium rates should then be varied until the profit criterion is met.

Consider the extent of cross subsidies between model points, with a view to minimising new business mix risk.

Sensitivity analysis
Test the sensitivity of the final premiums to adjustments in the individual assumptions and refine inputs accordingly.

Competitors' rates
Research competitors' office premium rates to assess levels of new products – adjust assumptions then if deemed appropriate.

END OF EXAMINERS' REPORT