

# **INSTITUTE AND FACULTY OF ACTUARIES**

## **EXAMINERS' REPORT**

April 2019 Examinations

### **Subject CP1 – Actuarial Practice**

#### **Paper One**

##### **Introduction**

The Examiners' Report is written by the Chief 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.

Mike Hammer  
Chair of the Board of Examiners  
July 2019

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

1. The aim of the Actuarial Practice subject is that upon successful completion, the candidate should understand strategic concepts in the management of the business activities of financial institutions and programmes, including the processes for management of the various types of risk faced, and be able to analyse the issues and formulate, justify and present plausible and appropriate solutions to business problems.
2. This subject examines applications in practical situations of the core actuarial techniques and concepts. To perform well in this subject requires good general business awareness and the ability to use common sense in the situations posed, as much as learning the content of the core reading. The candidates who perform best learn, understand and apply the principles rather than memorising the core reading.
3. The examiners set questions that look for candidates to apply the principles specific to the situation set out in the questions, having read the question carefully. Many candidates gain few marks by writing around the subject matter of the question in a more general fashion. Detailed specialist knowledge is not required and nor is very detailed development of particular points.
4. Good candidates demonstrate that they have used the planning time well to understand the breadth of the question and to structure their answer – this is a big advantage in making points clearly and without repetition. This also enables candidates to use the later parts of questions to generate ideas for answers to the earlier parts.
5. Time management is important so that candidates give answers to all questions that are roughly proportionate to the number of marks available.
6. 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 use these points to aid their revision.
7. Candidates who give well-reasoned points, not in the marking schedule, are awarded marks for doing so.

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

This paper was generally well answered compared to previous sessions. The pass mark for CP1 is assessed over the two papers with the pass mark for this session being a combined 58. Paper 1 scored considerably higher than Paper 2, and therefore a score of c63 of Paper 1 was at the overall pass mark for this session.

On the longer questions those candidates that structured their answers to the question being asked scored considerably better than those candidates that simply rewrote bookwork answers.

**C. Pass Mark**

The Pass Mark for this exam was 58

## Solutions for subject CP1 -1 April 2019

### Q1

- |     |   |     |
|-----|---|-----|
| (i) | Employees   | [½] |
|     | Managers / Directors  | [½] |
|     | Customers / policyholders   | [½] |
|     | Owners / Shareholders   | [½] |
|     | (Chief) Risk Officer / Risk Manager   | [½] |
|     | Regulator/Govt/State  | [½] |
|     | Credit rating agencies  | [½] |
|     | Advisors / Professionals ( <i>or any reasonable example eg auditors, actuaries, investment manager, reinsurer</i> ) | [½] |

[Marks available 4, maximum 2]

- (ii) *Give marks for the best 4 if more than 4 stakeholders considered.  
To get credit, the activity/example must be attached to a related plausible stakeholder*

#### Employees/Managers

All employees should follow the risk governance framework, and suggest changes. Also be looking out for risks the business is exposed to and should be suggesting ways these risks can be managed, mitigated, or controlled. Reports from staff on risk should be noted and rewarded through the normal appraisal system. [2]

#### Customers/ policyholders

These should be encouraged to note and report risks they come across, and company should carry out root-cause analysis of comments/complaints received. These can be risks with the company’s products, website or visiting premises. Company may need to encourage or reward such feedback. [2]

#### Directors/ Owners / Risk Officer

These should clearly define/communicate the required risk culture/objectives and risk appetite. [1]

They will be responsible for allocating the risk budget to business units after allowing for diversification, and monitoring group exposure to risks and documenting risks that have materialised and affected the group. [2]

Each business unit would have responsibility to make full use of the allocated risk budget, as well as data collection, monitoring and reporting. [1½]

Shareholders can also monitor the company and communicate with the management about any concerns over risks. They can also use their votes. [1½]

#### Regulator

The regulator will need to ensure that the company holds enough capital. It could also influence risk governance in a number of ways eg ensuring suitable products with fair terms and conditions and adequate pricing, review risk processes and reporting, impose sanctions or penalties. [1½]

Credit rating agencies

Agencies can measure the risks associated with the company in various ways and use these in their ratings. This may put pressure on the company to deal with unwanted risks. [1½]

Advisors

Their contribution depends on their role (eg customer facing or company facing professional). They should be encouraged to note and report risks. Also to control/manage risks, where appropriate to their role. These can be risks associated with e.g. the company’s products, website or visiting premises. [1½]

[Marks available 14.5, maximum 4]

[Total marks available 18.5, maximum 6]

- |  |
|--|
| <p>(i) <i>This question was answered very well with most candidates scoring full marks.</i></p> <p>(ii) <i>Most candidates picked up most of the marks available. No credit was given to implausible combinations or the repeating the same point in a different way</i></p> |
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**Q2**

- (i) Solvency II establishes 2 levels of capital requirements  
The Minimum Capital Requirement (MCR) – this is the threshold at which companies will no longer be permitted to write new contracts (*or – new business, trade*) [1]

The Solvency Capital Requirement (SCR) – this is the target level of capital below which companies may need to discuss remedies with their regulators [1]  
[Marks available 2, maximum 2]

- (ii) Under Solvency II an insurance company needs to either use a standard formula model (prescribed by the regulator) or an internal model that will be built by an insurance company [½]

The main reason that the company will want to apply for an internal model is to reduce the capital requirement of the company. This would provide various advantages to the company eg ability to write more new business, pursue a less restrictive investment policy, and so on. [1½]

The capital requirement will need to be reduced enough compared with the money/time/resources that will need to have been invested. [½]

Likely to be a feasible undertaking only for large(r) companies. [½]

The internal model will reflect the company’s specific risk or business characteristics rather than the standard model which may have inappropriate assumptions embedded into the calculations based on an average company. [1½]

In particular the standard formula may not include risk classes that are important to the insurance company, which an internal model can take account of. [½]

The company may have assumptions built of more appropriate experience which can help assess both the assumptions and the relative stresses for its capital model. An internal model could take this approach into account. [1]

Using an internal model could also remove any approximations that a standard formula approach may have taken into account. [1]

The company could already be using the internal model for other metrics (e.g. Economic Capital) and could be therefore more efficient to only run one model [1]

The company may have spent a lot of time and money in building the model which it therefore wants to exploit (eg use to reduce the capital requirement). [1]

[Marks available 9, maximum 4]

[Total marks available 11, maximum 6]

- |   |
|---|
| <p>(i) <i>Most candidates were able to produce the required definitions although some candidates gave answers that were very vague or described in too much detail what would happen if the relevant capital was breached rather than focusing on the available marks for the question.</i></p> <p>(ii) <i>This was broadly well answered although there was a tendency to repeat similar points. Some candidates focused on why an internal model would not be used which didn’t answer the specific question being asked.</i></p> |
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### Q3

General points (MAX 3 MARKS):

Assumptions will need to reflect expected future experience. The impact of healthcare reductions on the future trend of mortality therefore needs to be considered. [1]

Five years max lack sufficient credibility to draw any reliable conclusions. Also, there may be a time lag before any impacts are felt. [1]

Need to allow for differences in impact between general and insured population. The impact of underwriting/exclusions needs to be allowed for. [1]

May need expert input/judgment (to understand impacts) eg health professionals. [½]

To the extent that the healthcare reductions are a result of cures being found for certain illnesses, or lifestyle improvements are occurring there may be no impact on mortality rates. In general, however, the possibility of some increase to future mortality rate should be considered, subject to competitiveness pressures. [2]

It might be expected that healthcare provision is politically sensitive and that any worsening mortality will be picked up on and corrected by increased healthcare in the future. It may therefore be reasonable to assume only short term mortality deteriorations. [1]

Specific issues:

(a) Pays out on death within policy term. Terms can be long (eg 30+ years). Need to understand the extent to which healthcare cuts may impact mortality (rather than morbidity) rates. Prudent to look particularly for any chance that mortality rates will increase, as this will lead to losses for insurer. Big part of healthcare spending is use of technology. If spending on technology is being cut, lives will probably die sooner and this needs to be allowed for in assumptions. Term assurances priced by age, sex (at least) – likely difficult to discern trends at this level of detail. Also price-competitive line, may absorb any mortality increase by reduction in existing margins, leaving overall assumptions unchanged. May screen out increased mortality through underwriting. Larger sums assured may be wealthier lives who use private healthcare and aren't affected by government cutbacks. Possible increase to underwriting expense assumptions eg less detail available in doctors reports because of government cuts. May reduce the withdrawal assumption, as people less healthy/likely to be more reticent to cancel policies. [6½]

[Max 3]

(b) These annuities pay more to people with specific lifespan-limiting health conditions. Difficulty will be to understand which diseases the cuts are affecting, and how quickly and to what extent lifespans are affected. Will probably be less important to allow for assumption changes because now any cuts are likely to reduce lifespans, and the insurer will profit from this. But possible that although overall healthcare is reduced, some areas may have benefited from increases and insurer needs to be alert to any lifespan gains for the related diseases. Likely to have to do more work in underwriting again, so expense assumptions rise. [3]

(c) Government cutbacks may well increase incidence of claims on this line of business, because less procedures may be offered by government health services. May be able to reduce contingency margin in assumptions if greater volume/diversity of business occurs off the back of state healthcare cuts. Severity of claims will increase if newer/expensive technology is restricted on the state side, or policy cover changed to cover more (or more expensive) procedures. On the other hand, there may be doctor redundancies on the state side, reducing rates of pay in private sector. Expenses per policy may reduce if large increases in volumes of policies sold. Mortality of the increased new business may be higher eg more lower income people buy because

concerned over healthcare cuts. May not be concerned so much of whether healthcare cuts affect morbidity rather than mortality, depending on contract design/benefits ie whether both contingencies are covered or not. [5½]

[Max 3]

(d) Pays relatively small sum assured on death. Simple line of business – don't need granular effect to be understood ... no split of premiums normally between ages or sex. No underwriting. Prudent to assume some increase to mortality on regular premium policies. Often bought by single premium, however, where death cost is then more neutral to time of death – because inflation of funeral costs may be similar to any investment return earned. May not make any change to assumption on single premiums. Likely that this product is not purchased by wealthier lives ie the lives who purchase this line may well be affected by government cutbacks. [4½]

[Max 3]

[Marks available 26 maximum 8]

*This question was not answered well. Most candidates were too dogmatic in assuming mortality/morbidity would increase and therefore the answers were limited. Few candidates seemed to understand Funeral Cover as a product which meant answers to (d) didn't score very well.*

## Q4

Diversification (MAX 3 MARKS)	[1]
• Lines of business e.g.	[½]
○ Age group (under 14s, over 65s)	[½]
○ Frequency of travel (single, multi-trip)	[½]
○ Purpose of travel (business, winter sports etc)	[½]
○ Number of lives (single, family, groups)	[½]
• Sales channel	[½]
• Geographical areas of business	[½]
○ Travel location (domestic, continent, worldwide)	[½]
• Reinsurance provider	[½]
○ Use reciprocal quota share reinsurance	[½]
• Investment asset classes e.g.	[½]
○ Bonds, Cash	[½]
• Investment asses held within a class e.g.	[½]
○ Government bonds, Corporate bonds	[½]
	[Max 3]
Underwriting (at the proposal stage) (MAX 3 MARKS)	[1]
• Prevents anti-selection	[1]

- Enables the insurance company to classify risks into homogeneous groups for which a standard premium can be charged [½]
    - A whole range of rating factors is used to determine granular data regarding the risk [½]
    - Ensures that all risks are rated fairly [½]
  - Identifies risks for which special terms need to be quoted [½]
    - Special terms for certain activities e.g. ski trip [½]
    - Insurer may simply decline risks e.g. historic medical conditions [½]
  - Helps ensure that actual claim experience not too far from that assumed in the pricing [½]
  - Reduces risk of over insurance e.g. [½]
    - Very high level of medical expenses cover for someone who is terminally ill [½]
- [Max 3]

Claims control/ Claims underwriting (**MAX 3 MARKS**) [1]

- Mitigates consequences of a financial risk that has occurred [½]
  - E.g. maximum cap on lost luggage to avoid dispute on the quality of luggage bag and the contents inside
  - use of excesses to reduce costs/admin of small claims
  - use of exclusions/extra premiums for specific high value items eg cameras/laptops [3]
- Guards against fraudulent or excessive claims [½]
- E.g. have a prescribed list of overseas hospital and/or medical service providers [½]
- Costs of implementing and maintaining a control system must be compared with the benefits gained from it [½]
- Give suitable example linked to the question [½]
- Tight policy wordings
  - to be able to impose exclusions/other conditions
  - but need to balance against competitiveness of product [1½]

Management controls (**MAX 4 MARKS**) [1]

- Data recording [½]
  - Ensure adequate provisions are established for the risks [½]
  - Reduce the operational risks from having poor data [½]
- Accounting and auditing [½]
  - Can't change the risks accepted but enables proper provisions to be established [½]
- Monitoring of liabilities taken on [½]
  - Protects against aggregation of risks of a specific type to an unacceptable level [½]

- E.g. request flight dates and times from policyholders so the insurer can cross-reference against events and be aware of any risk sooner [½]
- Check business mix is as expected
  - regularly monitor claims especially by location travelled to
  - feedback into future pricing and reserving [1½]
- Insurer also needs to be aware of high impact but low probability risks, e.g. plane crash/disease outbreaks, taking into account its own risk tolerance [1½]
- These can only be diversified in a limited way [½]
- Can use CAT reinsurance/related ART to transfer away [½]

Other types of reinsurance/ART/derivative (need to be specifically named) could also be used (*need to explain usage to get credit*). This includes for example use of currency derivatives for paying claims in foreign currency, weather derivatives for flight delays. [1]

[Marks available 32.5, maximum 10]

*This question was generally well answered, however the stronger candidates scored nearly full marks mainly due to structuring their answers under high level sub- headings. Some candidates didn’t go into sufficient breadth to score full marks.*

## Q5

- (ii) Nothing for salaries/HR/IT/property – need loadings-level points, not expenses-level points.

The expenses loadings that need to be provided for in a long-term insurance contract cover from the initial product development, through to sales, underwriting, on-going administration and claims underwriting. [1]

The precise contract design will affect how and the extent that expenses are provided for within the pricing of a contract. [½]

The following expense loadings are relevant to a long-term insurance contract:

Initial product development

Initial product development/design costs [½]

Sales

Product marketing/advertising costs [½]

Initial sales commission [½]

Initial administration costs to set the contract up. [½]

Initial costs to invest assets [½]

Share of sales overhead costs (one off distribution costs or access fees) [½]

Underwriting

Medical underwriting costs [½]

Other underwriting costs e.g. anti-money laundering underwriting [½]

Renewal/On-going costs

On-going contract administration costs [½]

Premium collection costs [½]

Renewal or trail commission [½]

Ongoing investment costs [½]

Financial administration and reporting costs (includes costs of legislative changes)[½]

Share of on-going overhead costs [½]

Share of on-going systems and development costs [½]

Claims/Terminations

Example Claims/withdrawals cost [½]

Both Claims admin/processing and claims underwriting need to be covered [½]

[Total 10, Max 5]

- (ii) A new or recently established insurance company will have little or no existing internal expense experience to price a new long-term contract. [1]

External sources, for example reinsurers or consultants, can be used to get information on the range of expenses for competitors for different types of expenses loads. [1]

If the new insurance contract is already available in the market from competitors then external sources may be available for the different types and levels of expense loadings. Information will be required for both for the new contract and for other types of contracts. [1½]

*Marks TT-Z CAP TO 3 (AS GENERAL, NOT SPECIFIC TO NEW CONTRACT)*

The insurance company will undertake an expense analysis for its existing business.

Overall, will need to allow for fixed vs variable costs. [½]

First, strip out non recurring costs and amortise one offs. [½]

The expenses analysis will need to cover both allocation to classes of business and functions. Functions will include product development; sales & commission; new business processing and policy issue; initial underwriting; on-going administration and claims underwriting. (*Equivalent credit for split initial, renewal, termination.*) [1]

Expenses need to be allocated by class of business. Some expenses can be identified directly to a particular class of business. Others do not have a direct relationship to any one class of business. These need to be apportioned between the appropriate classes. [2]

Expenses need to be allocated to different types of business in as realistic manner of possible so that they are appropriate for pricing a new business. [½]

Direct expenses arising from a department dealing purely with one class of business can be immediately allocated to the relevant class. However, where the department is involved with more than one process or more than one class of business, then timesheets can be kept (either for a period or permanently) to help split the costs between classes and functions. Alternative methods are also possible eg floorspace or charging out bases. [1]

Indirect expenses are harder to allocate. In this case it is necessary to use a sensible apportionment of the expenses across direct business activities so that they can be onward allocated between classes and functions. [1½]

Having allocated expenses between classes and functions the expenses needs to be converted into expense loadings. This involves identifying an appropriate driver for expenses. Examples of expense drivers include policies, sum assured, fund values, activities (number and type of medical underwriting tests) etc. Inflation needs to be allowed for. Past inflation should be added for the time between now and the time that the expense investigation related to. Future inflation should be added for half the expected period until next repricing, or based on a long term projection of future expenses. [3]

#### *END OF CAPPING*

For the new contract the expense loadings for existing contracts will need to be adjusted to take account of differences between the classes and functional activities required. [1]

A decision will also be required as to whether expenses will cover only the marginal costs of the new product, or also a share of overheads. However, all expenses must eventually be recovered from somewhere. [1½]

Also need to allow for competitiveness, eg cross subsidise by policy size. [½]

[Total 15.5, Max 5]

[Total marks available 22.5, maximum 10]

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|--|
| <p>(i) <i>This was generally well answered but some candidates confused expense loadings with expense items which meant no credit was given</i></p> <p>(ii) <i>Most candidates understood how to conduct a general expense analysis and picked up some marks, with the stronger candidates then focusing on the specifics of the question to score well.</i></p> |
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## Q6

- (i) The set of assumptions that has an equal probability of overstating or understating the future experience.

OR

The set of assumptions that gives the median future experience.

*(Note “average” not allowed, nor reference to between optimistic and pessimistic.)*[1]

[Marks available 1, maximum 1]

- (ii) Management information to ensure appropriate decisions are made. [1]

Expert witness assumptions otherwise one party may have an advantage. [1]

Base liability in certain regulatory regimes. [1]

*(Equivalent credit should be given for other reasonable examples. NB TVs is a good eg, also recovery plans, but not purchase price for a company.)* [2]

[Marks available 5, maximum 2]

- (iii) Best estimate plus margin [½]

A risk margin is built into each assumption by including an explicit margin for caution (on top of ‘best estimate’ assumptions). [1]

Assessment of the necessary margins will depend on the risk involved and its materiality to the final result. Where a risk factor has been stable over many years and is not exposed to economic events, it may be reasonable to add a simple percentage loading. [1½]

In other cases, a more detailed analysis of experience for various sources, perhaps using a stochastic approach, may be needed to determine a margin consistent with the risk. [1]

Contingency loading [½]

This approach is to increase the output (eg liability value) by a certain percentage. The choice of this loading is effectively another assumption and should ideally reflect the degree of uncertainty that exists. It would be expected to increase with the value of the liabilities but not in a proportionate manner. [2]

This approach is excessively arbitrary given that there are many analysis tools available. [½]

Discounting cash flows at a risk premium (NB talking about increasing cashflows, is not enough, but consider credit under contingency loading method above) [½]

Cash flows are assessed on a best estimate basis, and then discounted at a rate of interest that reflects the overall risk of the project or liability. Determination of the risk premium is often arbitrary and may be a requirement of the governing body. Alternatively some judgment may be applied. The risk discount rate may not be based on the risks associated with the cash flows but on the opportunity cost of not pursuing other business opportunities. [2]

If risk discount rates are high, they can affect the near and the remote cash flows disproportionately to the actual risks of the cash flows. [½]

[Marks available 10, maximum 6]

- (iv) If a product provider has a portfolio of low probability risks with a large and highly volatile outcome then its results are likely to be volatile. In years when no such events occur, profits will be greater than the long term average but in years where such an event does occur the company may show a significant reduction in profits. [2]

The provider might wish to exhibit stable/smoothed results from year to year. [½]

To smooth results, a company may establish a claims equalisation reserve in the years when no claim arises. This reserve can then be used to smooth results when a claim does occur. [1½]

[Marks available 4, maximum 3]

- (v) Equalisation reserves are not provisions as they do not cover a future liability. [1]

They could be seen as a way of deferring profits eg a ploy for reducing the tax being paid in a particular year. [1]

[Marks available 2, maximum 2]

[Total marks available 22, maximum 14]

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| <p>(i) <i>Candidates who knew this part of the course scored full marks.</i></p> <p>(ii) <i>Candidates who knew this part of the course scored highly with a range of answers being given.</i></p> <p>(iii) <i>Most candidates knew 3 methods, but only the stronger candidates gave enough explanation to score highly</i></p> <p>(iv) <i>This was answered poorly with few candidates recognising this part of the course</i></p> <p>(v) <i>This was the worst answered part of the question with many not attempting.</i></p> |
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## Q7

- (i) The scheme believes that the lower yielding overseas bonds will have a higher **expected** total return. [1]

This could be due to expected currency movement ie expectation of overseas currency strengthening. [1]

Or alternatively an expectation of overseas yields falling further, with an intention to unlock this by selling the bond before maturity/expiry. [1]

Overseas bonds may be (or expected to be) more secure ie lower default risk. [1]

Or there are market inefficiencies allowing an exploitation of pricing anomalies in the current market [1]

The scheme may have some overseas liabilities, and purchasing overseas government bonds may match the liabilities better than the current approach. [1]

- Or they may provide a better match in other respect(s). [½]
- There may be diversification benefits for investing overseas which could reduce the investment risk for the scheme. [1]
- There may be beneficial tax treatment in holding the overseas assets [½]  
[Marks available 8, maximum 4]
- (ii) The scheme needs to consider the risks of currency fluctuation that would occur in investing in the overseas bonds, and any possible default risk. [1½]
- In particular it would need to consider the current and future fiscal deficits of the country, any outstanding national debt, outlook for inflation, the current exchange rate compared with purchasing power parity, and the country's credit rating [1½]
- Needs to consider how liquid the bonds would be and what the level of supply and demand currently is (and could be in the future) [1]
- The scheme will need to consider whether it has the expertise required to assess and manage the overseas bonds. Does the current fund manager have the capabilities or will it need to employ experts. [1]
- A decision of which specific assets to be transferred when will be needed, and whether to achieve this via actual switches, or synthesise using derivatives. [½]
- Will there be any language issues in investing in these assets classes, how important this is will depend on the amount of interaction required (will depend on the overseas territory this investment is in). [1]
- How much exposure does the scheme want to this overseas bond [½]
- Will they be investing in one overseas bond or a range of bonds and is the duration available suitable to the liabilities it has . [1]
- What other matching requirements does the scheme have. [½]
- Is there any restriction in investing in the particular government bonds and is there any likely change in this approach in the future (i.e. is there political risk for the scheme) [1]
- The scheme will need to consider whether there are any different tax or accounting or repatriation practices for the overseas bonds. [½]
- Are there any timing delays that make investing difficult? This shouldn't be an issue due to improved communications but depends on the territory that is being invested. [1]

May need to consider whether the right level of information is available and how quickly this can be obtained. Again this shouldn’t be an issue for most territories but could be if the overseas bond is in a remote territory. [1]

Does the company need to invest in new admin functions (eg custodianship). [½]

Dealing costs. [½]  
[Marks available 13, maximum 5]

- (iii) *Note, in this part, candidates may continue to discuss why the idea of overseas assets was dismissed. This should be cross-credited into the relevant parts i/ii above, plus there is one overall blanket mark in this section.*

Specific reasons may exist for why the overseas proposal might have got dropped. [1]

The scheme may prefer the revised proposal for a number of reasons:

The scheme believes that the returns that the new bond will achieve are attractive. [1]

This could be due to a “new issuance” premium. [½]

Or the scheme plans to unlock an illiquidity premium (eg buy and hold strategy). [½]

It may be anticipating upgrade of retail sector bonds. [½]

The scheme believes that the new bond is a better match to the liabilities of the scheme, this could be because the duration of the newly issued bond is more appropriate or indeed the bond may have other features which again match the liabilities in a more appropriate way compared to the government bonds. [1½]

The investment could be a short term investment (i.e. the newly issued bond could be short term) with very attractive returns, but is planned to reinvest back into government bonds over the longer term. [1]

The scheme may possess specific retail bond expertise eg new specialist investment mgr. [½]

There could be a risk that the government bonds are about to default or significantly reduce in value (e.g. downgrade) [1]  
[Marks available 7.5, maximum 3]

- (iv) When investing in corporate bonds the main risks that the scheme will be exposed to are default, inflation, marketability and liquidity risk. [1]

The retail sectors profits and therefore ability to pay for the coupon and principal on any bond are determined on the sales of the business’s products. Generally the retail sector’s sales of products have been via shops/shopping centres. Therefore the default risks of the sector are heavily dependent on the success of the high street. [1]

This risk can be minimised by having an online presence but the costs of any shops will still need to be covered and there could be increased competition. [½]

The retail sector is particularly exposed to changes in cultural and social trends. If the particular brand is no longer liked or indeed hit by scandal then there will be a risk that sales will fall and therefore the default risk for the bond increases [1½]

The sector is also heavily influenced by the overall economic environment. If the economy enters recession or starts to struggle there could be a decrease in sales for the retail sector – again this would reduce the sales and increase the default risk of the country. [1]

They are also impacted by increasing inflation – i.e. costs for the companies in the sector increasing – this would again impact the default risk of the sector [½]

There is a risk that the liquidity of the bonds also reduces if the sectors performance and outlook deteriorates. [1]

Additional risks around downgrades that could impact the ability to hold the bonds if rules do not allow a particular credit rating in the schemes assets [½]

[Marks available 7 maximum 4]

[Overall Marks Available 35.5]

[Maximum 16]

*This question was answered well with most candidates having a reasonable attempt at all parts.*

- (i) This question was answered well, with some candidate going into far too much detail for the available marks.*
- (ii) Most candidates picked up on the currency risk, but few focused on the economic factors*
- (iii) This was mixed, those candidates that focused on the justification of the switch on its own merits scored well, whilst those that focused on why the proposal in (ii) was dropped limited their answers.*
- (iv) Most candidates picked up on the bonds versus gilts point but only the strongest candidates focused on the specifics of the retail sector corporate bonds.*

## Q8

- (i) When a life table is constructed it is assumed to reflect the mortality experience of a homogeneous group of lives i.e. all the lives to whom the table applies follow the same stochastic model of mortality represented by the rates in the table. This means that the table can be used to model the mortality experience of a homogeneous group of lives which is suspected to have a similar experience. [2]

If a life table is constructed for a heterogeneous group, then the mortality experience will depend on the exact mixture of lives with different experiences that has been used to construct the table. Such a table could only be used to model mortality in a group with the same mixture. It would have very restricted uses, and could lead to anti selection. For this reason, separate mortality tables are usually constructed for groups which are expected to be heterogeneous, for example, separate tables for males and females. Separate tables might also be prepared for different purposes/products. [4]

Sometimes only parts of the mortality experience are heterogeneous (e.g. the experience during the initial select period for life assurance policyholders), and the remainder are homogeneous (e.g. the experience after the end of the select period for life assurance policyholders). In such cases the tables are separate (different) during the select period, but combined after the end of the select period. [3]

Marks Available [9]

Maximum [5]

(ii) *(Notes on cross-credit in this section – Part X marks should not employ cross-credit. The principal factors need to be given in the right part (a) – (c) to get credit. Part Y marks should be awarded only once, wherever the factor is explained further.)*

(ii) PART X MARKS

(a) The term assurance policyholders will be only a cross section of the general population, by the following factors expected to affect mortality:

- age
- sex
- income level
- marital condition

[2]

Cross-sections arise because of:

- the way insurers target particular markets
- the imposition of minimum premiums/maximum ages
- because of the differing propensity of people to purchase insurance eg
  - awareness/intelligence, level of need eg married/dependant

[1]

Within cross sections, underwriting will be expected to lower the experienced mortality. Both initial underwriting and claims underwriting (exclusions) will remove certain levels of diseases/sickness compared with general population. [2½]

Expect overall lower term assurance mortality than population mortality. Although some specific arguments could be made for why the reverse may be true. [1½]

(b) (MAX 8 MARKS)

Only employees are covered – active service mortality effect. Their overall fitness would be expected to be higher on average, and this would lead to lower mortality compared with policyholders. Employers may do health screenings at job application stage, or may be paternalistic in some other way that impacts employee mortality (eg generous sickness scheme). [3]

There will be one occupation of the employees compared with a range in the insurer's policyholders. This will make them more or less of a mortality risk than policyholders, depending on nature of occupation and degree of hazards. [2]

Similarly the income level will be different from the average of policyholders. And employees may be based in a particular location/climate. [2]

The turnover of policyholders of the employer is likely to be quicker than that of policyholders. Older or ill policyholders leave employment continually, whereas policyholders stay until policy expiry. This is likely to lead to lower mortality of policyholders in the longer term. [2½]

Underwriting will be different. Normally no underwriting of the individual employees will be undertaken up to a certain level of benefit, and no exclusions for pre existing conditions will be applied. This compares with lower underwriting limits for policyholders and the likely imposition of at least some exclusions for pre existing conditions. The lower level of underwriting in theory will mean higher expected mortality for group life. However, the following factors will reduce this impact:

- active service mortality as described above
- less ability of employees to select benefit level eg employer benefit is 4 x salary automatically
- scheme likely to be compulsory/free to employees – so greater spread of mortality risk [5]

Overall, expect different level of mortality. Unclear whether higher or lower. [1]

- (c) Occupation of directors is different. Mortality impact depends on relative nature of staff occupations. [1½]

Level of income/size of pension pot is likely much larger. Likely lower Director mortality because of this. [1½]

More likely to get to Director position if better educated. [½]

However, they may be more exposed to unhealthy social activities (e.g. drinking alcohol/rich diets) or continue to be impacted by earlier high stress working environment, hence their mortality rates may be higher.  
(Give credit for reasonable contra arguments) [1]

Mortality likely to be measured on an amounts basis rather than a lives basis. Director experience likely to be more unstable/subject to more random variation than staff experience. Eg retired CEO dies early (or late), with very high pension, will have massive impact on mortality experience. [2]

Expect overall lower Director's mortality than staff mortality, or there may be specific arguments as to the reverse situation. [½]

PART Y MARKS (Explanation of why individual factors affect mortality. Half mark per example, MAX 9)

General credit – individual factors rarely act in isolation. Eg education affects income/housing conditions.

*(Socio economic status – no credit in itself – need to dissect into more detailed components below)*

age – naturally expect increases with age; accident hump late teens to mid 10s, proneness to diseases increases as body weakens, genetic effects

sex – normally expect male mortality higher than female; less hazardous pursuits, higher proneness to certain illnesses, genetic effects

income level – normally expect higher incomes have lower mortality; link to education, private healthcare. May expect higher mortality with higher income however – sedentary or more stressful occupations/lack of exercise, rich diets and high alcohol consumption

marital (or long term relationship condition) – expect lower mortality:- natural selection of healthier partners, emotional and practical support, having children matures outlook/less hazardous pursuits

occupation – hazards related to employment, legal requirements (health and safety, regular medical check ups)

nutrition – proneness to contract certain diseases, affect chances of recovery. Obesity leads to heart disease, high blood pressure, strokes ...

housing – physical dangers from poor housing, overcrowding, infection/pollution, link to poverty.

climate/geography – natural/local disasters, link of certain diseases to weather patterns.

education – awareness of healthy lifestyle (diet/exercise/harmful activities)

genetics - rapidly developing new area of study for the medical profession, gives information about the likelihood of a person contracting certain diseases

[9] *Maximise to 9*  
Marks Available [39½]  
Maximum [18]

(iii) General reasons for monitoring experience

The environment in which a provider operates is constantly changing, so the actual experience will diverge from that assumed originally. [1½]

Therefore experience will be monitored to:

- understand sources/relative significance of divergence

- update the methods and assumptions adopted so they reflect expected future experience more closely
- monitor any trends in experience, particularly adverse trends, so as to take corrective actions eg adjust underwriting, close loss making lines of business; and
- provide information to management and other key stakeholders. [5]

By such monitoring, the provider is more ready to change pricing/reserving/surplus distribution so as to:

achieve its financial objectives eg profitability, revenue, market share quickly ... respond to changing market pressures eg competition, economic/underwriting cycles or other trends eg social/cultural [3]

The actuary is trying to estimate how the provider will progress in the future, based on what has happened in the past. As time goes by, the actuary will have more information. The assumptions and models resulting from this should get closer to what will actually happen.

This is an iterative process/part of control cycle. [3]

May be a regulatory requirement. [½]

Category- specific reasons for monitoring experience

term ass vs popn

particularly concerned about q increases

reinsurance review – price/treaty type

Update for significant change eg change in underwriting approach/standards, respond to new info/technology eg automated underwriting [2]

group life vs individual

particularly concerned about q increases

group generally yearly renewable ... set the next premium appropriately

for profit sharing arrangements

changes to free cover limits understood [2]

exec annuitants vs staff

particularly concerned about q decreases/future improvements

retain equity between the two membership categories eg:

will need to manage possible insolvency – don't pay full value to retiring CEO if this is anticipated to impoverish future staff pensioners, or indeed current ones ... manage higher influence that execs can impose compared to staff

more likely to be repricing execs than staff eg new execs onboarding with competitive package... bigger financial impact ... hence more important for up to date assumptions

report to membership about experience

scheme takeover – want up-to-date experience [2]

Marks Available [19]

Maximum [7]

Overall Marks Available [6 ½]  
Maximum [30]

- (i) *This question was answered poorly with only the strongest candidates answering the question with most focusing on “What factors influence mortality” – this scored some credit for part (ii) but didn’t focus on the question being asked in part (i)*
- (ii) *This part was answered well, with a lot of good points being made, although some candidates didn’t explain in sufficient detail to cover all the points available,*
- (iii) *Most candidates picked up the reasons for monitoring but only the stronger candidates went into sufficient depth to score all available marks.*

**END OF EXAMINERS’ REPORT**