

INSTITUTE AND FACULTY OF ACTUARIES

EXAM SOLUTIONS

Specimen 2019

**Subject SA1 – Health and Care
Specialist Advanced**

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

1. The aim of the Health and Care Specialist Applications subject is to instil in the successful candidates the ability to apply knowledge of the health and care environment and the principles of actuarial practice to the provision of health and care benefits.
2. Candidates who approach the questions, especially the more substantial elements of each question, in a methodical and detailed manner are far more likely to pass the subject. Candidates will gain few marks if they do not address the question asked but merely write around the topic of the question. 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.
3. It is often helpful to use subheadings when answering long part questions.
4. Candidates who give well-reasoned points, not in the marking schedule, are awarded marks for doing so.

B. General comments on the Specimen 2019 paper

1. The Specimen 2019 was based on the following previous SA1 questions:
 - Q1 is Q1 April 2014
 - Q2 is based on part of Q2 September 2014
 - Q3 is Q3 April 2015
 - Q4 is Q3 September 2014

C. Pass Mark

The Pass Mark for this exam was 60.

1 (i) Need for cover

- ½ There is generally a very low awareness of the IP product amongst consumers.
- ½ People do not understand it, and its features and benefits and hence are unlikely to go to the website proactively to buy.

Complexity

- ½ The terms and conditions of the product are complex, and may be very difficult to understand.
- ½ For example, there are complex restrictions on the sum insured in relation to income and salary to avoid over-insurance, restricting the amount of benefit available.
- ½ In particular, this can be highly complex for the self-employed or people with many sources of income.
- 1 The cover has complex interactions with employer provided benefits and State benefits for long term sickness. If misunderstood, this can lead to over-insurance and hence restriction of benefits at claim stage.
- ½ Hence it may be better to use a distribution channel that offers advice.

Underwriting

- ½ Financial underwriting needs to be performed.
- ½ Health underwriting can be complex and take a long time so the insurer may need to simplify the underwriting procedure.
- ½ Customers are unlikely to understand the initial underwriting stages of the process; for example, the use of exclusions.
- ½ There may be a greater risk of non-disclosure.
- ½ Underwriting at the claim stage may also be difficult for the customers to understand.
- ½ Misunderstandings can lead to ombudsman rulings, lawsuits and reputational damage.
- ½ The insurer may not be able to obtain reinsurance at affordable rates or at all.

Product design

- ½ There is a wide variety of products which are not directly comparable between companies.
- ½ Some products offer additional services, e.g. rehabilitation services.
- ½ It can be difficult to assess which one best meets customer needs.
- ½ Similarly the customer has to make a variety of choices, for example occupational claim definition (e.g. own v. any), deferred period, waiting period.

- ½ Customers are unlikely to understand these, and may choose something that is not optimal for their circumstances leading to accusations of mis-selling or problems with Treating Customers Fairly.

Price

- ½ The product tends to be expensive and therefore needs to be sold, rather than customers proactively buying it.
- ½ Small changes to the product, for example change of deferred period, can lead to large changes in price (and customers are unlikely to understand that).

Market coverage

- ½ Most providers do not offer the product directly hence the customers would struggle to compare the products and make the best choice.

[Max 8]

(ii)

- ½ The insurer could simplify the application form.
- ½ Underwriting could be simplified,
 - ½ for example by declining more customers rather than assessing special terms,
 - ½ introducing some initial predictive/automated underwriting
 - ½ e.g. based on answer to one question, choose which question next to ask.
- ½ Have basic financial underwriting at application stage only or make further restrictions and automated checks on income and salary to avoid over-insurance.
- ½ The product could be simplified, for example by reducing or eliminating choices available to the policyholder such as deferred periods, waiting periods or claim definition.
- ½ The insurer could offer only a basic limited benefit / budget plan version of the product.
- ½ The terms and conditions could be simplified by using plainer language, to be more easily understood.

- ½ An educational campaign could be run to improve understanding of the product and raise brand awareness.
- ½ A telephone advice team could be created that could answer questions.
- ½ Automatic referral to an advisor/ broker if the benefit requested exceeds a certain level could be instated.

[Max 5]

- (iii) Age
Basic lifestyle question e.g. smoker status
Amount of drinking
Hazardous pursuits (or suitable alternatives)
Location
Employment status
Occupation
Current income including salary
Single / joint life policy
Sum insured
Claim type (own/any occupation)
Deferred period
Waiting period
Basic underwriting questions on health status e.g. family history
Own medical history
Pre-existing conditions (or other alternatives)
Premium payment frequency
Term of policy/retirement age

¼ mark for each point

[Max 3]

(iv)

- ½ This could encourage buying based on price and not on need, leading to higher lapses or reputational risks if mis-sold.
- ½ This could lead to lower future new business.
- ½ This could introduce price pressures in the market to offer the lowest price to generate sales which might reduce profit margins and could even make products loss making.
- ½ If the company aims to offer the best service to consumers or better terms and conditions it may lose out as the website may not fully reflect the terms and conditions of the product or make clear all of the additional features provided.

- ½ This may lead to misleading comparisons and the customer may not have purchased the best available product.
- ½ Hence there are risks of accusations of mis-selling which can lead to ombudsman claims / lawsuits / regulatory fines.

- ½ There will be additional operational risks; for example internal systems and external website systems need to be compatible, and be able to “talk to” each other.
- ½ There may be additional risks relating to data security.
- ½ There is a risk that the data captured by the comparison site is not sufficiently detailed or accurate.
- ½ There is a risk that premiums change upon asking additional questions, etc.
- 1 There is a risk of selling higher than expected additional new business through the comparison site channel (compared with what would have sold directly anyway) with consequent implications for admin capacity and/or capital strain.

- 1 There is also a risk of selling lower than expected additional new business through the comparison site channel (compared with what would have sold directly anyway) so the initial costs/investments of setting up the arrangement may not be recouped e.g. costs to set up system links, etc.

- ½ There is an expense risk arising of greater than expected increases in the charges levied by the price comparison website.

- 1 There is additional counterparty risk arising from reliance on the third party comparison site e.g. counterparty IT issues leading to a loss of sales and related reputational risk from association with the comparison websites if they gain bad publicity (e.g. from sales of other types of insurance).

- ½ The insurance risks may differ if the target market (e.g. by socio-economic group) differs between those using comparison websites and those who would go direct to an insurer.

- ½ There may be an increased risk of non-disclosure if customers perceive the comparison sites to be relatively detached from the insurance company.

[Max 8]

[Total 24]

- 2** (i)
- 1 The best estimate liability is the present value of expected future cashflows discounted using a yield curve (i.e. term dependent rates) based on “risk-free” rates.
- 1 These future cashflows will be the expected future claim payments plus expenses less premiums for current healthy lives and claims in payment for those claiming or in the process of claiming.
- ½ All assumptions should be best estimate, with no prudential margins.
- ½ The projections should allow for all expected decrements (e.g. mortality) and policyholder actions, including lapses.
- ½ Lapses may vary according to the economic scenario if a simulation approach is used.
- ½ The key assumptions will be future expected claim inception rates and claim durations or claim termination rates.
- ½ The assumptions should take into account expected future changes in health status.
- ½ Insurance companies must take into account all relevant available data, (both internal and external) when arriving at assumptions that best reflect the characteristics of the underlying insurance portfolio.
- ½ In particular, the morbidity assumptions should be appropriate to the features of the underlying portfolio such as socio-economic status, occupation.
- ½ The morbidity assumptions should also take into account the possibility of anti-selection, including the impact of selective lapsing.
- ½ External data (e.g. from reinsurers) may be used to help set these assumptions.
- ½ Future premiums can be taken into account up to the “contract boundary”,
½ which is broadly defined as the point at which a company can unilaterally terminate the contract, refuse to accept a premium or change the premiums or benefits in such a way that they fully reflect the risks.
- ½ For income protection business this would mean the maturity or expiry date of the contract if written on guaranteed terms.
- ½ However, if the premiums or benefits are reviewable so that they fully reflect the risks, then the insurer will need to consider carefully whether the contract boundary is in fact an earlier date.
- ½ Allowance for future expenses needs to take into account both overheads and directly attributable expenses and future expense inflation.
- ½ No closure reserve is required.

- ½ Assumptions will also be required for future rates of inflation to the extent that benefits or premiums are indexed.
- ½ Such assumptions should be “market consistent” and consistent with the expense inflation assumptions.

- ½ Contractual options and guarantees and take up rate assumptions need to be allowed for, e.g. if there is an increase option written into the contract.
- ½ For some of these, a market consistent simulation or stochastic analysis may be the most appropriate calculation approach although a deterministic approach could be acceptable depending on the risks involved and the materiality.

- 1 The discount rates should be set using market-based “risk-free” observed rates such as swap rates or government bond yield curves which may then need to be adjusted to allow for credit risk (e.g. a deduction from swap rates).

- 1 It is also noted that the method used to determine the discount rate needs to be consistent between different currencies including those without an active government bond or swap market or where the market is not active for as long a duration as the liabilities.

- ½ It may be possible to adjust (increase) the discount rate to allow for the illiquidity premium within assets held such as corporate bonds.
- ½ However, for income protection business it may be challenging to demonstrate sufficiently close matching of future liability and asset cashflows.

- ½ The cashflow projections should ideally be performed on a policy by policy basis.
- ½ However, approximations are permitted and grouped model points can be used (provided certain conditions are met).

- ½ Recoveries expected from a reinsurer are shown as an asset in the balance sheet, so the liabilities should not be reduced to take account of any reinsurance held.

- ½ Appropriate allowance needs to be made for taxation.

[Max 13]

(ii)

- ½ The risk margin would be determined using the “cost of capital” method.
- ½ It is based on the cost of holding capital to support those risks that cannot be hedged in financial markets, which for this product would include:
 - ½ Insurance risk – particularly morbidity risk
 - ½ Operational risk

- ½ Reinsurance credit risk (if applicable)

- ½ It is unlikely for this product that there will be any “residual market risk” associated...
- ½ and so no need to hold a risk margin for that element.

- ½ The company will first need to identify the capital that it is required to hold within the SCR for the insurance and operational (and reinsurance credit, if applicable) risks.
- ½ Allowance for diversification between the risk types can be made.

- ½ The company will project this subset of the SCR forward each year
- ½ for the whole period of run-off of the existing book.
- ½ These projected capital amounts are then multiplied by a cost of capital rate.
- ½ For Solvency II it is currently proposed that this is a fixed rate of 6% per annum.
- ½ The product of the cost of capital rate and the capital requirement at each future projection point is then discounted using risk-free rates to give the overall risk margin.

- ½ Since the projection of the SCR is potentially complex, various simplified approaches can be used.
- ½ This could involve selecting a driver which has an approximately linear relationship with the required capital or its components.
- ½ For example, the morbidity risk could use the expected claim amounts as a driver, the expense risk might use policy count, and the operational risk could more simply use total reserves.

- ½ The initial capital requirement can be expressed as a percentage of that driver, and the projected capital is then approximated as the same percentage of the projected values of the driver.
- ½ In practice, more sophisticated methods using a combination of drivers and correlations may have to be used.

- ½ The risk margin for operational risk may be assessed at company level rather than being allocated directly to this product.

- ½ The risk margin for the product may be reduced to take into account any diversification that there might be between other lines of business that the company might be writing.
- ½ For example, the diversification benefit might be apportioned according to the (subset of) SCR used at the start of the risk margin projection.

- ½ However, the implication here is that this insurer is not well diversified across product lines and so diversification potential may be limited.

[Max 8]
[Total 21]

- 3** (i)
- ½ The experience difference by birth month is not significant.
 - ½ It is vastly outweighed by the differences that correspond to the existing rating factors used.
 - ½ It would not have a significant impact on premiums.
 - ½ It is a proxy (alternative) to other rating factors already used.
 - ½ It is not expected to have a significant impact on business volumes e.g. materiality.
 - ½ Management may not believe the results of the analysis or the volume of data on which the analysis was based was not credible.
 - ½ It may have been a temporary phenomenon that is not expected to continue in future.
 - ½ The company wants to see some more experience coming through before considering implementing this change.
 - 1 The company cannot justify the investment based on the return/profit it will generate i.e. costs incurred due to changes to admin systems and changes to process (pricing, underwriting) and additional queries that people have as a result of this (or the need to do additional training of customer services).
 - ½ The company has other priorities/preferred uses of capital or not enough resources/capital to implement this.
 - ½ It may be difficult to explain / justify this differentiation to policyholders.
 - ½ Customers or distributors may see this as a marketing stunt which could discredit the company (reputational damage).

- ½ The company may be of the view that using this as a rating factor may be outlawed by the regulator in the future.
- ½ Other competitors in the market have said they are not going to make the change/ wait to see what other competitors do.
- ½ The company took advice from a reinsurer, which recommended not to include it.

[Max 6]

(ii) **Reputational risk:**

- ½ There is a risk of reputational damage e.g. the company may be seen as lagging behind a major competitor...
- ½ ...or because some policyholders may feel that they have not been treated fairly (if they were born in a month with low claims experience).

Claims experience and anti-selection risks:

- ½ If ABC does not change its own premiums, then on average ABC's premium may be more expensive than those of the competitor for people born in the lower risk months, and cheaper for higher risk months.
- ½ It is therefore more likely to attract more people born in the higher risk months and fewer in the lower risk months.
- ½ This is a type of anti-selection.
- ½ The situation may be exacerbated by the actions of distributors.
- ½ Claims experience is therefore likely to deteriorate, leading to lower profits or the need to increase premium rates for all lives which will exacerbate the anti-selection issue.
- ½ There may be an impact on the availability or cost of reinsurance.

Data risk

- ½ It may be harder to price the changed experience.

New business and persistency risks:

- ½ As there is effectively some cross-subsidy between premium rates if month of birth is not allowed for, there is new business mix risk (as described above).
- ½ Depending on how the competitor sets (and markets) the new premium rates, new business volumes may reduce overall.

- ½ Lapses may increase and this may be selective i.e. more likely that those born in the lower risk months would lapse.
- ½ There is a risk of not being able to cover cost overheads due to lower new business and in-force volumes.
- ½ The extent of the risk to the company will also depend on how many other competitors implement this change.

[Max 6]

(iii)

- ½ Increase premiums to reflect the potential higher claim costs due to anti-selection (i.e. the risk cost of higher risk birth months).
- ½ Monitor experience and reprice regularly.
- ½ Monitor competitors' premiums.
- ½ Increase reserves if allowed to.
- ½ Reduce premiums in order to prevent loss of business (or sell as a loss leader).
- ½ Reduce expenses e.g. through cost efficiencies / outsourcing or reduce claim cost e.g. renegotiate provider arrangements to enable offering the same cover at lower cost to all customers.
- ½ Offer discounts when bought together with other policies (e.g. CI or IP).
- ½ Ensure that customer service is better than that of the main competitors.
- ½ Improve claims processing efficiency and simplicity.
- ½ Improve new business processing efficiency and simplicity.
- ½ Improve underwriting efficiency and simplicity.
- ½ Increase overall marketing specifically to the desired target market (i.e. lower cost birth months).
- ½ Improve brand awareness e.g. through sponsorship.
- ½ Give away incentives or “freebies”.
- ½ Improve the overall product offering and appeal e.g. the range of conditions and treatments covered, limits and excesses, helpline services, deals with hospitals that are desirable to policyholders.
- ½ Set up a customer retention team.
- ½ Introduce no claims discount.
- ½ Create a cheaper and simpler product.
- ½ Ensure that the company has good relationships with distributors and pays them a competitive remuneration. Alternatively may consider changing the distribution channel.
- ½ Use other rating factors which may be better drivers / indicators of expected claim experience.
- ½ A reinsurer may be used to access technical assistance on pricing.

- ½ The company might switch to selling more group PMI or stop selling the product completely.

[Max 8]

[Total 20]

4 (i)

- ½ This critical illness is suitable for inclusion in the critical illness policy.

- ½ It is considered to be “severe”, so will have a very material impact on the life of the individual.

- ½ Since the claim cost is estimated to be around 2.5%, the inclusion of the definition is likely to cover a significant number of claims.

- ½ The illness looks to be well defined and is measurable when an appropriate level of the specific enzyme is met.

- ½ The existence of the enzyme is the current method of diagnosing Dalgaard Syndrome.

- ½ however, should medical diagnosis of Dalgaard Syndrome change then there could be difficulties in the future with diagnosis.

- ½ There is a need to consider if the disease is hereditary (which could provide scope for anti-selection).

- ½ There seems to be sufficient data available on which to price it.

- ½ The company will need to ensure clarity of the definition of the disease in the sales literature and technical policy wording - specifically about what is, and is not, covered.

- ½ It could potentially be temporary or curable and hence generate too many windfalls.

[Max 3]

(ii)

- ½ The impact on pricing model/cashflows will be:

- ½ Premiums: 0.5% higher
- ½ Claims: 2.5% higher
- ½ This will be due to higher numbers of claims, not to a change in the amounts paid per claim

- ½ Commission payments: 0.5% higher (assuming this is expressed as a proportion of premium) for both initial and renewal commissions.
- ½ Claw back of commission: 0.5% higher, offsetting in part the higher commission.

- ½ Other premium related expenses: higher e.g. sales consultant credit or higher premiums resulting in increased medical underwriting.

- ½ Claim expenses: higher since the number of claims will increase.

- ½ Other expenses (i.e. per policy): likely to be unchanged.

- ½ Reserves: increased to cover higher frequency of claims given that the expected increase in claim costs exceeds the expected increase in future premiums.
- ½ In the first month the higher initial reserves will reduce profit. But in later projection periods there will be an increase in the release of the reserves.
- ½ The solvency margin will be similarly affected.

- ½ Investment income: higher mainly due to the higher reserves.

- ½ Slightly fewer policies continuing due to increased claim frequency, so very small reduction in mortality profits (no change to assumed mortality) and similarly for lapses (no change to assumed persistency).

- ½ Reinsurance premiums: 2.5% higher.
- ½ Reinsurance recoveries: higher due to the expected increased claim frequency.

- ½ Tax on profits: the overall impact will depend on the various expense, claims and premium impacts but profits would generally be expected to reduce.
- ½ Hence tax also reduces.

- ½ Overall pricing model profit: the increase in premium is unlikely to offset the increase in claims and in reinsurance costs....

- ½so a significant reduction in profitability from the pricing model would be expected.

- ½ The payback period would be expected to be increased and the IRR (internal rate of return) reduced.

- ½ The actual profit arising will depend on new business volumes.
- ½ If the change attracts higher business volumes, overall profit could even be increased (or vice versa).

- ½ The actual profit arising also depends on the experience relative to the pricing assumptions, for example:
 - ½ Additional expenses incurred in the development of the product
 - ½ Lower per policy expenses if business volumes increase significantly (or vice versa)
 - ½ Lower lapses due to additional coverage
 - ½ Higher/lower claim rates if the initial analysis proves to be inaccurate.

[Max 10]

(iii)

- ½ The increase in premium rates will reduce the price competitiveness of the product.
- ½ However, the additional benefits will make the product more attractive and this is likely to more than compensate for the price rise.

- ½ The company needs to consider whether doctors accept the validity of the test and/or do they carry out the test routinely.

- ½ If the market accepts the coverage of Dalgaard Syndrome as a material risk for customers then product marketability will increase, leading to an increase in sales (and vice versa).

- ½ The company should investigate the market and see whether any competitors are covering this critical illness.
- ½ If not, the company could have a niche product that is more attractive, although competitors may then follow.
- ½ If competitors already cover this illness, the company may need to include it in order to stay competitive.
- ½ In either case, the views of distributors may be sought.

- ½ If sales increase too rapidly then this will put stresses on new business systems, perhaps leading to backlogs in processing.
- ½ Pressures on underwriters may lead to delayed acceptances.

- ½ Overall this could damage the company's reputation (e.g. through unclear policy wording) which could then have a negative impact on future sales.
- ½ The new product has higher reserves than the current product and reserves may also be increased due to higher prudential margins to reflect greater uncertainty about future experience.
- ½ So more capital is needed to write the same level of new business.

- ½ If the new product sales are materially increased then even more capital will be required.
- ½ If capital is limited this could become an issue.
- ½ It could even result in new business being stopped partway through the year.
- ½ This could also result in significant reputational damage.

- ½ Administrative processes and systems need to be changed and staff and distributor training will be required.
- ½ Also, policy and marketing literature will need to be rewritten.
- ½ These changes will all incur costs.
- ½ The company needs to consider whether it will sell sufficient additional new business to recoup these development costs.

- ½ The company needs to consider the potential for anti-selection risk and non-disclosure risk from those most likely to develop Dalgaard Syndrome.
- ½ It may have to consider making changes to its underwriting process and/or its underwriters.
- ½ However, the development or recruitment of underwriters will take many months.
- ½ Third party organisations could be used but the company would need to ensure that the company's underwriting policy is applied correctly.

- ½ Policyholders with policies written recently without the Dalgaard Syndrome may decide to lapse and re-enter with the new product resulting in losses for the company and increased administration.
- ½ The company could investigate offering existing policies the new benefits for an increased premium.

- ½ The company could investigate whether another reinsurer could offer better rates.

- ½ Including a new critical illness for which there is no historic experience increases the risks to the company.
- ½ The company will need to monitor actual claims experience closely and then re-price as appropriate.

- ½ The mix of new business may change as a result of the inclusion of this new critical illness.

- ½ Other considerations would include:
 - ½ Any regulatory constraints on including this illness e.g. gender equality legislation.
 - ½ Shareholders' views/impact on share price.
 - ½ Fit with corporate strategy - whether high margin or loss leader.
 - ½ Consistency with other products (e.g. any accelerated critical illness products sold).
 - ½ Whether there are better uses of the capital.

[Max 12]

(iv)

- ½ Need to understand the reason for the suggestion.

- ½ The increase in sum insured would increase business volume.
- ½ However, it would result in coverage of extremely large individual risks which could result in volatile company earnings.
- ½ This could have a negative impact on the share price.
- ½ It could even threaten the solvency of the company, unless the reinsurance cover could be extended to these levels.

- ½ The company would consider whether existing policyholders would be able to increase their sums insured.

- ½ The underwriting of the high sum insured cases is much more onerous and specialised as the risk of anti-selection is heightened.
- ½ Robust and detailed financial underwriting is required to avoid windfall opportunities.

- ½ Claims approval is also more onerous and there is an increased risk of fraudulent claims.
- ½ Hence if the number of applications for such cases was material, it may lead to processing delays and knock-on effects on the processing of other policies.

- ½ The reinsurer might be able to provide technical assistance (and control) in the areas of underwriting, claims approval and claims monitoring for these risks.

- ½ Such reinsurances can be arranged on a facultative or treaty basis depending upon circumstances.

- ½ Surplus or excess of loss treaty reinsurance would likely be used here.
- ½ Reinsurance can also assist with the financing of the business as the solvency requirements are normally reduced in line with the proportion ceded, though this may be subject to an upper limit.

- ½ The £10 million sum insured limit may well be in excess of what any reinsurer (or even a group of reinsurers) will accept and so a lower level may have to apply.
- ½ For a particular life insured the reinsurer will also look at the total sum at risk across all the business that it is exposed to on this life and may impose a lower limit.

- ½ For underwriting, and particularly for claims, the reinsurer (having the bulk of the risk) will have control over the acceptance of such claims.

- ½ The company should consider how many such high sum insured applications are likely to arise.
- ½ Have there been any social, demographic or economic trends which might lead to a demand for higher sums insured (e.g. how much individuals can borrow for mortgages, high inflation).

- ½ The product might be bought as Keyman CI requiring a high sum assured.

- ½ A different distribution channel might be needed to reach this different target market.
- ½ The level of anti-selection risk is dependent on distribution channel (e.g. using brokers might exacerbate anti-selection).

- ½ It should balance the possible additional profits from this business against the additional costs of implementation, such as system changes and greater underwriting costs.

- ½ It could consider the limits imposed by competitors.

- ½ It needs to ensure that it has sufficient capital to cover any new business strain from writing such large contracts.

- ½ The company could consider whether the experience of high sum assured policies might differ from smaller policies e.g. due to the policyholder being from a higher socio-economic group. The product may be hard to price as company does not have such experience to date.

- ½ Such policies would also contribute significantly to the coverage of fixed costs; therefore it may be possible to offer beneficial (lower) premiums to such cases (even after allowing for higher underwriting costs).

- ½ There may be increased potential for high premium cross-selling opportunities.

[Max 10]
[Total 35]

END