EXAMINERS' REPORT

June 2014 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. Asset-enhancing financial reinsurance can help since:

- It may be used to unlock a proportion of the value of the "profitable" in-force business or discounted cashflow on policies.
- The value of in-force (VIF) is the excess of the statutory reserves over the realistic reserves in a portfolio.
- VIF will be released over time, but is currently an off-balance sheet, non-tangible asset.
- In exchange for entering into a reinsurance contract on existing business, typically an original terms quota share, the reinsurer gives the insurer cash now.
- This is paid back over the next few years from the future emergence of the VIF as future profits.

This may be preferable to a loan since:

- The cash received from the reinsurer increases the assets of the insurer's balance sheet.
- However, there is no change in the liabilities since the financing reinsurance takes the form of a contingent loan that was provided by the reinsurer.
- The loan is contingent since the repayment of the loan is dependent on the future profits arising (VIF and the block of business on which the loan has been secured will be specified).
- A regular loan would create an additional liability on the balance sheet that may not be desirable for the company.
- Regulations may prohibit insurers from taking out a loan.

ii. Reasons:

- A proportional arrangement may be a requirement from the reinsurer to provide technical support.
- Technical support is likely to be required given that the company is new to CI products, may be exploring new, unfamiliar target markets and/or sales channels.
- Technical support may include:
  - Product development, data and pricing.
  - Underwriting guidelines and/or manuals, assessing sub-standard or very large cases.
  - Assistance with claims assessing.
  - Training of staff.
  - Monitoring of the emerging experience.
- The proportional reinsurance arrangement will also help with:
  - Reducing new business strain as capital may be scarce during the expansion.
  - Reducing claims volatility which might be desirable given that the book will take time to grow.
  - Perhaps reducing regulatory capital requirements.

iii. The key interested parties:

- Shareholders – stability and protection of profits and continued existence of company, access to expertise of the reinsurer to keep the company up to date with trends.
- Clients – ability of their insurer to meet claims, even under difficult claim/ economic circumstances.
- Regulator – compliance to any regulations relating to reinsurance, capital adequacy affected by security of reinsurer.

Other interested parties include:

- Credit rating agencies – to assess the credit worthiness, and hence rate, the insurer.
- Intermediaries – to assess the stability of the insurer and its ability to pay claims.
- Auditors – to audit the reinsurance arrangements, including premiums paid and recoveries made.

This was a fairly straightforward question handled reasonably well by most candidates. In part (i) some candidates did not answer both parts of the question, i.e. how asset-enhancing reinsurance can be used, and why it may be preferable to a loan.

In part (ii) the answers of several candidates were overly generic, giving general reasons for reinsuring and not focusing on the specific question. Some candidates, unnecessarily, explained what proportional reinsurance is. Part (iii) was very straightforward, with many candidates scoring full marks.

QUESTION 2

i. Medical conditions:

- Cancer
- Heart attack
- Stroke
- Coronary artery bypass graft (bypass surgery)

ii. Difficulties in pricing:

- Data:
  - The company is unlikely to have sufficient internal data with which to price the conditions that it has not priced in the past.
  - External data such as industry investigations, international research or reinsurer data may not be available.
  - Any external data may not be relevant, or may be based on different disease definitions.

- Tiered benefit:
  - To tier the benefits the company first needs definitions for the different severity levels for each of the conditions covered.
  - The company would also need incidence rates that correspond to those definitions.
  - Determining appropriate payout percentages for different severity levels would also be difficult, and would require significant medical expertise.
  - The company may also need to adopt a multistage modelling approach to allow for disease progression (for example a low severity cancer claim may later become more severe).
  - It is unlikely that offering tiered benefits on anything other than the four core benefits would be viable, and even on those the company would have difficulty coming up with accurate rates.
- Medical advances:
  - The uncertainty about both current rates and future changes in experience due to medical advances makes it difficult for the company to price the 10 year guarantee.
  - Medical advances (which are very difficult to predict) may lead to earlier detection of claims (hence more frequent low severity claims).
  - Medical advances may also prevent more serious conditions from occurring.
- Accelerator benefits:
  - If the benefit is offered as an accelerator on life cover it would be necessary to calculate survival factors (e.g. for 30 days after the occurrence of the claim event), since death within the survival period as a result of a critical illness would result in a death payment.
  - This factor would then be used to determine an "overlap discount" which the company would need to apply either to the mortality or to the critical illness rates.
  - The company is likely to have very limited data with which to determine such survival factors.

Difficulties in administering:

- Underwriting:
  - The company would need underwriting and claims guidelines for all 40 illnesses, for each severity tier, which would be difficult to produce.
  - This would introduce significant complexity into the day to day work of assessors.
- Qualified staff:
  - Highly qualified claims and underwriting staff who have been very thoroughly trained on the product would be needed.
- Reinsurance:
  - The company may have to rely heavily on a partner reinsurer, which could require reinsuring a significant portion of the business.
- IT:
  - Current IT systems may not be able to deal with a product of this complexity, which may represent significant infrastructure expenditure.

    - A medium-sized company may not have a sufficient IT workforce of its own and may require external consultants for this type of work.
- Claim disputes:
    - At claims stage the company may be exposed to disputes.
    - E.g. when a policyholder suffers from a disease that is not technically on the list of 40, but is similar.
    - Policyholders may expect that the policy would cover any critical illness.
    - This exposes the company to legal action and the potential for bad publicity.
- Distribution:
    - The complexity of the product means that it is best suited for sale via independent intermediaries.
- Rate guarantees:
    - Even if experience is very bad, as a result of the expectations of the policyholders the company may in practice be unable to increase rates at the end of the 10 year guarantee period.
    - Even if it is able to increase rates there is a good chance that healthy lives would simply choose to lapse their policies, leaving the company with only the bad risks (selective withdrawals).
    - This uncertainty makes it difficult to appropriately allow for the reviewability of premiums after 10 years.
- Lapse and re-entry:
    - Depending on the success of the product it may cause significant churn, where policyholders with the existing core product may wish to upgrade to the comprehensive product.
    - The company would need to decide beforehand whether or not to pre-empt this and offer existing policyholders an upgrade to the new product.

Part (i) was a fairly easy question, based on bookwork, with many candidates scoring very well. There were, however, many weak attempts. Some candidates were penalized for not reading the question properly and giving more than the 4 medical conditions asked for.

In part (ii) many candidates presented a generic answer, so large parts of what was written down did not score any marks. For example statements such as the following did not score marks: check what the regulator will allow; check what competitors are doing; expense inflation; medical inflation; new business strain; expense allocations and cross-subsidies; impact on asset shares; etc. Such statements only gained credit if candidates mentioned why they were relevant in this specific instance. Some candidates confused issues that would have been relevant for income protection policies with what would be relevant for critical illness business. Some candidates lost marks by using abbreviations which they had not defined, e.g. CABG. The question did not claim that the product was entirely new in the market.

QUESTION 3

i. Mortality:

- The risk is that the office underestimates mortality (when the unit fund is below the guaranteed death benefit). If so the mortality charges will prove inadequate.
- As the product may attract a different target market the company's experience may be of limited value.
- There may be a need to source appropriate assumptions elsewhere, e.g. from a reinsurer.
- The extent of the risk will depend on how applicable the existing data are.
- AIDS will be a major concern, even though the target market may be less exposed to HIV/AIDS than the population in general.
- Since no HIV testing is done a high incidence of AIDS deaths could result.
- Anti-selection may be a problem since there are no medical tests.
- Selling through independent intermediaries will exacerbate the problem of anti-selection.
- However, mortality selection may not be too severe as it is tied to the purchase of a house and the ability to convince a bank to issue a mortgage.
- Moral hazard (fraud) may be a concern since declarations of health are easy to lie on.
- Selective withdrawals are also a risk.
- The ability of the office to revise its mortality charges at any time reduces the mortality risk.
- Charges though can only be varied to the extent permitted by legislation, competition and PRE.
- If mortality experience is favourable, the office may come under pressure to reduce mortality charges (and premiums at review).

Expenses and Inflation:

- The risk is that the expense charges (the 10% unallocated premiums) are too low to cover the expenses.
- There is a mismatch in timing between initial expenses and charges.
- The level of expenses will be uncertain because the office is entering a new market with a new product.
  - 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 (e.g. by policy size) from that anticipated is also a problem as there are likely to be cross-subsidies involved in the expense recoupment.
- Lower than expected new business volumes is also a risk as fixed expenses may not be adequately recouped.
- Higher than expected new business volumes may be a risk as it may cause capital strain and put pressure on administration systems, etc.
- Higher than anticipated inflation is a concern as the terms of cover may be fairly long.

- The fact that charges (through the unallocated premium) are not variable exacerbates the situation.
- However, since premiums can be reviewed after 5 years there is the possibility of obtaining higher expense charges at that time.

Withdrawals:

- The greatest risk of loss is associated with more early withdrawals than expected when asset shares are low/negative.
- Withdrawals at later times should be able to be dealt with by imposing an appropriate surrender penalty.
- The company has no relevant experience of withdrawal rates with this type of product.
- However, because the product is linked to house purchases through mortgages withdrawals are likely to be quite low

Marketing/Legal:

- If investment returns are poor and maturity values are lower than expected, it is possible that payouts will not cover the policyholder's mortgage.
- This could lead to a reputational risk through bad publicity, accusations of mis-selling associated with the quality of advice given, etc.
- If the premium review procedure is not explained well to policyholders and intermediaries (in marketing literature and policy documentation) there could be significant problems if there is a need to implement a review.

New Business volumes:

- New business volumes are likely to be very unpredictable as this is an entirely new product in the market.
- It may be difficult to develop this new market, as the consumers and intermediaries are not used to unit-linked business.

Other risks:

- The fact that benefit charges and premiums are reviewable may encourage the office to make unrealistically optimistic pricing and reserving assumptions.
- Future regulatory changes relating to this new product may be a risk, e.g. requiring guaranteed surrender/maturity values.

ii. Negative non-unit reserves:

- A negative non-unit reserve can be held for a policy under which future charges are expected to be more than sufficient to meet future non-unit liabilities (including expenses).
- Negative non-unit reserves thus reduce the total reserves required by taking advance credit for the expected present value of these future positive cashflows.

- The reserve represents a loan from other contracts which have positive non-unit reserves.
- The loan will be repaid by the emerging future profits from the policy for which the negative non-unit reserve is held.

Constraints:

- Negative non-unit reserves need to be permissible under local legislation.
- The sum of the unit and non-unit reserve for a policy should not be less than any guaranteed surrender value.
- There should be adequate non-unit surrender penalties to ensure that the value of the future cashflows is not lost on a surrender.
- The future profits arising on the policy with the negative non-unit reserve need to emerge in time to repay the "loan".
- After taking account of the future non-unit reserves, there should be no future negative cashflows for the policy (i.e. no future valuation strain).
- In aggregate, the sum of all non-unit reserves (from all business, not just unit-linked policies) should not be negative.
- The negative non-unit reserves should be determined prudently, i.e.:
  - The projections of the future positive cashflows should be lower than best estimates, the rate of interest used to discount them should be higher than best estimate, and we should assume that survival rates are lower than best estimates

Part (i) was not a difficult question and was handled reasonably well by the better-prepared candidates. However, points were often too generic, e.g. simply listing "anti-selection" as a mortality risk instead of indicating why this was relevant here (i.e. as the result of the limited underwriting or distribution channel). Some candidates did not focus on the "primary risks" as required.

Regarding the mortality risk, listing model, parameter and random fluctuations risks does not explain why mortality is a risk for this product. It was also important for candidates to identify at what stage of the policy the mortality risk is most significant (i.e. when the guaranteed sum assured exceeds the unit fund). The risk at this stage in the policy is a mortality risk (the risk that the risk benefit charge is inadequate) and not an investment risk caused by underperformance of the underlying assets. This was not always understood.

Part (ii) was answered badly by most candidates. It was disturbing to see how many candidates thought that actuarial funding would be appropriate for a contract with no unit-related management charges. Some candidates did not know whether actuarial funding or negative non-unit reserves would be "the" method (as asked for in the question) and so described both. Such answers only demonstrated to the examiners that the candidates did not know the correct answer and thus did not help the candidate. This again highlights the importance of answering the question. No credit was given for suggesting redesigning the contract as the method to reduce new business strain.

QUESTION 4

i. a. Retrospective earned asset share/normal premium rates:

- The proposal is over-generous to the policyholder.
- By giving the earned asset share, the insurer will be retaining none of the profit (or loss) on the policy to date.
- By then applying this amount on normal premium rates the insurer will only make the amount of profit loaded for in the new policy.
- This amount of profit is unlikely to be appropriate for the company since the new policy is much smaller than the original one.
- However, the company uses the normal single premium basis which will include an allowance for initial expenses, leading to double counting of initial expenses. This offsets the "loss" of profit to some extent.
- Given that the asset share is used in the alteration and assuming that that asset share is positive at this duration, the alteration should be affordable.
- The insurer will need to make sure that the asset share less the deduction for alteration expenses is not less than zero, as this would result in an altered benefit which is lower than the equivalent new business benefit for the altered policy, exposing the company to a lapse-and-re-entry risk on the altered policy. This is not likely, however, so far into the policy.

b. Equate realistic policy values:

- This alteration should be affordable, provided that the asset share exceeds the realistic reserve on the original policy given that the benefits of the altered policy are valued on a realistic basis.
- Using a realistic value means that the company will retain the full expected profit (over the full term) for the original policy.
- Using a realistic basis for the altered policy makes no allowance for profit that is expected to emerge over the remaining term of the contract, and hence the company will not expect to make any further profit on the altered policy.
- This method may thus not be suitable since the size of the policy is being substantially reduced, and so it may not be fair to retain profit as if no alteration were made.
- The new calculated premium might be larger than the office premium for a new policy at the lower sum assured.

c. Equate policy values on original premium basis:

- The method should be affordable, provided the policy value before the alteration is less than the asset share and the original premium basis is still appropriate at the date of alteration.
- Using the policy value on the original premium basis extracts the accrued profit from the original policy.
- Using the same (original) basis for the altered policy would produce further expected profit on the altered policy provided the basis is still suitable now.

- There is no mention of adjusting for initial expenses in the premium bases to the extent that these are not required. However commission would be paid on the increased premium.
- There is also no mention of the costs of the alteration. It is therefore unlikely that expenses have been correctly allowed for.
- It should be checked that the sum assured of the altered policy is more than the sum assured available under the boundary condition of using the increase in premium to buy a new policy (and keeping the original policy).
- There is an anti-selection risk that relatively unhealthy policyholders will increase the benefits under an endowment assurance policy. If there is no additional underwriting being done, then the original pricing basis may not be appropriate for the altered product.

ii. Withdrawal assumption:

- The withdrawal assumptions should reflect the expected future experience in respect of the contracts that will be taken out, and should include an allowance for trends.
- There have been high sales volumes so the insurer should have internal data to use for this exercise.
- Data will be divided into homogenous groups, but subject to having enough data in each group to make the analysis for that group statistically credible.
- Internal data from the bank business can be used, but may not be sufficient for longer durations as it is a relatively new product and most policies may not have expired.
- Internal data from the bank business might need to be adjusted to allow for any significant differences between the original and the new product, e.g. a different premium structure or different market.
- Where withdrawal data is insufficient the insurer may rely on the withdrawal experience from other distribution channels and/or industry data.
- Adjustments will need to be made to industry data and internal data from other distribution channels, as distribution channel is likely to affect withdrawals.
- Industry data and withdrawal experience for other distribution channels can be used to adjust withdrawal rates at durations where internal data are not sufficient.
- The results of such analyses should be assessed to see if they have been affected by special factors such as an adverse economic situation in the country.
- The best estimate assumption might be adjusted by a margin for prudence, depending on the degree of uncertainty associated with the assumption.

In general candidates struggled with this question. This was as the result of a combination of not understanding the underlying principles and failing to pay sufficient attention to the question wording and mark allocation.

In part (i) only 2 marks were available per alteration. Candidates thus needed to focus on the most important issues (i.e. affordability and profit extraction) and not on aspects such as ease of documentation. A number of candidates failed to focus on the specifics of the particular alterations and discussed general boundary conditions.

In part (ii) many candidates did not take note of the question's instruction and mark allocation, and provided too much detail on the calculation of the withdrawal rate and omitted an adequate description of the (high-level) process.

QUESTION 5

i. Possible information that could be gathered:

- Medical questions e.g. current health and treatment, personal and family medical history.
- Lifestyle questions e.g. participating in dangerous sporting activities and other hazardous past-times.
- Financial questions e.g. income relative to sum assured.
- Other questions e.g. smoking habits and occupation.

How these can be included in the sales process:

- Simple underwriting questions can be included as part of the call script or proposal form.
- The insurer will need to be very selective in choosing questions to minimise time of the sales call.
- These questions would need to be near the end of the script so that the sales person only asks people that are likely to take out the cover.
- It is important that the sales person makes it clear that answers to these questions will materially affect the insurers assessment of the risk and that the claim may be repudiated or the claim amount adjusted if the person does not answer these questions accurately

ii. Additional ratios that could be used to investigate past experience.

- [Number of sales] / [Number of leads]
  This ratio provides information on how many leads end up being sales, which is an indication of the overall success of the distribution method.
- [Number of calls] / [Number of leads]
  This ratio provides information on how many leads are converted into calls, potentially indicating the quality of the leads that are being bought.

iii. Factors that could be used:

Quality of leads (based on information provided in lists):

- Source of leads:
  - Different companies could be providing leads.
  - Companies could provide different types of leads, e.g. income-bracket of card holder.

- Information about the policyholder:
  - Age, gender, geographical location, salary, if this information is available, occupation, if this information is available.

Only items that will be available on the list can be used to identify the quality of the lead.

Insurer's process etc.:

- Call centre agent that made the call.
- Specific product that the agent tried to sell.
- Specific sales script that was used, if there is more than one script.
- Underwriting questions and whether further underwriting was required. (This can be used to determine whether the underwriting process is deterring potential sales).

iv. Reasons why it is important to monitor the sales experience:

- Setting pricing assumptions:
  - The initial expenses incurred in selling a policy need to be allowed for in pricing.
  - This would include the costs of obtaining the leads and running the call centre, which are incurred across all leads and calls, whether or not these result in successful sales, and other policy initiation costs.
  - However, these costs can only be recouped from successful sales.
  - Understanding the historical sales experience of the distribution model would thus allow the company to appropriately spread these initial expenses across only the successful sales.
- Optimising the sales strategy:
  - Firstly the investigation would show whether the distribution method is performing sufficiently well in aggregate.
  - This performance could be measured against performance targets of the call centre or against the performance that was assumed when the distribution method was launched.
  - If results are split by call centre agent then it could be used to manage performance of the call centre staff by relating performance incentives to the success of each member.
  - Analysing past experience across different homogeneous groups will also allow this distribution method to be optimised by allowing sales resources to be used most efficiently.
- This information can be used to target sales resources in any of the following ways:
  - Target specific lead providers, as they might provide better quality leads.
  - Target specific types of leads (e.g. income bracket).
  - Certain products might sell better than others.
  - Certain sales scripts might work better than others.
  - Certain demographics might be easier to sell to than others, e.g. gender, geographical location or occupation.

The question was handled reasonably well by candidates who were well prepared. Parts (iii) & (iv) were generally not answered well, with answers being too brief and generic in nature. In isolated cases candidates lost marks because they failed to answer all of the parts of the question, had numbering incorrect or produced illegible hand writing.

QUESTION 6

i. Restrictions:

- Restrict the types of contracts that a life insurance company is permitted to sell.
- Restrict the premium rates (or charges) that can be used for some types of contracts.
- Requirements relating to the terms and conditions of the contracts offered.
- Restrictions on distribution, such as:
  - the channels through which life insurance may be sold;
  - the procedures to be followed for a sale;
  - the information to be given as part of the selling process;
  - minimum qualifications requirements for the sales staff;
  - remuneration rules e.g. maximum commission payable.
- Restrictions on the ability to:
  - underwrite; or
  - differentiate between different classes of lives (e.g. males and females).
- Constraints on the amount of business that may be written (directly or through the requirement to hold a minimum level of reserves and minimum solvency margins.).
- Restrictions on permissible reinsurance.
- Requirements to "Treat customers fairly".
- Specifying reserved statutory roles e.g. statutory actuary must sign-off on solvency valuations.

ii. Product design considerations:

- Profitability:
  - In theory, a life insurance company should be able to determine the level of charges so that profitability is unchanged.
  - However, there may be a negative effect on profitability if there is indeed an increase in competition.
- Marketability (Attractiveness of product features to the client):
  - Policyholders may find this charging structure easier to understand and therefore attractive.
  - A relatively more simple product may also become more attractive to the sales staff (easier to distribute).
  - If the increase in competition leads to lower charges, then savings products in the insurance industry may become relatively more attractive to saving products in other industries e.g. the banking industry.

- Improved attractiveness of the product could increase sales volumes leading to lower per policy contributions required to cover fixed overheads.
- However, charges may appear relatively high (compared to a percentage-of-fund value charge, for example) and make products unattractive.

- Competitiveness (attractiveness of features compared to competitors' products):
  - Level of charges may become a more important competitive factor.
  - This may force companies to reduce their profit requirements and/or force them to sell the savings product as a loss leader.
  - Some competitors may decide to exit the market, reducing the choice available to clients.
  - But other product features, like past investment performance, may be a bigger driver of competition. It is therefore not clear that this proposal will result in increased competition.
  - Insurance companies may attempt to differentiate their products through the introduction of other features (e.g. more investment choice), potentially limiting the impact of the proposal on competitiveness.
  - Not all distribution channels are equally sensitive to price, again limiting the potential impact on competitiveness.
- Risk:
  - Both types of charges are level for the duration of the contract, which reduces an insurance company's upfront income (i.e. ability to front-end load on regular premium products).
  - This is less of a problem for single premium products.
  - Therefore there may be a larger mismatch between initial expenses and income, which increases withdrawal risk early on in the contract.
  - This may result in a requirement to increase surrender penalties (at early durations in particular).
  - Because charges are level, there is an increase in inflation risk.
  - However, this risk is mitigated to some extent on regular premium contracts if premiums escalate over the contract term, or where charges can be reviewed.
  - Charges are not dependent on fund values and therefore this would decrease investment risk (if charges were previously levied as a percentage of fund).
- Financing:
  - Mismatching of charges may also require additional working capital from shareholders, making these products potentially more expensive.
    Because there are no fund-related charges, actuarial funding will no longer be an option, which decreases the capital efficiency of these products.
  - However, the company may still be able to use negative non-unit reserves to reduce new business strain (if allowed by the regulator).
- Sensitivity of profit:
  - There is a potential mismatch between charges and some expenses (e.g. fund management expenses are often a percentage of funds under management), thus profits may be more volatile.

- Cross-subsidies:
  - Since charges are level across different policy terms the new structure would increase any cross-subsidy that exists between longer term and shorter term products.
  - A level monetary amount has a relatively larger impact on small premium policies (assuming the monetary amount does not vary by premium size), making small premium products relatively unattractive.
  - If charges are level across different policy sizes or between products with relatively large premiums and relatively small premiums this increases business mix risk.
  - May be viewed as unfair by policyholders that want to invest large premiums.
- Administration:
  - It is unlikely that any changes to the administration systems would be required, given that these types of charges are probably already part of the existing product design.
  - However, administration should be simpler because the design has been simplified.
  - There may be some costs in retraining staff, reprinting training material and product material etc.
- Consistency with existing business:
  - Some policyholders may surrender their existing products, if the new product provides better value for money.
  - Life insurance companies will have to consider whether they want to offer conversion terms from the old to the new product.
- Regulatory requirements:
  - Not applicable.

Part (i) was standard bookwork, with the better prepared candidates scoring well. In part (ii) the candidates that followed a structured approach did best. Answers had to be specific, and thus generic comments (e.g. "the actuary should ensure that charges match expenses") did not gain credit. Some candidates demonstrated that they did not know the difference between premiums, charges and expenses. A more conservative pricing basis will lead to an increase in charges, but not necessarily an increase in premiums on the savings product. The "level" charge will not increase in line with inflation, but need not necessarily be guaranteed. Both alternatives were accepted, however.

QUESTION 7

i. Advantages:

- The cashflow method allows for assumed experience to vary over time,
  - e.g. mortality improvements.
- This allows a stochastic model to be built for deriving a distribution of reserve level and for valuation of options.
- Allows for withdrawal experience explicitly – if withdrawal benefits have a non-zero financial effect, the resulting reserves will be more accurate.

- It allows more easily for complex benefit structures,
  - e.g. where charges and benefits depend on future assumptions such as unit-linked business should the company sell this in future.
- The risk discount rate can take account of the term structure of interest rates.
- Tax can be allowed for more appropriately.
- Can more easily allow explicitly for future bonuses.

Disadvantages:

- Formula method is much easier and quicker to calculate.
- Formula does not require establishing/purchasing complex and expensive models.
- Formula requires fewer assumptions.

ii. Comments:

- While reversionary bonuses have remained level at 4% p.a., it seems likely that policyholder expectations for regular bonuses are based on real returns.
- These have been decreasing due to increasing inflation.
- The reserving basis is the same as the premium basis, resulting in no initial capitalisation of margins and instead surplus emergence is deferred over the life of the contract.
- With investment returns at 10% p.a., the surplus emerging each year is 5% p.a. (the difference between the actual and reserving interest rates).
- With regular bonuses at 4% p.a., the remaining undistributed surplus of 1% p.a. is deferred and can be distributed as a terminal bonus.
- The proposal to increase regular bonuses to 6% p.a. is not feasible as this exceeds the investment surplus emerging and would lead to an erosion of free assets.
- The maximum that regular bonuses could be increased to is 5% p.a., however this leads to no deferral of surplus for terminal bonuses, and this is also likely to make policyholders unhappy.
- Even 5% p.a. regular bonuses are unlikely to meet policyholder expectations as this is lower than inflation.
- If other items of actual experience (e.g. mortality, surrenders) are similar to the reserving basis, these items will not give rise to any additional surplus.
- However if other items generate sufficient surplus each year the company might be able to afford 6% p.a. regular bonuses.
- One option for the company is to consider a more aggressive investment strategy that will yield higher real returns such as equities and property.

iii. Investment principles:

- The principles of investment are that an insurance company should select investments that are appropriate to the nature, term and currency of its liabilities.
- The investments should also be selected so as to maximise the overall return on the assets, where the overall return includes both income and capital.

- The extent to which the company may depart from investing in appropriate investments in order to match its liabilities, depends amongst other things on the extent of the company's free assets.

Or (for second two bullets) these investment principles can also be expressed as:

- The life insurance company should invest so as to maximise the overall return on the assets, subject to the risks being taken on being within the financial resources available to it.

iv. Comments:

- The current split of assets and liabilities (as % of total) is:

Assets	**%**	**Liabilities**	**%**
Local equities	26%	With profit	
Offshore equities	2%	- SA+RB declared	38%
Direct property	5%	- RB future	19%
Fixed Interest	53%	- TB future	19%
Cash	14%	Surplus assets	24%
Total	**100%**	**Total**	**100%**

- To consider the appropriateness of the asset allocation of the insurer one needs to consider the nature of the liabilities, level of free assets and policyholder reasonable expectations regarding future bonuses.
- Benefits guaranteed in money terms (i.e. sums assured + declared RB) are best matched by assets providing returns fixed in monetary terms such as fixed interest stocks of suitable term.
- The holding of fixed interest (53%) is much higher than might be suggested by the liabilities.
- We cannot comment on the appropriateness of the assets in terms of term or currency as no information has been provided on this.
- The most suitable assets for discretionary benefits (i.e. future RB and terminal bonuses) depend on:
  - Level of free assets is high at 3x required level, implying greater investment freedom.
  - Policyholder expectations which are likely to be for real returns.
  - Any published or expected investment strategy.
- Equities, property and index-linked stocks are likely to provide the best match for discretionary liabilities.
- Real assets (equity + property) comprise 33% of assets, which seems low compared to discretionary benefits.

- The minimum solvency margin would usually be invested conservatively, such as cash.
- It seems like the company has sufficient cash to achieve this level of conservativeness.
- Surplus assets: The excess, which may be invested in assets expected to provide a real return, or cash if the company is planning to utilise these for investment opportunities or new business growth.
- The amount allocated to direct property suggests that perhaps this is only a single investment:
  - This leads to lack of diversification.
  - However, the property might be used by the company itself.
  - Indirect property would provide greater diversification benefits.
- Expenses linked to inflation are best matched by linked assets (in this case assets whose returns are likely to match expense inflation, such as equities and property).
- It appears that investment in real assets is low for this company (given the nature of the liabilities and the level of free assets), and that the director is correct that returns could be enhanced by investing more heavily in equities.
- The current asset split might not be a long-term split, but a tactical position away from the long-term strategic position due to mispricing in the investment markets
  - e.g. fixed interest may be offering good value relative to equities and this is the reason for the asset split.

If surplus is equal to required level:

- Surplus funds equal to required level implies the company is barely solvent, and the company would have no investment freedom.
- The company would need to match its guaranteed liabilities very closely (with fixed interest assets).
- It should also hold stable assets (e.g. cash) for discretionary liabilities.

Overall the question was not well answered, with part (ii) being particularly bad. Part (i) was a simple application of bookwork, requiring a comparison of cashflow and formula methods specifically for the calculation of reserves. The majority of candidates regurgitated bookwork points not related to reserving e.g. it is not necessary to know profit/return on capital at future points in time to calculate reserves (this was given as an advantage for the cashflow method by many candidates).

Part (ii) was testing candidates' understanding of the relationship between pricing and valuation bases, and actual experience. Most candidates did not even recognise this, and proceeded to produce often long answers on the general issues to consider before increasing regular bonuses. Exceptionally few candidates used the information provided to correctly analyse whether the proposal was sustainable or not. Worryingly, most candidates came to a conclusion (mostly in favour of the proposal) without doing any analysis. Equally worrying was the number of candidates whose analysis was limited to comparing the total return (10% p.a.) to the proposed bonus rate (6% p.a.) and concluding that there is ample room to

increase the bonus rate, not realising that 5% p.a. return was used in the premium rate (and must therefore be earned) to support the sum assured.

Part (iii) was easy bookwork, and thus was done well.

Part (iv) was a relatively easy investments question which was not answered well by many candidates. A number of candidates resorted to making general comments without an analysis using the information provided. Many candidates made comments based on incorrect analysis e.g. guaranteed liabilities as a percentage of total liabilities (50%) compared to say fixed interest as a percentage of total assets (53%). As total liabilities are not equal to total assets, this comparison is faulty and often led to incorrect comments. A large number of candidates simply made assumptions (without making this clear) about the currency of the liabilities (usually assuming there were no foreign liabilities) and making comments based on those assumptions. A number of candidates commented on the proposal to increase bonus rates and made no comments on the proposal to increase equity holdings.

END OF EXAMINERS' REPORT