INSTITUTE AND FACULTY OF ACTUARIES

EXAMINERS' REPORT

September 2015

Subject ST1 – Health and 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.

The report is written based on the legislative and regulatory context pertaining to the date that the examination was set. Candidates should take into account the possibility that circumstances may have changed if using these reports for revision.

F Layton
Chairman of the Board of Examiners
December 2015

A. General comments on the *aims of this subject and how it is marked*

1. The aim of the Health and Care Specialist Technical subject is to instil in successful candidates the ability to apply, in simple situations, the principles of actuarial planning and control needed in health and care matters on sound financial lines.

2. 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.

B. General comments on *student performance in this diet of the examination*

Overall, the paper was of a fairly standard level and 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 2 and 4, were often 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 concentrate their revision in these areas.

C. Comparative pass rates for the past 3 years for this diet of examination

Year	*%*
September 2015	47
April 2015	45
September 2014	44
April 2014	43
September 2013	43
April 2013	47

Reasons for any significant change in pass rates in current diet to those in the past:

The pass rate for this examination diet is broadly in line with previous diets. Some variation in the pass rate between sessions is expected as different cohorts of students sit the examination.

Solutions

Q1 (i) Private medical insurance **(**PMI) is usually an indemnity-based product, i.e. it seeks to provide compensation for the cost of private medical treatment.

(ii) Cover is usually provided for acute types of treatments. In particular:

- It would usually cover hospital costs such as in-patient treatments, surgery, hospital accommodation and nursing.
- It would typically cover specialist fees.
- It may include cover for out-patient tests or treatments.
- It may provide cover for physiotherapy, radiotherapy etc.
- It may provide cover for private ambulance.
- It may provide accommodation for dependents.
- It may provide cover for recuperative care.
- It may provide overseas cover.
- It may cover alternative therapy treatments e.g. homeopathy and acupuncture.
- It may provide cash payments if in-patient treatment is provided by the State healthcare system.

(iii) It provides standard PMI benefits but only when the local public health service is unable to provide the treatment within a specified period (which is often six weeks) and within a reasonable radius of residence.

Premiums are lower than for full PMI.

(iv) There may be a lack of demand for waiting list plans or the product doesn't meet customers' needs.

There may have been high non-renewal rates.

More affluent customer base may prefer full PMI cover.

Feedback from sales team / distributors or a change of distribution method.

Following the actions of competitors.

The premiums for the waiting list plan may not be sufficiently cheap to attract enough sales and it is not possible to reduce the premium and still make an

adequate profit margin. Alternatively sales may have increased dramatically leading to capital strain.

Tax or regulatory changes may have made the waiting list plan less cost effective or government incentives may have made the full PMI more desirable to policyholders. The government may have banned waiting list plans.

There may have been bad publicity relating to waiting list plans. There could be reputational issues, e.g. if customer service were below standard due to understaffing.

Waiting times may have fallen significantly in the healthcare service which has reduced the attraction of the plans. Alternatively, State healthcare provision may have been withdrawn or severely restricted.

Difficulties in pricing waiting list plans e.g. due to lack of sufficient homogeneous data. Similarly, reserves held may have to have high margins e.g. due to uncertainty in experience, over time, between regions causing solvency/capital pressures.

There may have been poor claims experience from waiting list plans.

Anti-selection risk was too high with policyholders only buying waiting list plans in regions where the waiting list is long or choosing State treatment at hospitals with long waiting lists.

Change in mix of business sold such as increasing proportions of sales in regions where waiting lists are long.

Reinsurance may not be available at an acceptable cost for waiting list plans.

Administrative expenses of managing waiting list plans are much higher than for full PMI.

The product may have been deemed not to fit with overall business strategy; e.g. the insurer may want to focus more effort into the PMI business due to better deals from treatment providers / bulk discounts for commissioning more treatments

There may be PMI policies with other, cheaper variants, which may be taking business away from waiting list plans or which may be a better option for the insurer to concentrate on.

Many candidates scored well on this question. The first three parts were mainly bookwork. Most candidates provided abroad range of points in answer to part (iv).

Q2 (i) There may be material changes to the expenses that should be allocated to each policy due to:

Changes in the portfolio of business, for example:

- in the numbers of in-force policies which will be impacted by changes in persistency rates
- in the mix of business between IP and CI
- in the mix of business between group and individual
- in the mix of business by product (if different versions are offered)
- in the mix of business by distribution channel
- in the mix of business by single and regular premium
- in the mix of business by size of policy
- in the size of investment portfolio (which could impact investment expenses)
- in the numbers of claims (which impacts claim expenses per policy)

Changes in the underlying expenses incurred, for example:

- distribution costs may have changed
- underwriting costs may have changed due to changes in underwriting approach
- technology improvements may mean less costs involved in servicing e.g. introduction of tele-underwriting or expert underwriting systems
- changes in the initial claim validation approach (CI and IP) and ongoing claim maintenance approach (IP)
- changes in marketing costs, e.g. due to a new business drive
- changes in policy conditions requiring more, or less, management
- cost of dealing with lapses may have changed
- changes in regulatory/legal/compliance costs

- changes in the overhead costs of the business e.g. purchase of new offices, relocation of office, restructuring of the business, purchase of a new computer system

There may have been more, or fewer, claims disputes.

Past assumptions may have included an allowance for past development costs (e.g. in pricing assumptions) and these are no longer needed.

Administration or other functions may have been outsourced.

Changes in staff levels or in the additional benefits given to staff e.g. pension contribution levels.

Actual expense inflation may be different from the index used. In particular, salary costs may increase at a different rate from the price inflation rate used. The cost of medical tests (underwriting) may increase at a different rate from general prices. The index may lag actual inflation.

If expenses are changing materially, it may be insufficient to update the assumptions only annually

Commission payments to the distributors should not be treated in this way as they are typically expressed as a percentage of premium.

(ii) Pricing assumptions may be inappropriate. There is a risk that actual expenses are higher than the pricing assumptions so the company is making lower actual profits than intended and may even be writing business at a loss which could ultimately lead to insolvency.

For insurance intermediary business in particular, relatively low premiums may drive increased market share leading to even greater losses.
Very high volumes of new business could also lead to capital strain and administration strain.

There is a risk that actual expenses are lower than the pricing assumptions so the company may be writing business on a higher premium than is necessary. For insurance intermediary business, it could therefore be losing new business market share relative to competitors. With less new business, the fixed expenses are spread over fewer policies (reducing profitability). Intermediaries may encourage policyholders to lapse existing policies and take out policies with competitors.

For the tied agent business, there is a risk that the arrangement will have to be renegotiated (or may be lost) if terms are out of line with the best in the insurance intermediary market.

Expense assumptions (and therefore premiums) may be higher for some products/policies then they should be, and lower for others. This leads to

pricing cross-subsidies between policies and is likely to mean selling more of the policies which are less profitable and fewer of those which are more profitable in the insurance intermediary distribution channel.

Cross-subsidies also mean that the insurer is more exposed to changes in the underlying mix of business (new business mix risk)

Valuation assumptions may be inappropriate. So the company may be under-reserving which could lead to insolvency or the company using more capital on other projects than it can actually afford. Or the company may be over-reserving which could make the company appear weaker than it is. This could cause loss of sales in the insurance intermediary distribution channel and may result in a lower credit rating than should be the case and so higher borrowing costs.

Inappropriate supervisory reserving levels could lead to regulatory intervention and a possible fine.

Inappropriate reserving levels in accounts could lead to under- or over-statement of profit which could impact the share price of the company.

Mis-statement of reserves could lead to reputational damage.

There could also be an impact on tax.

Embedded value expense assumptions may be inappropriate e.g. expenses too low means over-statement of value of the company (or vice versa).

When restated, there will be loss of value which could result in a reduction in share price / reputational damage.

Overall, the board cannot make robust business decisions based on this data.

Many candidates scored well on part (i). On part (ii) candidates did not always put down a sufficiently wide range of points to gain a high score. Whilst many candidates discussed the consequences on new business and reserving of assuming higher or lower expenses in the pricing assumption than actually occurred, fewer candidates discussed the possible effects arising from cross subsidies, or the effect on embedded value calculations.

Q3 (i) (a) **Indemnity commission**

Indemnity commission is a type of initial commission.

It is a lump sum payment from the insurer to the distributor in respect of new business written.

It is typically expressed as a percentage of the first premium but may be expressed as a proportion of sum insured.

It indicates that the insurer is willing to pay the distributor commission in respect of premiums that the insurer has yet to receive.

It is earned over a defined earnings period which is normally stated in months.

(b) **Commission clawback**

Clawback is a process by which initial indemnified commission is reclaimed from a distributor if a policy lapses before the commission is fully earned (i.e. during the earnings period).

The extent of clawback is calculated by a formula specified in the commission agreement such as the proportion of the initial commission that the number of premiums actually paid bears to the number expected during the earnings period.

(c) **Level commission**

Every premium paid by the policyholder entitles the distributor to a proportion of that premium and this proportion is fixed at the same level throughout the policy term.

(d) **Renewal commission**

This is often paid where there is commission paid as a large initial amount (such as indemnity commission for regular premium business).

It is usually set at a lower level than the initial commission.

Renewal commission is normally payable for the balance of the policy term, in line with future premium payment. It may, for example, be paid annually after the end of the earnings period for contracts paying initial indemnified commission.

(ii) It provides a lump sum cash payment "up-front" which can be helpful to meet expenses incurred in advising the client (or other initial costs) without needing to borrow capital.

The distributor may need cash "up-front" to develop his/her business.

If the policyholder lapses, the distributor is likely to have received a higher overall commission payment than under a level commission arrangement. Depending on the clawback rules, this could even be the case if the policyholder lapses during the earnings period since the level of indemnity

commission is typically higher than the total of level commission over the earnings period.

It could better support the distributor in giving best advice.

It is attractive to distributors who are "hunters", i.e. those that attempt to sell one product only to a customer, rather than "farmers", i.e. those who believe in the value of a long-term relationship and building up a stream of recurring commissions.

(iii) Indemnity commission

Since the entire amount of indemnity commission is payable at the point when the business is written it does not directly form part of the cash flows in the calculation of reserves.

Commission clawback

Commission clawback will need to be allowed for in the cash flow projection in line with the formulae and indemnity term agreed between the insurer and the distributor.

As commission clawback is only payable from the distributor to the insurer if the underlying policy lapses, it will come through as a positive cash flow item and will be linked to the persistency assumption.

It will only be relevant for policies which are still in the earnings period.

Assumptions will also be needed in respect of the proportion of indemnity commission that is expected to be recovered from the distributor. This will be based on the actual experience specific to the different types of distributor. However, the insurer may alternatively decide not to reserve for commission clawback in order to be prudent (depending on the regulatory regime).

Level commission

Level commission will need to be allowed for directly in the cash flow projections as cash outflows. The allowance will be in line with the structure and term agreed for payment between the insurer and the distributor e.g. as a percentage of projected premium cashflows.

The projected cash flows will depend on the assumed rate of persistency.

Renewal commission

The initial amount is payable at the point when the business is written so doesn't directly form part of the cash flows in the calculations of reserves, otherwise the approach is the same as for level commission.

Although part (i) was bookwork, not all candidates scored well. Part (ii) was generally not well answered; for instance, the point that indemnity commission being payable at the point the business is written means that it does not directly form part of the cash flows in the reserve calculation was often not realised.

Q4 (i) These three illnesses constitute the majority of all cases of critical illnesses so the claim frequency of the remaining 26 conditions is relatively low, and there may be no major difference in the morbidity cost between covering all 29 conditions and only three conditions.

The majority of the remaining 26 conditions could lead to death within the survival period. Hence the reduction in morbidity cost is offset by an increase in mortality cost.

Expenses and commission may comprise a large proportion of the premium.

The administration expense component of the premium may be broadly unchanged.

Claims management expenses could be similar or higher.

Initial costs could be more expensive compared to the current product.

If the expected volume of sales of the new product is low it may be carrying a disproportionately high per policy expense loading in respect of fixed or overhead costs (offsetting the reduction in morbidity cost).

The commission component of the premium may also be unchanged. Alternatively, the insurer may aim to sell the product via a different distribution channel where the distribution costs are higher (offsetting the reduction in morbidity cost).

The terms and conditions may be different for the two products but result in similar prices.

Higher margins may be required for uncertainty e.g. potentially more claims disputes.

The target market could be different. Hence other assumptions, such as lapses, could be different (offsetting the reduction in morbidity cost). The new target market could have higher expected mortality/morbidity experience.

The price may reflect a decision to target a different profit margin.

(ii) **Positives:**

There may be a trend in the market towards simplified products.

The product should be easier for customers to understand.

Initial underwriting may be simpler.

Hence it may result in more customer interest and higher sales.

If competitors are not already offering such a product, it may be an opportunity to demonstrate innovation and gain market share.

The product may be easier to advertise, as it is simpler.

The three critical illnesses covered are the ones which customers are likely to feel they most wish to protect against.

Recent cases of cancer and strokes in celebrities may result in a higher demand for such a product.

It may be possible to distribute the simplified product directly/online rather than by advisers.

Negatives:

The very low difference in price may be difficult to justify.

The product may be viewed as over-priced given the narrow coverage.

The product may not be viewed as providing a comprehensive benefit (e.g.no payment on TPD) and hence may not be viewed as meeting customer needs.

Advisers may not be able to recommend the product given that for only an increase in premium of 5% customers would be covered for a wider range of other illnesses and anyone particularly concerned about contracting one of the other 26 critical illnesses won't want the simplified policy.

There may be restrictions on calling the new product a critical illness insurance product as there may be regulations that forbid using the name, unless certain illnesses are covered. There may be other regulatory restrictions that would apply to offering this type of product which would reduce its potential marketability and attractiveness.

The company may not wish to incur the additional costs of setting up a new (and more appropriate) distribution channel e.g. online.

Competitors may be already offering such a product so the company may be too late into the market to gain any market share.

Offering two similar products may lead to confusion making the product difficult to sell.

This question involved applying knowledge to a specific scenario and was generally well answered,

In part (ii) few candidates suggested that there might be restrictions on calling the new product a critical illness insurance or other regulatory restrictions or the possible confusion in offering two similar products.

Q5 (i) Model risk is the risk that the model chosen to represent future morbidity is not appropriate or that it contains errors.

Parameter risk is the risk that the parameter estimates used in the model may not adequately reflect the future experience of the class of lives insured even though the underlying model may be appropriate.

Random fluctuations risk is the risk that the actual future experience may not correspond with the model and parameters adopted (or the risk of unavoidable random statistical fluctuations that occurs in any stochastic process) even if the insurer has chosen a model that is totally accurate and has accurately estimated the parameters of the distribution under that model.

(ii) **Model risk**

In the context of morbidity assumptions, the "model" would typically refer to a probability distribution or projection approach chosen to model the future morbidity rates since it is necessary to project claim inception rates forward through the prefunding period which can be significant (e.g. benefits paid in an insured's 80s and 90s, originally purchased in that person's 40s and 50s).

The projection is complicated because long term claims arise as a result of many factors, including benefit eligibility triggers, policyholder behaviour and the willingness of family members to provide care-giving support.

The potential impact of medical advances needs to be allowed for in the model, which is difficult; in particular, projections of improvements to treatments and care standards which could extend life whilst in residential care.

Morbidity rates can be correlated to persistency rates (anti-selective lapses) and to mortality rates so the pricing model needs to allow for these correlations appropriately.

Different models are required for claim inception rates and claim termination (normally by death) rates which increases the complexity of the modelling and the scope for error. There are also interactions between claim incidence and claim continuance which are complex and may not be modelled accurately. For example, claim incidence can move in the same or opposite direction to claim continuance, depending on the drivers of the changes e.g. an increase in the rate of Alzheimer's disease can lead to an increase in LTCI claim incidence and average claim duration, while an improvement in active life mortality can lead to more insureds reaching older ages at which more long-term care services are needed.

Model risk can arise due to under-specification of the model, i.e. when a model is over-simplified. For example, morbidity rates that are independent of age. It can arise due to over-specification, i.e. too much complexity or too many parameters.

This becomes problematic if the model has to be fitted to non-statistically credible or irrelevant data. Or there may be over-extrapolation (e.g. linear extrapolation when not appropriate).

The underlying structure of the model chosen might be incorrect.

There is no single accepted model for long term care morbidity rates.

Parameter risk

Parameters may be based on historic data. If so, this may not be relevant, since it is obtained from conditions different from the period to which the estimates will be applied. For example, it will not allow for medical advances. Historical data is a set of observations that is only one realisation out of an infinite range of "might have been" scenarios. As a result, it is subject to random sampling error.

There may be data errors.

There may be non-homogeneity of morbidity risks that are not intuitively obvious.

There may be different characteristics or behaviour between cohorts or generations.

There may have been changes in the composition of insureds covered by LTCI over time; for example, caused by coverage of different market segments / target markets, different distribution channels, changes in underwriting rules,

different risk classification groupings applied or due to changes in the product design or terms and conditions.

There is unlikely to be sufficient quantity of data for this insurer to base the estimates on own experience, particularly if the experience has to be separated (due to heterogeneity) and it is particularly unlikely that there is sufficient quantity for the parameters to be set to reflect all relevant risk factors.

It is not clear how long the insurer has been writing LTCI business; it may be that it has not even started to pay claims yet

If the parameters are instead based on industry experience, this could vary from the insurer's own experience due to differences in the factors as above. Alternatively, population data may have to be used which is even less likely to be relevant.

The adjustments made to allow for the lack of relevance may be inaccurate.

Changes in future experience will differ from changes that have occurred in the past.

For example, due to changes in legislation, in the State approach to long term care provision and assistance, in social attitudes or in the relative prevalence of particular disabilities, e.g. lower disabled life recovery rates as a result of a greater percentage of claims due to mental or cognitive conditions than anticipated, greater claim incidence because of greater supply of home care support or assisted living facilities, a cure for Alzheimer's disease being found, new government care programs.

A long period is required to study whether any parameter demonstrates a trend occurring.

(iii) This depends on the number of relatively homogeneous but independent risks. As the number of risks increases, the random fluctuations risk reduces. However, as there are likely to be only a few thousand policies in-force spread over different age groups and rating groups etc. the statistical risk will be significant for this insurer.

The risk is also significant because of the general lack of statistical credibility and relevant experience available for morbidity and there may be unforeseen and random external events that influence morbidity. Additionally there is stochastic uncertainty within the relationships between factors that affect experience.

Part (i) was generally well answered. However, only a few candidates provided a broad range of points in answer to part (ii). Similarly only the better candidates provided a range of points in answer to part (iii).

Q6 (i) (a) The period of incapacity before any benefit is paid.

(b) The ratio of (in benefit) income to pre-disability income. These can be net or gross of tax and may be adjusted for State benefits or similar.

A value of less than one is desirable from the insurer's viewpoint.

(c) A benefit which may be provided to people who are not in paid employment

usually for an amount lower than that which would be payable on incapacity for someone in employment.

The definition of incapacity usually changes to require confinement to the house (this may be extended to include a medical institution) or being unable to go outdoors without assistance or the inability to perform certain activities of daily living (ADLs).

(d) A reduced benefit paid to a claimant if he or she takes up employment in an occupation that is different from the one from which he or she was originally incapacitated. The reduction relates to the ratio that the gross earnings from the new job bear to those from the occupation against which disability was being claimed.

(e) A benefit payable when a claimant is no longer totally unable to follow his or her original occupation and returns to it in a reduced capacity. The amount of benefit is usually calculated in the same way as that for proportionate benefit.

It can also describe the process of counselling, whereby disability counsellors assist disabled persons with advice on practical matters to do with the benefit and their disability, in order to aid a return to work.

(ii)

	Ms A	*Mr B*	*Ms C*
Benefit at incapacity = original benefit × 1.05^n (where n = 1, 0 and 2 respectively)	315.00	200.00	551.25
Salary at incapacity (net) (given)	600.00	300.00	400.00
Max benefit payable based on replacement ratio = lower of benefit at incapacity and 0.6 × salary at incapacity	315.00	180.00	240.00
State benefit (given)	0.00	50.00	50.00
Max benefit payable when State benefit being paid = max benefit from above – State benefit	315.00	130.00	190.00
Proportionate benefit = max benefit payable (ignoring State benefit) × {1 – new salary/original salary}	157.50	0.00	60.00

Ms A	between 1/2/13 and 1/6/15	315 pm is paid
	from 1/6/15	157.50 pm is paid
Mr B	between 1/2/13 and 1/6/13	180 pm is paid
	from 1/6/13	130 pm is paid
Ms C	between 1/4/13 and 1/5/13	240 pm is paid
	between 1/5/13 and 1/6/14	190 pm is paid
	between 1/6/14 and 1/6/15	60 pm is paid

Part (i), which was bookwork, was generally well answered, although many candidates assumed that unemployment benefit in the context of income protection insurance was a benefit payable when someone became unemployed, which it is not. Some candidates assumed that a proportionate benefit would be payable on return to the original occupation, whereas it is paid if a claimant takes up employment in an occupation different to the one in which they were originally incapacitated. A return to the original occupation, but in a reduced role, would result in a rehabilitation benefit.

Many candidates scored well in part (ii) although some candidates did not apply the increases in benefit level correctly (these are only applied whilst a claim was not in payment or had been notified). Similarly some candidates did not apply the deduction for payment of State benefit correctly. Only the better candidates calculated the rehabilitation payments correctly. Credit was given in cases where the candidate provide the correct payment periods, even if they had calculated the monthly amount payable incorrectly.

END OF EXAMINERS' REPORT