

# **EXAMINERS' REPORT**

*November 2020 examinations*

## **Subject F102 — *Life Insurance* Fellowship Principles**

### **INTRODUCTION**

The attached report has been prepared by the subject's Principal Examiner. General comments are provided on the performance of candidates on each question. The solutions provided are an indication of the points sought by the examiners, and should not be taken as model solutions.

## QUESTION 1

- i. In general, the assumptions used to determine the liabilities should have regard to the legislation and accounting principles for published reporting.

### Mortality

- Assumptions will be required for the base mortality level and for the level of expected future mortality improvements.
- The assumptions chosen should be based on the expected demographic profile of policyholders and have a regard to the country where the annuitants live.
- The prudential margin would be a reduction in base mortality, and faster future mortality improvements.

### Benefit inflation

- It may also be required to allow for the future inflation of benefits, if the annuity is index-linked.

### Expenses

- An allowance for expenses should be included which should reflect expenses expected to be incurred in administering the annuities.
- An allowance for a share of future expected overhead expenses.
- The prudential margin would be an increase in expenses.

### Expense inflation

- An explicit assumption will be required to allow for the future inflation of expenses.
- The inflation assumptions could be based upon the:
  - current rates of inflation, for both prices and earnings which can be based on recent actual experience of the life insurance company or industry; and
  - expected future rates of price and earnings inflation which can be based on the differential between the return on government fixed interest securities and on government index-linked securities, where they exist.
- The prudential margin would be an increase in expense inflation.

### Valuation rate of interest

- A valuation rate of interest will be required which should have regard to the yield on government bond or corporate bonds (taking default risk into account).
- The level of reinvestment risk should be considered.
- A prudential margin could be included which would reduce the valuation rate of interest.

### Taxation

- An allowance for taxation will need to be included as an assumption either explicitly or implicitly within the assumptions for valuation rate of interest or other assumptions.

- ii. The insurer will analyse the surplus arising over a year on the supervisory basis to:

- show the financial effect of divergences between the valuation assumptions and the actual experience, exposing which assumptions are the more financially significant;
- show the financial effect of writing new business;
- provide a check on the valuation data and process, if carried out independently;
- identify non-recurring components of surplus;
- give management information on trends in the experience of the company; and
- comply with regulatory requirements.

(iii)

iii. Possible responses to these results:

Incorrect calculation or data:

- Use data reconciliations or spot checks on values that appear to be anomalies.
- If errors in the data or calculations are identified the insurer should consider improving systems and data recording.
- Compare the results from the analysis of surplus with a recent expense experience investigation to check if the results of the two investigations are consistent.
- Carry out a full expense experience investigation.
- For initial and renewal expenses consider salary, property and computer costs and identify any once-off expenses.
- Investigate the cause of any adverse experience.
- For example, a high inflationary environment or larger volume of policies with lower annuity payments where cross-subsidies are assumed.

Changes to assumptions:

- Consider whether this experience should result in a change to valuation and/or pricing assumptions.
- This will be strongly influenced by whether the cause of the higher than expected expenses (for example rental costs or salary inflation) is expected to continue in the future.
- Consider industry or competitors data before making any changes to pricing.

Expense control measures

- Consider implementing expense control measures.
- For example, active control of staffing levels relative to business volumes or ensure that cost-of-living and grade salary rises are not excessive.

*For part (i) candidates who listed a variety of assumptions with a brief description of each assumption tending to perform better than students who wrote long verbose answers. Many students failed to fully consider the characteristics of annuity products, including the absence of surrenders or lapses and the importance of mortality improvements. A significant portion of candidates did not specify the direction of the margin for it to be prudent.*

*Part (ii) was bookmark and candidates tended to perform well in this question. It was evident that some candidates did not know the bookwork for this section.*

*Overall part (iii) was fairly poorly answered as many candidates focused too much on a single element for example decreasing expenses. Candidates who performed better tended to write an array of considerations across various facets of an insurance company.*

## QUESTION 2

- i. A couple expecting to retire in 10 years' time.

### Income protection

- This product pays a monthly benefit on incapacity within a specified period. For example, until retirement age of the policyholder.
- This is needed to protect the couple against financial loss due to loss of the main household income.
- The income protection may not be needed if sufficient income protection benefits are provided as part of a group life assurance (GLA) by the employer of one of the couple.

### Critical illness

- This product pays a lump sum in the event that the person insured is diagnosed with a severe illness covered under the policy (for example cancer).
- The couple can use this benefit to pay lifestyle changes after a critical illness event.
- Income protection and critical illness contracts are typically conventional without profits.

### Endowments

- This could be in the form of a savings contract (e.g. a pure endowment) where the proceeds can be used to purchase an annuity on retirement to supplement provision from the employer.

### Deferred annuity

- The couple can take out either a deferred annuity instead of an endowment assurance to provide income during retirement.
- A surrender benefit may be payable during the deferred period.
- The key benefit is payment of a regular income, provided the customer survives to a specified date.
- It would not be needed if either are employed and the employer provides an adequate corporate pension scheme.
- Endowment and deferred annuity products are typically written as with profits or unit-linked.

- ii. Tourism company

### Group life assurance (GLA)

- This product provides benefits on the death of a member of staff while they are employed, normally to their dependants.
- Normally the benefit is set in terms of a multiple of the employee's salary, e.g. 3 x annual salary.
- Offering such benefits as part of the employment contract meets the customer's need of retaining and attracting good staff.
- Staff members might need additional benefits to cover repatriation of their body to their home town on death.
- This product is typically written as conventional without-profit on an annually renewable basis.

#### Key person insurance

- Would be written on the lives of key personnel, providing payment of a lump sum on their death, including the two owners of the company.
- It gives the company protection against financial loss from the death of key members of staff.
- This product is typically written as conventional without-profit.

#### Group pension scheme

- This can be offered as either deferred annuity or endowment assurance form.
- Provides retirement benefits for the staff. The cost could be shared with the employees by making the scheme contributory.
- As above, this meets the customer's need of retaining and attracting good staff.
- Typically written as with-profit or unit-linked.

#### Immediate annuities

- The company might purchase immediate annuities to provide retirement benefits emerging from the pension scheme.
- This removes longevity risk from the company.
- Typically written as conventional without-profit.

*This question was not well answered. Many candidates failed to give a wide enough range of suitable products and failed to cover how products would meet the needs of the couple or the tourism company. For part (ii) many candidates considered the needs of the partners and the employees rather than the objectives of the tourism company and focused on individual products rather than group cover. A number of candidates failed to fully answer the question and give the likely structure of the products in their solutions.*

### QUESTION 3

- i. Considerations for the methodology for determining alterations.
  - Affordability.
  - Fairness between shareholders and policyholders and reasonable amount of profit.
  - Manages anti-selection-risk.
  - Policyholder Reasonable Expectations (PRE).
  - Consistency with boundary conditions.
  - Stability (including over time and duration).
  - Alteration terms used by competitors.
  - Ease of administration and calculation and documentation.
  - Ease of explanation to policyholders.
  - The method should be allowed by regulation and professional guidance.
- ii. Suitability of the method for an alteration of an increase in the sum insured for a term assurance policy.

#### Affordability:

- The company should check that the alteration is supportable by the asset share to avoid making a loss.
  - The earned asset share together with future premiums, should therefore meet the cost of the benefits and expenses after alteration

#### Fairness between shareholders and policyholders and reasonable amount of profit:

- The difference between the asset share and the policy value before alteration (calculated on the original premium basis) represents the accumulated value of historic margins.
  - This could be a reasonable amount of profit to extract.
- Use of the original premium basis to determine the policy value after the alteration means that:
  - The company should extract profit over the remaining term consistent with what was expected in the original pricing basis.
  - This may be reasonable but may be inconsistent with the profit (more or less than) the company makes from new business policies.
- The calculation of the present value of the policy after the alteration should not include an allowance for initial expenses.
  - However, an allowance will be required if additional commission is payable due to the increase in the sum assured.
- Similarly, the alteration expenses should be deducted from the policy value before the alteration (or added to the policy value after the alteration).

#### Anti-selection-risk:

- It is likely that policyholders in poor health, in particular, would like to increase the sum assured.
- To deal with this anti-selection risk, the company could:
  - require a declaration of continuing good health;
  - restrict the conditions on which this alteration can be performed, for example, link it to a life event such as the birth of a child; or
  - underwrite alterations and modify the terms offered if necessary.

Policyholder Reasonable Expectations (PRE):

- The terms offered are not consistent with new business terms.
- It may be cheaper to buy a new policy for the increase in the sum assured, which may be inconsistent with policyholder reasonable expectations.
- The company will have to consider alteration terms used by competitors.

Consistency with boundary conditions:

- It may be cheaper to buy a new policy for the full sum assured, which creates a lapse-and-re-entry risk.
  - However, this risk is mitigated to some extent, because the policyholder is now older and will have to go for full underwriting again.

Stability (including over time and duration):

- Using the same basis for the present values before and after the alteration will make the method stable.
  - Therefore, a small increase in the sum assured should result in only a small increase in premium.
- For a particular policy, the alteration basis also does not change over the duration of the policy creating consistency over time.

Ease of administration and calculation and documentation:

- The company will have to keep a record of the original premium basis, which could be administratively cumbersome and difficult to document over time.

Ease of explanation:

- Could be difficult to explain to policyholders, who are unlikely to be familiar with present value calculations.

The method should be allowed by regulation and professional guidance.

*Part (i) was a straightforward bookwork question. Candidates performed well on this question. Performance on part (ii) was varied. Most candidates struggled to generate a sufficient number of points. Those candidates who took a structured approach to work through each of the various principles scored better.*

*A surprising number of candidates approached the question as if it were a surrender value question. Most candidates confused the point on affordability with a surrender value scenario. To the insurer the earned asset share plus future premiums should be sufficient to cover future outgo and expenses, and not just earned asset share on its own, as would be the case under a paid-up or surrender value scenario where there are no future premiums.*

## QUESTION 4

- i. Factors for determining the bonus philosophy.
  - Once reversionary bonus has been allocated to a policy it becomes guaranteed and must be paid on death or maturity.
  - Whereas terminal bonus gives the company more flexibility because the amount of terminal bonus is determined when the insured event occurs.
  - The assets underlying the investment fund for these policies are high-risk equities which are likely to have volatile returns.
  - Therefore, the assets share of these policies is likely to be volatile.
  - Since terminal bonuses are not guaranteed they are most suited to the distribution of the volatile returns from equity investments.
  - It is therefore expected that the insurer will follow the approach of high terminal bonuses and low reversionary bonuses.
  - Since terminal bonuses can be reduced in theory if there is a fall in the asset share of the policies.
  - High terminal bonuses result in more deferment of distribution of surplus.
  - Use of super compound reversionary bonus will assist with deferral of surplus.
  - This will also assist the insurer in maintaining its level of free assets, which is important since the level of free assets is low.
  - Low reversionary bonuses reduces the risk that guaranteed benefits might exceed the asset share of the policies at maturity due to a fall in equity markets.
  - The excess of the guaranteed benefits over the asset share would need to be paid out of free assets thereby reducing the free assets of the insurer.
  - Reversionary bonuses form part of the supervisory reserves, but reserves would not be held for terminal bonus.
  - A lower proportion of reversionary bonuses would reduce the statutory reserves that the insurer needs to hold for this product which is important to the insurer given its low level of free assets.
  - The strategic split between reversionary and terminal bonuses will also depend on policyholder reasonable expectations.
  - This will be influenced by the practice of bonus declarations for other products for this insurer and the practice of competitors.
  - This product may not be marketable if competitors offer high reversionary bonuses.
  - Policyholders prefer the certainty of higher reversionary bonuses.
  - The higher level of investment freedom and the expected higher return from high-risk equity investments may generate higher returns to policyholders.
  - This may be attractive to policyholders who are prepared to accept a lower level of certainty for potential higher returns.
  - The product may generate sales if marketed to this target market.
  - The insurer will need to consider any regulatory requirements around the use of reversionary and terminal bonuses.

ii. Possible impact on terminal bonus rates.

There may be no impact on the bonus rates of the insurer:

- If the fall in global equity markets has not impacted the high-risk equity investments underlying the with-profits fund for these policies.
- If the equity markets are expected to recover in a short time.
- If the current benefits payments including terminal bonuses is lower than the asset share of the policies after the fall in equity markets.
  - Recent terminal bonus declarations may have resulted in benefit amounts that are lower than the asset share due to smoothing or if the fall in equity markets was already anticipated.

The insurer may reduce terminal bonuses for the current year if:

- Benefit payments are higher than the asset share after the fall in equity markets.
  - This may be possible if policy documentation and regulations permit the insurer to reduce terminal bonus rates that have already been declared for policies that are maturing.
  - It is important for the insurer to reduce terminal bonus rates on surrender of policies to avoid selection against the fund.

The insurer may reduce future terminal bonus rates:

- To smooth out higher terminal bonus payments in the current year and losses due to benefit payments above the asset share of policies.
- If global economic conditions are slow to improve and low equity returns persist in the future.

Any reduction in terminal bonus rates will depend on:

- Policyholder expectations and documentation to policyholders.
- The smoothing policy of the insurer and how this influences the potential size of the change in bonus rates and the time period over which rates would be changed.
- Size of free assets and impact of any losses from these policies on the free assets of the insurer.

*Part (i) was generally well answered, however in discussing the factors to take into account when determining the bonus philosophy, many candidates focussed their answer on factors determining the level and sustainability of the reversionary bonus, instead of on the strategic choice between reversionary and terminal bonus. Many candidates missed easy marks by not stating the theory on which their conclusions or approach is based.*

*Part (ii) was answered very poorly. Many candidates were under the false impression that terminal bonus, once declared for the year, cannot be amended under any circumstances. Very few candidates recognised that the level and duration of the equity market collapse would play a role in determining an adjustment to terminal bonus.*

## QUESTION 5

- i. The value of the liabilities for the whole life policies on market-consistent basis would be determined as follows:
- A market-consistent value of a liability should be determined as the price that someone would charge for taking responsibility for the liability, in a market in which such liabilities are freely traded. Where this information is not available approximate measures are used.

### Cashflow projection approach.

- Project the expected liability cashflows in each future year, under the portfolio of whole life assurance policies.
- These cashflows would include guaranteed benefit payments, regular commission payments, ongoing expenses and premiums.
- Market consistent assumptions might be found as follows:
  - Mortality assumptions could be determined from reinsurance risk premium rates;
  - Expense assumptions could be determined from expense agreements available in the market e.g. third party administration companies; and
  - Inflation assumption could be determined from the difference between risk-free fixed interest and inflation-linked bonds of similar term.
- As it may not be practical to find market-consistent expense and demographic assumptions, the cashflow projections would therefore be made on a best estimate basis plus margins to allow for the uncertainty of the payments.
- This may be done by applying the margin to each such assumption or by using the “cost of capital” approach.
- The projected cash flows would then be discounted at current risk-free rates of interest.
- The risk-free rate of interest to discount a cashflow due in  $t$  years’ time would be the current market redemption yield on a secure zero-coupon government bond of the same term.
- Swap rates may be used if the swap market is sufficiently deep.
- Alternatively, high quality corporate bond could be used, with an adjustment to the yield, to allow for any credit risk.
- Inflation-linked bond returns could be used for inflation-linked liabilities such as expenses.

### Replicating portfolio

- A replicating portfolio of assets could be selected as a portfolio of zero-coupon bonds with exactly the same future cashflows as the projected liability flows under the model.
- The uncertainty in the timing of the cashflows remains and therefore the required term of the zero-coupon bonds.
- The current market value of this portfolio could then be considered as the market-consistent valuation of the book of whole life assurance policies.
- The market values of the replicating portfolio of assets may need adjustment for any short-term anomalies in the market at the present time.

- ii. The investment guarantee in the 10-year single premium unit-linked product is analogous to options traded in the market place:
- Guaranteed minimum maturity values correspond to European put options.
  - Guaranteed minimum death values could be viewed as corresponding to American put options.
  - However European options can also be used if the timing of the expected guaranteed future death benefits can be estimated.
  - The underlying asset for the options is the local All-Share total return index.
  - The exercise price corresponds to the death and maturity guarantee.
  - For the in-force endowments, the expected minimum guaranteed benefits on a per-policy basis using the guaranteed minimum return needs to be projected.
  - From this the insurer will obtain a schedule of expected guaranteed minimum death and maturity benefits.
  - The insurer will also need to determine the level of the All-Share index corresponding to the minimum guaranteed benefits, as this will be used to determine the required exercise price on the options.
  - The market price of the options of relevant term and exercise price will be used to determine the liability for the investment guarantees.

This method is unlikely to be suitable since:

- The method requires market prices for a very large number of put options (there will be many combinations of terms and exercise prices required).
- Even in developed markets it may be difficult to find all the market prices needed, it will be even more impractical in a developing country.
- Market prices may be distorted by short-term factors.
- The insurer may wish to be more prudent than that derived from market prices.

*Part (i) was a straightforward question and most candidates scored well. Some candidates struggled to give details of how the market consistent assumptions for the discounted cashflow model are set. A few candidates neglected to discuss the replicating portfolio as an alternative valuation approach. Where they did, the details were sparse. Some candidates spent too much time discussing the cost of capital approach or the adjustments to the assumptions to allow for the illiquidity premiums which did not yield many marks. Some candidates spoke about the valuation of assets and the valuation of an endowment, which was not asked for in the question.*

*The majority of candidates struggled with part (ii). Some candidates failed to provide specific types of put options to use for maturity and death benefits, e.g. European/American put options respectively. A number of candidates neglected to answer the second part of the question regarding the efficacy of using option pricing and hence failed to score valuable marks. A few candidates explained how option pricing works in general without applying themselves to the specific situation provided in the question.*

## QUESTION 6

### i. Considerations:

- The benefits would need to be attractive to the employer (as potential sponsor) and to the employees.
- The definition of disability would need to be appropriate. For example, based on own/other job or Activities of Daily Living.
- The benefit should take account of pre-disability income (e.g. income in the month prior or average monthly income over the year prior to disability claim).
  - The replacement ratio needs to be such that it does not discourage a return to work. For example, 60%-90% of pre-disability income may be appropriate.
- An appropriate escalation rate could be considered, e.g. inflation-linked.
- The duration of the benefit would need to be considered. The benefits would need to cease on recovery, death or at an appropriate age, most likely the normal retirement age.
- The timing of benefit payments, likely to be weekly or monthly depending on the frequency of wage payments.
- The appropriateness of deferred periods.
- Whether a proportionate benefit would be offered on a partial return to work.
- Whether there are any regulatory requirements or restrictions.

### ii. Risks faced:

- The insurer will not have the necessary data or experience to price accurately.
  - The new product has a different target market making this more challenging. Claim rates will be significantly different for a low-income group relative to the professionals currently insured.
- The new product will have lower sums insured, and hence the expense loadings may have to be a bigger proportion of the premiums.
- The administration of the new product, in terms of monitoring the lives at risk, will be more complex as the insurer will need to check each week or month who is on risk for that week or month.
  - This makes the estimation of expenses more difficult.
- The volumes of business written will be difficult to estimate, which is important for expense loading assumptions.
- There is more chance that the new product could be abused by the employer who:
  - puts underperforming workers on disability or manipulates the wages or salaries of employees.
- The small sums insured may not justify expensive claims management, leading to more fraudulent, or marginal, claims being admitted.
- The small sums insured may not justify a lot of underwriting being done, which will impact the experience.
- Free cover limits will also play a role here.

iii. Role of a reinsurer:

- A reinsurer can assist with the product development:
  - Pricing and how proposed premiums compare to the rest of the market;
  - Determination of product features and terms and conditions; and
  - Risk management of the product (claims, underwriting, administration).
- A reinsurer can share in the risk of the product.
  - This would probably be through a quota share arrangement.
- As this is a new product, for a medium-sized insurer, a reinsurer could assist with financing for the product. For example, through financial reinsurance.
- If there are significantly more claims a reinsurer could assist with claims management.
- A reinsurer can perform an experience analysis and provide feedback as to how the experience compares to what was priced.

*For part (i) many candidates failed to answer the question and focus on the benefit definition of the product. A number of candidates focused on occupational definitions and ALDs rather than considering a range of aspects of how the benefits could be structured.*

*Part (ii) was poorly answered. A number of candidates gave points on general risks to the products and failed to focus on pricing risks. Candidates also failed to consider the scenario in the question and gave general points on high expenses, which did not score marks. A number of candidates missed scoring marks because they did not focus a risk of experience being different to that expected in the pricing.*

*Part (iii) was mainly bookwork and fairly well answered. Stronger candidate covered a wide range of areas where the reinsurer could assist the insurer.*

## QUESTION 7

i. Impacts on the company and risks faced:

### Market risk

- Investments may have lost value due to the economic challenges, resulting in lower free assets.
- Some investments (e.g. equity and property) may take a long time to recover.
- Short-term volatility of investments may have increased resulting in higher capital requirements for more volatile investments (e.g. equities).
- The impact of the lower asset values and increased solvency requirements depend on how well capitalised the insurer is.
- For longer term investments, there is potentially greater reinvestment risk as yields may be lower in the short term and higher in the long term.

### Business volumes

- The poor economic environment and restrictions in business may result in lower business volumes which would put strain on the insurer's ability to recover expenses.
- There may be a move towards lower premiums resulting in lower sum assured policies. If higher sum assured policies were priced to cross-subsidise lower sum assured policies this would result in an under recovery of expenses.
- Brokers and agents may move to other types of employment resulting in fewer intermediaries selling policies and lower business volumes.
- Salaried agents are likely to generate less new business resulting in losses to the insurer.

### Expenses

- Economic circumstances may result in an increased price inflation impacting on the inflation of expenses for the insurer.

### Withdrawal risk

- There may be an increase in withdrawals due to pressure on the affordability of premiums due to higher unemployment rates and failure of small businesses.
- This is a risk to the insurer at early policy durations when the asset share is negative.
- Such withdrawals are also likely to be selective, resulting in a worsening of the mortality experience on the in-force business.

### Credit risk

- The poor economic climate may result in a higher chance of default by corporate debt providers.
- The poor economic outlook may result in a deterioration in credit ratings. This results in higher future borrowing costs and an increase in the capital requirements for investments with worsening credit ratings.

#### Mortality and morbidity risk

- There may be an increase in deaths, particularly in respect of lives most exposed to the health pandemic.
- Policyholders may also not be able to access healthcare facilities if they have reached capacity, and/or may be unwilling to do so for fear of contracting the disease – exacerbating the situation with respect to mortality.
- Future experience would depend on how the company deals with underwriting, pricing and policy design going forward.
- There may be an increase in expected claims on disability, particularly if there is an increase in fraudulent claims due to the economic recession.
- There may be a long-term impact on claims experience for income protection policies if there is an increase in the factors that impact on the health of policyholders due to a reduction in usage of health care facilities in the outbreak period, poor economic environment and business restrictions.

#### Data risk

- Accuracy of death data will make insights from experience investigations for pricing challenging in the medium term.
- Clients will also have changed their behaviour and there is risk in the medium term that data from the past may be less relevant, and that new models and the parameters associated may be incorrect.

#### Competition risk

- Pressure on the income of individuals and businesses may result in increased competition.
- Competitors leveraging digital capabilities may have a competitive advantage in the restricted business environment.

#### Operational risk

- Business restrictions may impact the business activities of the insurer, particularly in the areas of sales and servicing of products.

#### Reputational risk

- The reputation of the insurer and the insurance industry in general may be negatively impacted by failure to pay claims due to exclusions relating to pandemics.
- This may result in an increase in complaints, an increase in policy withdrawals and reduced new business volumes.

#### Strategic risk

- Management and directors may experience challenges in responding to the changes in the economy and business environment.
- Investors may require higher returns on capital and may require the insurer to take higher risks in more competitive markets to meet stakeholder expectations.

#### Reinsurance

- Increase in cost of reinsurance, greater risk of default or risk to reinsurers not honouring claims due to exclusions on reinsurance policies.

ii. Actions that the company could take:

- Ensure that assets and liabilities are suitably matched to manage better the guaranteed liabilities or to better manage potential greater reinvestment risks in the future.
- Improve sales through the broker channel by ensuring good relationships and providing additional support to brokers in the challenging circumstances.
- Expand sales channels to access a wider customer base. For example, through telemarketing, partnerships or online methods.
- Focus on increasing retention activities and improved customer analytics and associated engagement with policyholders.
- Engage with distribution channels and consider changes to remuneration associated to facilitate better client retention, cross-sell and upsell.
- Consider whether to exit some lines of business (e.g. income protection).
- Consider whether to increase premiums based on the additional risk for new business or reviewable premium business.
- Although it may be difficult to increase new business and reviewable premiums due to affordability constraints in the current economic environment.
- Consider whether to move to reviewable premium business, which needs to be balanced also against long term reputation risk.
- Management of expenses is key in being able to ensure that earnings and capital remain viable in the medium to long term.
- The outbreak may heighten the urgency for the company to consider the viability of investing in automation, and digital self-servicing to meet client needs and save costs.
- Consolidation in the industry may allow benefits to be unlocked and economies of scale to be recognised.
- More frequent reporting and focus on key risk metrics and associated with mitigating actions.
- Repricing policies going forward. (It may not be known how long the outbreak will last.)
- Introduce exclusion clauses on new business (but may have a reputational risk).
- Seek appropriate reinsurance cover, this could include financing if required.
- Increase the rigour in underwriting to prevent anti-selection.

*A number of candidates made a reasonable attempt in both parts of the question.*

*Most candidates did not highlight enough points to score very well in part (i) given the high mark allocation. Some failed to articulate risks they specified mitigation for in (ii).*

*Some candidates did not make the best use of time by repeating the same point in different ways or by expanding too much in trying to explain why the point listed was valid.*

*Good students were able to present in a structured way several valid points such that each was clearly articulated and able to demonstrate relevance in the context specified in the question.*

## QUESTION 8

i. Suitability of corporate bonds:

- The assets match the benefit liabilities in respect of:
  - Nature: The non-profit annuity is fixed in nature, while the corporate bond returns are fixed in nature (provided they are held to maturity).
  - Currency: The assets and liabilities are both in local currency terms.
- It is unclear if the assets match the liabilities by term, however this may be unlikely since:
  - Life annuities are likely to have long terms (exceeding 20 years).
  - Corporate bonds are unlikely to exceed 20 years due to the investment risk associated with such a long term.
  - It is therefore likely that there exists significant reinvestment risk for the insurer in needing to roll-over the investments.
  - As this is a developing country, there may not be a well-developed corporate bond market, which will make it difficult to achieve exact term matching.
- The insurer's expenses in respect of annuities are real in nature, and therefore the bonds do not provide a suitable match by nature for these liabilities.
- Corporate bonds are likely to be far less liquid than government bonds, however this may not be a large concern for the insurer if bonds can be held to maturity.
- Corporate bonds carry a risk of default, and this is unlikely to make them suitable for matching guaranteed benefits:
  - The insurer may have a high level of capital assets to absorb some defaults, however it is unlikely to have sufficient free assets in the event of large-scale defaults.
- Corporate bonds are likely to offer higher expected returns compared to government bonds, to compensate for the higher default risk and lower liquidity:
  - This may allow the insurer to offer better annuity rates than competitors (provided it only takes credit for the liquidity premium, not the default risk premium).

ii. The insurer can use a model to determine the suitability of proposed investment strategies as follows:

- The liabilities, minimum regulatory capital and the assets are projected forward on assumptions that represent expected future experience.
- The insurer will also consider the effect of variations in the assumptions on the asset and liability projections.
- The insurer will determine an appropriate projection period (e.g. for the current strategic business planning or capital planning period) and an appropriate projection frequency (e.g. quarterly but at least annually to provide sufficient information on the free assets of the insurer).
- Liabilities and regulatory minimum required capital will be projected on the current supervisory basis based on the:
  - Current in-force policies using all the individual policies or model points and expected future new business using model points for the expected profile of new policyholders.
  - Assumptions for this model should be consistent with the assumptions for the asset model (e.g. the inflation rate should be consistent with investments returns).

- Assets (including free assets) will be projected using:
  - A stochastic investment model to simulate future investment returns and capital gains and losses.
  - The asset mix will be based on the current asset mix and expected future changes in asset mix.
  - Considering any regulatory restrictions on asset admissibility and liquidity needs of the insurer.
- The level of free assets will be determined at the end of each quarter for the entire projection period.
- The insurer will assess whether the projected levels of free assets meet the requirement of free assets being at least double of the minimum capital required by the regulator.
- The stochastic models can be run many (1000s) of times using the randomly generated investment returns.
- This will produce a statistical distribution of the free assets relative to the regulatory minimum required capital available each quarter.
- From this, the probability of not meeting the insurer's targeted level of free assets can be estimated given a particular investment strategy.
- The insurer will repeat the process for the different proposed investment strategies.
- The investment strategy that meets the targeted level of free assets in each quarter with the highest probability may be selected.
- The insurer may also assess the effect of the investment strategy on future shareholder earnings and choose an investment strategy that maximises future shareholder income achieving the targeted level of free assets with a certain probability.

*For part (i) candidates who scored well gave a wide range of points focusing on the current investment strategy relative to the liabilities and the expenses. A number of candidates lost time giving points on improved investment strategies which was not asked for in the question.*

*For part (ii) weaker candidates gave vague and general points on modelling instead of focusing on the modelling of the assets and the liabilities for this product. Stronger candidates considered the steps for modelling assets and liabilities with a stochastic model for investment returns.*