

EXAMINERS' REPORT

November 2022 examinations

Subject F102 — *Life Insurance* Fellowship Principles

INTRODUCTION

The attached report has been prepared by the subject's Principle 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. Assumptions required:

Mortality:

- The base mortality assumptions will be needed.
- An assumption on the level of expected future mortality improvements will be needed.
- The assumptions should be based on the expected demographic profile of the policyholders and have regard to recent mortality experience investigations which the company has conducted.
- Since it is a supervisory reserve performed on a prudent basis, the prudential margin would be a reduction in the base mortality, and larger future mortality improvements (as it is more prudent to assume fewer lives die for an immediate annuity).

Benefit inflation:

- A benefit inflation assumption will be required since it is an inflation-linked annuity.
- This could be based on the expected future rates of inflation based on the differential between the government fixed interest securities and government index-linked securities i.e. the difference between the nominal and real curve.

Valuation rate of interest

- A valuation rate of interest will be required which should take into consideration the yield on the government or corporate bonds (taking default risk into account).
- The prudential margin which should be included would be a reduction in the valuation rate of interest.

OR Valuation rate of interest net of benefit increases:

- A valuation rate of interest will be required which should take into consideration the yield on the government or corporate inflation-linked bonds (taking default risk into account) as these are the likely assets which the entity will use to match these liabilities with.
- This automatically allows for benefit increases matched to the index used by the bond.
- This may not be appropriate if the lags on the increases are different.
- It may also not be appropriate if different indices are used.
- The prudential margin which should be included would be a reduction in the valuation rate of interest.

Expenses:

- An allowance for expenses needs to be included which should reflect the expenses expected to be incurred in administering the annuities.
- This should also include a share of marginal/variable as well as overhead expenses.
- An explicit assumption will be required to allow for future inflation of expenses, which could be based on:
 - Current rates of inflation which can be based on recent actual experience of the life insurance company; or
 - As for benefit increases, use the difference between the nominal and real curve.
- The prudential margin would be an increase in expense and expense inflation assumption.

Withdrawals:

- Since it is an immediate annuity, withdrawal assumptions are not applicable.

ii. Mortality:

- The assumptions should be based on the expected demographic profile of the policyholders.
- The insurer likely can't use its own experience for this newly launched product.
- The target market may be different to the annuity book.
- Age profile would be broader.
- The prudential margin would need to be an increase in the base mortality (as opposed to the decrease used on the annuity product).
- May want different mortality tables for each premium option.
 - E.g. if target markets are different or expect more anti-selection on age-related premiums.
- May use information from a reinsurer to assist with setting the mortality basis.
- Another external data source could perhaps be used (e.g. industry data) but the insurer would need to adjust for its expected business mix.
- In addition, the insurer may want to include some additional margin given the uncertainty around the new product.
- If the age-related premiums are reviewable, this margin could be reduced.

Withdrawal:

- Withdrawal is quite a material assumption.
- Given the different premium pattern options, the insurer might find it necessary to have different withdrawal assumptions for the different premium patterns.
- Since level premium policies go through a 'pre-funding' stage where premiums are generally higher than the equivalent age-rated premium and hence the withdrawal assumption may be higher.
- However, once the level premium policies premium is less than the age-rated premium we would expect the withdrawal rates to be lower.

- Hence, for age-rated policies, the direction of the margin would be an increase in the withdrawal assumption.
- However, for level premium policies it would depend on the stage of the policy that the policy is in. If it is in the "pre-funded" stage, then an increase in the withdrawal assumption would introduce prudence.
- However, once they are in the "funded" stage i.e. where the level premium is insufficient to cover the actual claims cost then it would be prudent to decrease the withdrawal assumption.

Expenses:

- Considerations will largely be similar to those for setting the assumptions for annuities described above.
- However, immediate annuities are often not underwritten at all but the company will need to underwrite the whole of life assurance leading to higher initial costs.
- The insurer may need to include an assumption for initial expenses, commission and commission clawbacks which will be material for the whole of life product.
- Renewal expenses will need to be estimated as these expenses (regular premium collection, etc.) will differ from those for annuities (relating to annuity payments).
- The insurer will need to allow for expenses at claim stage which would not have been applicable under the annuity contract.

In part (i) the majority of candidates were able to describe each key assumption. Candidates who performed particularly well on the question focused on explaining the margins that would be incorporated into each assumption and importantly which direction that margin would be applied as opposed to just talking about "adding margins" as a general point.

Part (ii) was generally not well answered, with most attempts being too general and without focusing on the specific considerations within each of the assumptions for the different premium payment groups. In addition, due to the product being a whole life product (as opposed to the annuity in part (i)), the direction of the margins for particular assumptions may be different.

QUESTION 2

i. Regulatory restrictions:

- There may be restrictions placed on premium rates or charges for certain contracts.
- There may be restrictions on the types of contracts that may be offered.
- There may be restrictions on the terms and conditions placed on certain contracts, e.g. restrictions on surrender value terms.
- There may be enhanced disclosure requirements.
- There may be restrictions on underwriting.
- There may be higher minimum requirements for statutory reserves, or there may be restrictions on the amount of new business written through minimum solvency requirements.

- There may be restrictions placed on the types of assets which may be held.

ii. Investments for the funeral business:

- The insurer will first consider the investments that match the liabilities by nature, term and currency.
- The benefits are without-profits, making the nature of liabilities fixed in monetary terms (whether level or fixed annual increases).
 - Fixed interest bonds of suitable term are suitable for matching these liabilities.
 - Government bonds are lowest risk, while corporate bonds may provide a higher expected return for higher default and liquidity risk.
- Local currency assets are suitable for matching local currency liabilities.
- Funeral cover is usually short-medium term cover, and it should be possible to find bonds of suitable matching term.
- Some liabilities will relate to the management expenses for this business, which are mostly salary-related and therefore inflation-linked.
 - Investments that produce expected real returns such as index-linked bonds and perhaps equities and property may be suitable for these liabilities.
- Cash should be held as working capital and to meet short-term expenses and claim payments.
- The extent to which investments can mismatch liabilities depends to a large extent on the level of free assets of the insurer.
 - The larger the level of free assets, the more investment freedom the company has.
 - Mismatching could be by nature, term, and/or currency, in order to maximise returns for shareholders.

iii. Impact on sales volumes:

- Sales volumes of the savings contracts may drop as investors divert money to less risky investment structures in the short term, such as bank deposits.
- To the extent that economic conditions deteriorate as a result of higher interest rates, and result in higher unemployment, sales of most products, and in particular savings type products, will suffer as premiums become unaffordable.
- The volumes of with-profits contracts may reduce by less than the volumes of unit-linked savings contracts in the short term as the company will have the ability to smooth bonus rates through volatile market cycles.
- The impact on the volumes of funeral insurance contracts should be negligible, however, it depends on how employment levels are affected.

Impact on product profitability:

- A drop in the asset values of unit-linked contracts will reduce the fund-based fee revenue of the company and therefore the product profitability.
- Sustained poor investment returns may lead to an increase in lapses for the unit-linked contracts, reducing product profitability.

- Higher unemployment will most likely lead to higher lapses and lower sales, impacting profitability negatively.
- Depending on the degree of matching and reserving methodology, a sudden drop in the asset values may lead to reserves decreasing by less on some contracts, e.g. whole life contracts, leading to losses.
- As funeral contracts have lower sums assured and require smaller reserves, the impact on the profitability of these products should be negligible.
- As profits and losses are shared with policyholders of with-profits contracts, the impact on the short term profitability of these products to the company is expected to be muted.

iv. Risks:

- The internet-based distribution platform will sell to a different target market than the adviser channels.
- The target market is likely to have a different underwriting experience, for which the company may not have experience data.
- This data may be available through local reinsurers in the foreign market.
 - However, the reinsurance terms may not be attractive, impacting product margins.
- Clients purchasing insurance products through an internet-based platform are likely to be much more price sensitive, reducing product margins.
- The company should consider what the competitor offerings look like through similar channels in the developed country and how competitive their product offering would be as this would impact product volumes and margins.
- The Life & Invest brand will not be well recognised in the new market, which may negatively impact sales volumes, especially those of savings products.
 - Higher costs may thus be incurred to market effectively and build credibility. This could increase premiums and negatively impact sales.
- An internet-based sales channel may not be suitable for the company's full range of products, negatively affecting sales volumes
 - It may be well suited to simpler products such as funeral products and with-profits endowment products.
 - It will not be suitable for whole of life products as the ability to underwrite will be negatively impacted, leading to reduced margins through worse experience.
 - Savings products with complex charging structures or complex underlying investment structures, such as unit-linked contracts typically sell better through advised channels, where there is a better opportunity to explain terms face-to-face for an investor.

Part (i) was a bookwork question and was well answered by most candidates.

Part (ii) was well answered by most candidates. A number, however, mistakenly indicated that funeral liabilities would be long term and thus that bonds of a suitable term would not be available.

Part (iii) was poorly answered by most candidates. Very few candidates referenced a diversion of new business flows to competing banking products or recognised the fact that with-profits policies would be mostly unaffected due to smoothing of returns and bonus levels.

Part (iv) was poorly answered by most candidates, as most were distracted by potential administration issues or technical challenges that an internet platform may face, as opposed to evaluating the basic risk factors associated with an insurance product.

QUESTION 3

i. Factors:

- The model points should be chosen in such a way that they represent the mix of expected whole life assurance business accurately.
- Specifically, you would want to ensure that there are model points from each of the age bands shown in the product design.
- Each model point should represent a group of policies with similar features and characteristics of the expected whole life assurance book.
 - E.g. age of policyholder, sum assured applicable, different premium levels.
- Different model points would specifically be chosen, to allow for variations in factors that directly affect capital requirements.
 - E.g. mortality levels which differ by age and other underwriting factors such as gender, smoking status, health status etc.

ii. Advantages of using a deterministic model for profit testing:

- The model should be relatively easy and quick to run for different premium levels to assess the impact on our profit criteria.
- Different parameters can also be sensitivity tested/scenarios tested by re-running the model to understand the sensitivity of profit towards different key assumptions thereby getting a clear understanding of which parameters/assumptions cause more risks to the profitability of the product.
- The time to build the model should be relatively quick compared to a stochastic approach.
- Modelling mortality deterministically also makes sense as it is normally not subject to large fluctuations as would be the case for say investment returns.
- A deterministic model would allow easier iteration to allow us to understand the parameters better. (We could use this over time to test and calibrate a stochastic model with less chance of then having a spurious outcome from a sensitive parameter.)

iii. Description of model:

- The model would project all expected cashflows associated with a single policy or model point up to some terminal age, for example 100.
- Cashflows should be projected on a monthly or annual basis.

- To calculate expected cashflows, allowance would need to be made for the different decrements that could influence a potential policyholder, for example, death, cancellation of policy or making it paid-up etc.
- Specific care should be taken at the ages when large changes occur for example at ages 35 and 50 where a possible spike in cancellations could occur.
- The model should allow for all potential cashflows, such as:
 - Premiums charged and the changes in premium rates over time (by age) depending on the nature of the premium pattern/escalation pattern selected.
 - Specifically, the premium levels would need to be flexible enough to adjust in line with the sum assured changes if that is the intended design.
 - Expenses associated with the product for example initial commission, upfront distribution expenses, policy administration, premium collections, ongoing client communication expenses etc.
- The model would need to be able to accommodate different premium levels for which a profit metric is produced.
- The model output should align with the profitability metric decided upon, for example, net present value of expected profit or internal rate of return, etc.
- A suitable risk discount rate will be used when calculating the net present value of profit which considers the riskiness of the product, assumptions and the capital requirements of shareholders.
- The model should allow for the build-up of reserves over time and capital requirements including solvency capital and allow for a suitable cost of capital as an outflow item.
- The model would then be run for the different model points that represent the future expected new business sales for the company to produce a projected income statement and balance sheet for the business.

iv. Premium pattern:

- If a level premium or fixed increasing premium is used:
 - The premiums would need to be quite high initially (relative to the initial sum assured) as large reserves will have to be built up.
 - This might make the product appear expensive and unattractive to potential policyholders.
- If premiums change in proportional to the sum assured:
 - This might be difficult to explain to policyholders.
 - This might result in high lapses, particularly at age 36.
- If premiums are age-rated with some link to sum assured:
 - This would be even more complicated for policyholders to understand.

Part (i) was reasonably well answered. However, many students focussed on selecting model points for conducting a valuation on existing business rather than for pricing a new product.

In part (ii) many candidates only focussed on the generic comparison of a deterministic model versus a stochastic model and did not specifically apply their knowledge to the case at hand. Only a few mentioned that the main variable impacting the price would be the mortality rates which are relatively stable and hence a deterministic approach is sensible.

In part (iii) the candidates who described the cashflow model did fairly well. Many went into lots of detail discussing how the assumptions would be set rather than describing the model workings.

Only a few candidates scored well in part (iv). The majority focused their discussion on the level of premium rather than the premium pattern.

QUESTION 4

i. Benefits for the company:

- May bring the product in line with those of competitors or make it more appealing in the market.
 - This may lead to increased sales and profits for the company. As it could result in designing a more appealing or easier understood solution to clients or advisers,
 - This would reduce the likelihood of new business volumes being insufficient to cover the company's initial expenses.
- The company may be able to implement charges that are more easily reviewable
- It may also be able to formulate new (and easier to achieve) policyholder reasonable expectations.
- The company may be able to implement a more capital efficient product.
 - E.g. reduce guarantees; or implement higher initial charges.
- The unitised with-profits product may increase operational efficiency
 - E.g. The current administration systems, distribution and other processes for unit-linked business may only require minor changes to cater for the new product range.

Benefits to new policyholders:

- The new product is easier to understand and more transparent than the conventional product.
 - As fees are explicit and bonuses may be more easily understood in terms of value of units
- There is usually less smoothing in unitised with-profits business, so it may be more equitable to different cohorts of policyholders
- The company may be able to offer more choice, e.g. by level of risk/return trade-off and level of guarantees.
- The lower level of guarantees compared to the conventional product may provide greater investment freedom to pursue higher expected return investments leading to better returns for policyholders.

Benefits to existing policyholders:

- Any accumulated surplus won't be shared with new policyholders.

- This would result in a more equitable distribution to existing clients who contributed to the surplus.

ii. Investigations and associated action:

- Investigate whether any mistakes were made in the initial analysis to determine the actual expenses per policy (e.g. data used is all correct).
 - E.g. Initial expenses misclassified as renewal expenses.
- Check for once-off items.
 - If this is causing a distortion no remedial action may be required.
 - However, anticipated once-off expenses should be accounted for in the charging structure or bonuses.
- Check whether the deviation is significant in terms of absolute size.
 - For a small book, no immediate action may be taken.
- Check whether higher expenses per policy are due to expenses exceeding the expected level, or due to lower than expected business volumes, or both.
 - Past budgets and business plans may be useful sources for comparing against actual experience (expenses and business volumes).
 - Higher-than-expected expenses should be investigated to identify specific drivers and sources, and whether these can be managed in future, e.g. through cost-cutting exercises.
 - If business volumes are lower-than-expected then causes for this should be investigated and whether this trend is likely to continue.
 - E.g. higher than expected withdrawals or lower than expected new business may have led to lower overall volumes.
- If the expense over-run is significant and costs cannot be reduced or volumes increased:
 - Pricing assumptions and charges will need to be updated.
 - For new business and for existing business (if charges are reviewable).
 - Valuation assumptions will be adjusted as necessary.

This question was generally poorly answered.

In part (i) many candidates used the terms unitised with-profits and unit-linked interchangeably, without demonstrating an understanding of the difference between them. Furthermore, some weaker candidates assumed that “closed to new business” meant that the product was closed, and that the insurer had the right to use the surplus as it wished. Some candidates incorrectly focussed on risks rather than the benefits of the company’s decision. Often points made were too generic to gain credit.

In part (ii) only the stronger candidates used the context well, structuring enough points to answer the question whereas weaker candidates either only listed (often incorrectly) the steps in an expense investigation, or provided management actions not related to the pricing or valuation bases (and often to elements like mortality or investment risk).

QUESTION 5

i. Actuarial funding:

- This is the method that a life insurance company can use to reduce the size of the “unit reserves” it needs to hold in respect of its unit-linked business.
- The company effectively capitalizes some or all of the unit-related charges it expects to receive from the units it has nominally allocated, with the funding then being repaid from these future charges as they are received.
- When associated with appropriate surrender penalties it enables the company to:
 - reduce its financing requirements because initial expenses are matched in terms of time and nature.

ii. Surrender values should:

- Take into account policyholder’s reasonable expectations.
- At early durations, not appear too low compared with premiums paid (taking into account any projections given at new business stage).
- At later durations, be consistent with projected maturity values.
- Not exceed earned asset share, in aggregate, over a reasonable time period.
 - Make an appropriate contribution to profit, if possible (and consistent with the other objectives).
- Take account of surrender values offered by competitors.
- Not be subject to
 - frequent change, unless dictated by financial conditions.
 - discontinuities over the duration of a policy.
- Not be excessively complicated to calculate, taking into account the computing powers available nor explain to policyholders.
- Be capable of being documented clearly.
- Avoid selection against the insurer, including lapse and re-entry risks.
- Take account of auction values that may be available.
- Comply with regulatory and professional requirements.
- Appropriately allow for the cost of administering the surrender.

iii. a. Impact on ability to actuarially fund:

- Both designs include unit-related penalties, which will allow the company to actuarially fund units.
- Under both designs the maximum rate that can be used in the funding-factor is 0.2% (the fund management charge in respect of initial expenses).
- Under B, the actuarial funding factors will be limited to a maximum term of 10 years.
- Therefore actuarial funding will have a larger effect for A.

b. Fairness:

- To policyholders that surrender:
 - Both surrender penalties reduce over time (as a percentage of fund value), which is reasonable as initial expenses are being repaid over time.
 - Under A, the surrender penalty is approximately equal to the future management charges (in respect of the initial expenses) the company will not receive, which seems fair.
 - Under B, there is a relatively large penalty at early durations, which may not be viewed as fair to early leavers.
 - Under B, no surrender penalty at later durations may be overly generous to policyholders that lapse at these durations.
 - However, this may be appropriate as the insurer would have likely recovered a large portion of the initial expenses incurred.
- To policyholders that do not surrender:
 - Under A, the initial expenses are recovered, and therefore policyholders that do not lapse should largely be unaffected by surrenders.
 - Under B there is an under-recovery for late surrenders.
 - If these losses are passed on to other policyholders through higher policy charges (compared to A), this may not be seen as fair.
- To shareholders :
 - Under A, shareholders are not compensated for the loss of future profits. This may be viewed as unfair.
 - Under B:
 - Shareholders would receive some profit on surrender on very early surrenders.
 - e.g. $0.4\% \times 10 = 4\%$ of fund value $> 0.2\% \times 15 = 3\%$ of fund value.
 - Shareholders would not be compensated for (some of) the lost future charges, which could be unfair.
 - Under B, there is a cross-subsidy between policyholders that surrender early and those that surrender later.
 - B therefore exposes the shareholder to more risk, (due to it being less capital efficient and the cross-subsidy risk).
 - It is not clear that this design compensates the shareholder for that risk, which could be viewed as unfair.

Parts (i) and (ii) were generally answered well

For part (iii) most candidates compared the two designs, rather than discussing the two designs and giving reasons why each design impacted the ability to use actuarial funding and or why the design is fair (or not).

In addition, many candidates considered the surrender penalty to decide on the maximum discount rate that can be considered for actuarial funding. While the surrender penalty protects the company when policyholders surrender, it is not available for those that remain in-force.

QUESTION 6

i. Factors:

- The risks faced by the insurer.
 - The greater the risks faced by the company related to the new product the greater will be the extent of reinsurance needed.
 - The larger the benefits offered and/or replacement ratios, the greater will be the need for some form of reinsurance.
 - A high degree of future benefit increases can result in significant risk, and therefore a greater amount of reinsurance will likely be required.
 - If the insurer is planning on entering a particularly risky target market, a greater amount of reinsurance will be required.
- The experience of the insurer.
 - As this is a new product the company is likely to need reinsurance as it will have limited experience to draw on.
 - If it has similar products this may reduce the need for reinsurance as it may have relevant experience data to draw on.
 - The extent of technical pricing assistance available from the reinsurer could play a role.
 - The more competent and experienced the insurer's underwriting staff, the less the need for reinsurance or technical assistance
- Reinsurance available in the market for this type of product.
 - If there is nothing suitable available, it is a moot point.
- The cost of reinsurance.
 - If the reinsurer wants to charge significantly more than the insurer's estimate of the underlying risk cost, hence making the product unmarketable, it may not be able to use reinsurance.
 - If reinsurance is perceived to be cheap the insurer may put more reinsurance in place.
- Level of free reserves.
 - The larger the free reserves the less need there may be for reinsurance.
- The insurer's risk appetite.
 - The more risk averse the insurer is, the more reinsurance will be required.
- The impact of reinsurance on solvency capital requirements.
 - If reinsurance results in a significant reduction in solvency capital requirements, the insurer may seek out a larger amount of reinsurance.
- The terms of reinsurance on offer.
 - The more onerous the terms and conditions, the less likely the insurer will be to take up reinsurance.
- Regulation may place requirements/limits on the amount of reinsurance to be used.

ii. Reinsurance programme:

- This will depend on the factors mentioned above.
- Quota share reinsurance as this will protect the insurer against parameter risk.
- Surplus reinsurance will protect the insurer from claims on the larger policies.

- Stop loss reinsurance (if available) could protect the insurer from overall poor experience on the portfolio.
- Catastrophe cover could help protect the company from multiple claims arising from a single event.
- The insurer may need to reinsure more than it would ideally like (quota share rather than surplus, say) to get access to technical assistance from the reinsurer.

ii. Information from a standard application form:

- Height and weight;
- smoking and drinking habits;
- current health and details of any current treatment being received;
- personal medical history (any major illnesses or operations);
- family medical history (hereditary ailments like heart disease);
- occupation;
- potentially dangerous pastimes/hobbies;
- income; and
- assets and liabilities.

Part (i) was generally well answered by most candidates. Candidates scored well if they identified which factors would have an impact on the amount of reinsurance sought out, as well as identifying whether more or less reinsurance would be bought based on the factors identified.

Candidates scored well in part (ii) if they were able to name the specific reinsurance arrangements which would be appropriate.

Part (iii) was well answered by most candidates.

QUESTION 7

i. Conditions may include:

- The sum of the unit and non-unit reserves for a policy should not be less than any guaranteed surrender value.
- The future profits arising on a policy with a negative non-unit reserve need to emerge in time to repay the “loan”.
- After taking account of the future non-unit reserves, there are no future negative cashflows for the policy i.e. there should be no future valuation strain.
- In aggregate, the sum of all non-unit reserves (including from other business) should not be negative.
- Negative non-unit reserves cannot be used to offset unit reserves.
- Assumptions must be prudent (i.e. they should lead to larger reserves) in order to ensure that the negative non-unit reserve is not too aggressive resulting in upfronting of profit recognition.

ii. Accounting information:

Revenue account:

- Premium income
- Investment income
- Charges collected (from premiums and unit-linked)
- Claims outgo (death, maturity, surrender)
- Expenses outgo (commissions, life office costs)
- Tax outgo

Balance sheet:

- Asset values (including current assets)
- Accounting provisions (including current liabilities)

Fund management information:

Overall and per fund if more than one fund:

- Asset values for the fund (including a breakdown of holdings and their values)
- Investment income (e.g. dividends, interest, rental)
- Capital gains (realised and unrealised)
- Net cashflows received for investment or paid out (e.g. to meet claims)
- Transaction costs paid from fund assets

iii. Data checks:

Accounts versus Fund manager information

- Fund manager net cashflows compared to cashflows from the accounts e.g. net cashflow \sim premiums received – claims – expenses – tax (from accounts).
- Fund manager investment income compared to investment income shown in the accounts should be consistent.

Accounts versus data extracts

- Assets (from accounts) \sim number of units (in force) x unit price at valuation date.
- Accounts death benefit outgo \geq sum of unit values for deaths (in movements file).
 - And/or accounts death outgo \sim number of deaths (movements file) x average death benefit (taken as max of SA and unit value; from in-force file).
- Accounts maturity benefit outgo \geq sum of unit values for maturities (in movements file).
 - And/or accounts maturity outgo \sim number of maturities (movements file) x average unit value (in-force file).
- Accounts surrender benefit outgo $<$ sum of unit values for surrenders (in movements file).
- Number of units purchased (data extract files) consistent with revenue account (premiums received / average unit offer price).

- Check internal unit movements (e.g. charge encashments, such as expense and mortality charges deducted from policyholders' funds by cancelling units) are consistent with surplus emerging during the year (from Accounts).

Fund manager information versus data extract files

- Fund manager total returns should be consistent with the increase in unit price.

iv. Possible reasons:

- A positive non-unit reserve implies that future expected charges are not sufficient to meet expected non-unit fund outgo (including expenses and benefits in excess of the unit fund).
- As assumptions have remained unchanged, an increase in non-unit reserve will likely have occurred due to unfavourable experience.
- Poor (possibly negative) investment returns over the year:
 - This leads to lower fund values, which in turn leads to lower fund-related charges expected in future without a corresponding decrease in future expenses.
 - Lower fund values increase the value of the maturity guarantees which may need to be paid from the non-unit fund.
 - Lower fund values increase the value of death benefits to be paid from the non-unit fund (resulting in a positive non-unit reserve if mortality charges are non-reviewable and insufficient to cover expected death benefits).
 - Lower fund values decrease the value of future fund-based surrender charges.
- Expenses per policy may have increased unexpectedly during the year:
 - This increases the value of future expenses to be paid from the non-unit fund which may not be matched by increasing charges.
- A greater than expected number of policies being made paid-up:
 - This results in a loss of future charges had the policy not gone paid-up due to lower future fund values.
 - It also increases the value of maturity guarantees as the unit fund will not grow as quickly as before.
- Change in the profile of policies on books leading to more of the smaller and less profitable and loss-making policies being left on the books e.g.:
 - Proportionately more surrenders of large policies occur where charges exceeded expenses, leaving behind proportionately more of the smaller unit fund policies.
 - New business comprises more of the smaller and less-profitable policies.

Parts (i) and (ii) were bookwork questions and were generally well answered.

Part (iii) was generally not well answered, with many candidates focusing on general data checks as opposed to focusing on specific data checks which would be used to compare policy data, accounting information and fund management information.

In part (iv) some candidates answered the question quite well. However, it was clear that some ran out of time. A number of candidates misunderstood how a non-unit reserve is determined

and swapped around their explanations, i.e. wrote about how investment returns might have been better than expected etc.

QUESTION 8

i. a. Mortality and morbidity risk:

- The risk is that mortality and/or morbidity is heavier than expected and is not covered by the benefit charges.
 - This is of relevance when the unit fund is below the guaranteed death/disability benefit.
- The risk is exacerbated because the company has no experience in the new market.
 - The extent of the risk will depend on how applicable the data used are.
 - Assistance/data could be sought through a reinsurer.
- The risk will be higher if initial underwriting is not sufficient.
- Adequate allowance for the uncertain mortality/morbidity should be allowed for in pricing.
- Reviewable charges should help mitigate the risk.
 - However, the reviewable charges and premiums may encourage the office to make unrealistically low estimates of future mortality in pricing and reserving bases.
 - It is not certain that the market will accept significant increases in charges.
- If mortality/morbidity experience is favourable, the office may come under pressure to reduce benefit charges (and premiums at review).
- The disability definition, which is based on occupation, may exacerbate the morbidity risk as it may be more subjective than one based on activities of daily living.
- Anti-selection may be a problem if the reviewable premiums (only guaranteed for 10 years) result in policies being cheaper than their conventional counterparts for longer terms.
- If selective withdrawals from healthy lives are more than expected this would also pose a mortality/morbidity risk.
 - This is particularly so at the time of premium review.
- Small volumes of business, likely initially in a new market, would increase the mortality/morbidity risk.
- Poor performance on the assets underlying the unit fund will exacerbate the mortality risk (owing to there being a larger sum at risk).

b. Expense risk:

- The risk is that the expenses are higher than anticipated and not covered by the management charge.
- The risk is exacerbated by the fact that there is a mismatch in nature, timing and currency between the charges and the expenses.

- There is a risk that initial expenses might not be recouped if fund growth is not as expected.
- The company is also exposed to the risk of inflation being higher than expected on the administration and overhead expenses over the term of the policies:
 - The extent of this risk will depend on how closely matched investment growth is to expense inflation.
 - Charges are fund-related and so might be expected to produce amounts which beat inflation.
- The level of expenses will be uncertain because the office is entering a new market with a product new to that market.
 - E.g. admin. costs, development costs, marketing campaign costs.
- The costs of implementing premium reviews may not be known up front.
- Changes in the mix of business from that anticipated is also a problem as there are likely to be cross-subsidies involved in the expense recoupment (between policies with large & small unit funds).
- Lower than expected new business volumes, which is a significant risk in a new market, may mean fixed expenses may not be adequately recouped.
- More withdrawals than expected may also result in overhead expenses not being covered.
 - However, the surrender penalty may reduce this risk.
- Reviewable charges can in theory protect the company.
 - However, the company may not be able to review charges owing to factors such as policyholder reasonable expectations and competitive pressure.

ii. Recouping initial expenses:

- Initial expenses will have to be recouped through the management charge as this is the only charge (other than the benefit charge) on the contract.
- The management charge will thus need to be higher than required to merely recoup renewal expenses.
- The additional charge could apply to all units or only to “Capital units” issued during an initial period.
- In either case a unit-related surrender penalty will be required to recoup outstanding initial expenses on early surrenders
- Under this approach actuarial funding can then be employed to reduce new business strain, viz:
 - Initially purchase fewer units than notionally allocated.
 - Purchase the “missing” units over time from the future unit-related profits (associated with the extra management charges on the units).
 - A lower unit reserve is permissible because the full unit fund is only required on death/disability, which thus reduces new business strain.
 - The larger initial cash flow produced provides a better timing match for initial expenses and reduces the company’s exposure to the investment risk.

In part (i) most candidates did not list sufficient points for the marks available. Some candidates missed that even though premiums were not able to be reviewed for 10 years, charges were

able to be varied. As the question asked for an outline, marks were not awarded for simply listing generic items such as parameter risk or anti-selection.

In part (ii) only the stronger candidates explained the method sufficiently.

END OF EXAMINERS' REPORT