

# **EXAMINERS' REPORT**

*June 2022 examinations*

## **Subject F105 — *Finance and Investment* 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.

a.

Anchoring – the investor basing their views of the likelihood of an event on an arbitrary initial value (possibly from some expert or authority) and then adjusting this based on further observation. Often the adjustments are insufficient. (alternatively Anchoring – the investor basing their views of the likelihood of an event on recent experience (recent positive financial market performance). )

Dislike of negative events – the degree to which an outcome is considered negative or positive (the ‘valence’) has a significant influence on an estimate of its likelihood. In general, people are optimists and underestimate the likelihood of negative events.

Representative bias – Basing their probability estimate on particular (stylised or summary) features of the sample, rather than the whole available market history.

Availability – people are influenced by the ease with which something can be brought to mind, because of recency or emphasis in news reports.

Confirmation bias - a belief that markets will continue to go up because they have done so for some time *[If used here, then marks are not available in ii a below]*

(Other reasonable or relevant points may qualify for marks)

b.

Buy an at-the-money put on the index, and sell a call on the index of equal premium and maturity.

ii.

a.

Individuals are typically overconfident about their own skills and insights. Overconfidence arises from:

Hindsight bias – events that happen will be thought of as having been predictable prior to the event, events that do not happen will be thought of as having been unlikely prior to the event.

Confirmation bias – people will tend to look for evidence that confirms their point of view (and will tend to dismiss evidence that does not justify it).

Regret aversion: by taking no or only a small position (not taking a large position in a share), the investor avoids the feeling of regret when the position causes losses

Self-serving bias: the investor may take credit of decisions that led to profits, but blames circumstances if a decision causes losses

Status quo: Not taking action, even if potentially profitable trades have been suggested, favouring the current positions.

Herd behaviour: Following the positions of other funds. This can lead to market bubbles.

b.

Buy a call with strike  $S-y$ , buy a call at strike  $S+y$ , and sell two calls at strike  $S$ . (where  $(S-y, S+y)$  is the interval where the investor thinks the share might fluctuate)

### ***Examiner comments***

*This question contained bookwork and some relatively straightforward application and was largely well done, except for ii(b).*

- i. Part (a) was bookwork, and well done. In some cases a candidate would force a less appropriate answer onto the scenario. Part (b) was well done by most candidates.*
- ii. Similar comments for part (a) here as for i(a). In part (b) many students used a familiar setting where a share is thought to be very volatile, so it was important to realise that the scenario was for a range-bound share price. This show the importance of reading a question carefully and thinking through what the scenario is.*

## **QUESTION 2**

i.

- By entering into a forward contract on the non-USD assets, the investor will agree to exchange Rands for US dollars at a specified future date at a rate agreed today.
- In this way he is fixing the US dollar/Rand exchange rate applicable in three years' time and thus removing the uncertainty related to exchange rate volatility on the funds hedged.

ii.

*Merits:*

- He can reduce this risk that a depreciation of the Rand will reduce the value of his local (Rand) investment in USD terms,,
- Locking in an agreed exchange rate today, he can reduce overall exchange rate volatility.
- The investor can thus gain from growth expected in the SA assets while not being exposed to the risk of the proceeds being eroded by a weakening Rand/strengthening USD.

*Demerits:*

- The hedge will not be perfect because,

- ...The amount of future Rand proceeds to hedge is uncertain.
- ...If the returns earned on SA ringfenced assets are lower than needed to be paid under the forward, some other SA assets will have to be sold.
- ...SA returns earned above what has to be paid under the forward will not enjoy currency protection.
- He will face exposure to counterparty credit risk if the contract is not centrally cleared.
  - ...However, if he opts to clear the contract via a central clearing party, counterparty risk could be reduced if margin is deposited.
  - ...However, a margin requirement may affect the investor's liquidity position.
- Remove the possible benefit from positive currency movements (weakening USD) that may arise through.
- Purchasing power parity protection obtained from changes in the exchange rate will be removed.
- A bid-offer spread will be a cost incurred on the forward.
- A three-year forward contract might not exist and
- ...shorter dated contracts would therefore have to be rolled over on expiry at an unknown rate.

iii.

*Merits*

- The fundamental value of a share could be determined as the expected present value of future dividends, which in turn depends on future profitability.
  - Where profits would be a function of the amount charged by these companies
- To the extent that the profits and income of the companies invested in correlate with the planned holiday expenses, owning the shares may provide some hedge.

*Demerits:*

- It is unlikely that the hedge provided by the purchase of shares in travel and leisure/hotel companies will be a good one,
  - As profits of companies are a function of several additional factors, such as fixed costs, and occupancy/usage rates and volumes and gearing
- Share prices reflect investors' views of future expected profits.
- ...The time period thus incorporated in the share price is unlikely to coincide with the period of the holiday.
- Share prices are also impacted by other factors e.g. discount rates, that are not directly linked to future holiday expenses.
- And the profits of companies could include several resorts or flight routes based on different destinations and currencies than the planned holiday.
- Markets may also not be efficient and could be influenced by investor sentiment.

**Examiner comments**

- i. *Candidates are reminded to always present their answers in the context of the scenario presented.*
- ii. *A number of students misread the question and focused on the merits and demerits of the investment strategy itself rather than the use of forwards. Easy marks were available for referring to the bookwork knowledge of forwards applied to this context.*
- iii. *This question was less well answered. The reasons why the hedge will either be good or poor were not well explained.*

### QUESTION 3

i.

Capacity: Private companies have the expertise to design, build, operate and finance infrastructure assets efficiently.

Private companies can operate assets at lower costs, due to greater efficiency (this encompasses the lack of bureaucracy and red tape), so the overall cost to tax payers is reduced, and/or government can increase revenue by leasing out assets on contract.

Private companies can offer an improved customer service.

Governments may be inclined to allocate these projects to the private companies since they will then not have to generate the funding and carry the debt on their balance sheet.

Private companies may have the appetite to get involved if there are investors willing to provide funding.

Private companies are motivated by profit, which may lead to higher ultimate user costs.

On the other hand, infrastructure is often considered a public good and as such, the government might be the only entity that is able to ensure this (aligns with the point immediately above).

There is also nothing to guarantee the survival of the private entity which could lead to the government needing to step in and make good any shortfalls

ii.

Government can

- Offer tax incentives: reduce the tax burden in the first couple of years of a project
- Provide government or development funding at low rates; assist in security offshore funding; offer guarantees to funders.
- Reduce or waive tariffs for imports of specialist materials / tools
- Offer a take-off agreement: guarantee that government will hire the asset if built to specification.
- align government agencies to allow private sector infrastructure to connect with existing state-owned infrastructure

- Protect new technology infrastructure from abuse by labour with entrenched interests in old technology assets.
- Introduce labour policies which may be favourable towards the firms.
- Privatization of state infrastructure entities – an acceptable point, as it does technically answer the question.

iii.

- Highways
- Water and sewage facilities
- Various forms of energy generation and distribution
- Telecommunication networks

iv.

Expenses:

- The amount and nature (fixed/floating/inflation-linked) of borrowing, and the level of interest rates, will influence the interest that is payable on any loans outstanding.
- Outstanding borrowing can be high, on account of high development costs
- Maintenance expenses, with scheduled maintenance, may be stable, and relatively predictable
  - A separate relevant point around labour/maintenance cost inflation is accepted
- Currency risk in the event that they have to import some of their inputs/materials e.g. for maintenance, or if their debt is denominated in a foreign currency.
- The asset is exposed to large-scale disaster, which can cause loss of income
  - Insurance can cover some losses

Income

- Demand for the asset, which is likely to be stable but will be influenced by the availability of alternatives.
- The ability and/or willingness to pay may vary
  - The very poor may be subsidised
- Income term would depend on the nature of contract with government: only for a fixed period of operation; or build, operate and maintain
- Location of the infrastructure asset (e.g. a busy toll road) – I think this is a separate enough point to “demand”.
- Level of unit price of usage and future increases. These may be subject to regulatory approval
  - Unlikely to be able to charge very high prices
  - But prices are expected to grow in line with inflation
  - Operating company can make representations to the regulator to justify suggested prices
- State of the economy: Income may grow due to volume growth in a growing economy

v.

Defensive companies are those whose capital values and revenues are relatively immune to the state of the economy / interest rates. (or have less volatility or more stable returns)

Other defensive companies (especially with low gearing):

Food retailers

General insurance company

(telecommunication companies: not accepted)

vi.

- Consider if the fund's mandate allows for investment in these companies.
- The reason(s) for not holding infrastructure companies up to now must be re-visited; perhaps there was a view that these were expensive / overpriced
- Such a change will impact the riskiness of the fund. Consider if the risk exposure will remain in line with the risk appetite of investors' in the fund.
  - Diversification benefits may help to reduce the fund's overall risk.
- Such a change will impact expected returns and could either lead to withdrawals by existing investors or attracting more inflows.
- Whether the holding is to be a strategic position in line with the benchmark or a short-term position to take advantage of attractive pricing
- Consider if the shares of these companies are liquid and can readily be invested in.
- Consider which assets to sell. Perhaps other defensive assets, to minimise the impact on risk measures
  - Otherwise reduce overweight sector positions; might open scope for increased stock selection
- Does the fund have stock selection capacity in the infrastructure sector?
  - If not, the fund might consider a collective investment
  - A collective investment vehicle creates more diversification across assets, type of infrastructure, and geographies.
- The manager may wish to consider how this proposal will impact their responsible investing/ESG metrics.

### ***Examiner Comments***

- i. *Students managed to get at least some points. Some partially misunderstood the question, and made points which were not valid.*
- ii. *The majority made points which were contained in the memo - marks were mainly lost due to not producing enough/a high enough volume of relevant & distinct points. Some made additional valid points, and these were noted and even added to the memo where relevant.*
- iii. *Students scored close to full, if not full marks. Probably the best answered sub-question in Q3 (bookwork).*
- iv. *Some students answered this by describing the effects on operating company share prices, as opposed to focusing on the actual underlying asset cashflows. Marks were not awarded for this - the question did make it clear that it was the asset cashflows that were of interest, not the share price of a company operating an infrastructure asset for example. This sub-question*

*distinguished the weakest from the best students – with the strongest doing very well (and vice versa).*

- v. *There were varying definitions which were worded differently. Half-complete definitions scored half a mark, however quite a number of students scored full marks. Some students mentioned utilities (as opposed to additional companies/sectors) or companies in sectors that are not considered defensive (e.g. mining), and missed out on some of the remaining part marks. Overall, a well answered sub-question.*
- vi. *A range of answers were given, with many points being contained in the memo, but some outside of the memo. Additional valid points were given credit. Students mainly missed out by not producing a high enough volume of valid/distinct points.*

## QUESTION 4

- i.
    - The fund will commit to responsible investment practices by making environmental, social and governance (ESG) issues a consideration in their investment analysis, decision-making processes and active ownership.
    - In particular, the fund would be committing to implementing six voluntary and aspirational principles (where consistent with their fiduciary responsibilities) relating to ESG.
- [2]
- ii.
    - The trustees are right in that they have a fiduciary duty to exercise their rights, privileges and powers in such a way as to benefit the beneficiaries (i.e. the members).
    - Financial interests of members should not be compromised when committing to the PRI.
    - If consideration of ESG factors restricts the universe of possible investment, prohibiting investment in profitable opportunities, then investment performance may be negatively affected.
    - However, incorporating ESG factors can improve investment performance or reduce risk, through investing in companies that are involved in more sustainable and ethical practices e.g.:
      - Reduce costs through more efficient use of energy and raw materials
      - Attract new customers or be able to charge a premium if strong ESG practices enhance their brand
      - Perform better if staff enjoy good working conditions because this aids recruitment, retention and motivation
    - Investment performance could also be improved by avoiding companies at risk of:
      - Reputational damage if found to be involved in controversial practices.
      - Underperformance due to pay structures not aligning executive incentives with shareholders' long-term interests.
    - For the investment markets to operate efficiently, reliance is placed on the sound functioning of environmental, social and economic systems. Investment that promotes the health of these system should benefit investor/members in the long-term.
    - Members that are concerned about ESG issues, will be favourably disposed toward the trustees if a commitment to these issues are demonstrated.



### Examiner comments

- i. Most candidates were able to provide some explanation of what the PRI refers to.
- ii. This question was poorly answered. A complete answer would have included reference to trustees' fiduciary duty, as well as some arguments against and in support of the statement. Few candidates showed insights into why ESG considerations are important and how the improved sustainability that is aimed for will create value in the long-term.

## QUESTION 5

i.

Reasons include:

- The behaviour of an individual interest rate is more complicated than that of a stock price – interest rates vary by term, which must be incorporated as an extra dimension;
- For the valuation of many products, it is necessary to develop a model describing the behaviour of the entire yield curve – this is in contrast to the Black-Scholes model of share option prices, which is based on a model of a single share price only;
- The volatilities of different points on the yield curve are different;
- Interest rates are used for discounting as well as for determining payoffs from the derivative.

ii.

Price of a put option =  $P(0,T) [X \Phi(-d_2) - F_0 \Phi(-d_1)]$

$$d_1 = \frac{\ln\left(\frac{F_0}{X}\right) + \frac{\sigma^2 T}{2}}{\sigma\sqrt{T}} \quad d_2 = \frac{\ln\left(\frac{F_0}{X}\right) - \frac{\sigma^2 T}{2}}{\sigma\sqrt{T}}$$

Where

$T = 1$  year

$P(0,T) = 1.04^{-1} = 0.961538$

Current bond price (=  $B_0$ ) =  $R100 / (1.05)^5 = R78.35$

$F_0$  = forward bond price =  $B_0 / P(0,T) = B_0 / (1.04)^{-1} = R81.49$

$X$  = strike price = R78

$\sigma$  = forward bond price volatility = 5%

$d_1 = [ \ln(81.49/78) + \frac{1}{2} * 0.05^2 ] / (0.05 * 1) = 0.8996$

$d_2 = [ \ln(81.49/78) - \frac{1}{2} * 0.05^2 ] / (0.05 * 1) = 0.8496$

$\Phi(-d_1) \approx 1/[1 + \exp(1.7 * 0.8996)] = 0.1781$

$\Phi(-d_2) \approx 1/[1 + \exp(1.7 * 0.8496)] = 0.1909$

Put price =  $0.961538 * [ 78 * 0.1909 - 81.49 * 0.1781 ] = R 0.36$

### ***Examiner comments***

*This question was done reasonably well overall.*

*Part (i) was bookwork, and while many students knew their work, a substantial number did not.*

*Part (ii) was a relatively straightforward valuation questions, and many students either got it completely correct, or substantial components of it correct (credit was given for correct methodology even if the numbers were not correct).*

## **QUESTION 6**

i.

- Portfolio-based indices measure rental values, capital values or total returns of actual rental properties.
- ...An index will produce results particular to the portfolio underlying its construction.
- The barometer type of index aims to track movements in the general property market by estimating the maximum full rental values of several hypothetical rack-rented properties.
- A portfolio-based index may be inappropriate if the portfolio underlying the index differs significantly from the portfolio held.
- Further, typically the return on the index is a money weighted return so the index performance will be affected by the timing of the cash flow of the underlying portfolio.
- A barometer index may be unsuitable for portfolio performance measurement since an investor could not closely match its movement with an actual portfolio of property holdings.

ii.

(The production of reliable indices requires knowledge of the market prices of the constituents of the indices at frequent intervals. There are several problems in obtaining such information for property)

- Each property is unique.
- The market value of a property is only known for certain when the property changes hands.
- Estimation of value is a subjective and expensive process.
- Valuations may be carried out at different points in time, if at all.
- Sales of certain types of investment property are relatively infrequent.
- The prices agreed between buyers and sellers of properties are normally treated with a degree of confidentiality.
- The heterogeneity of property magnifies the problems of obtaining price data.

- It is difficult to group properties into usefully homogeneous groups and still obtain sufficient price data for each group e.g. the underlying portfolio of properties will vary in size, regional spread and sector weighting (office, retail etc.).
- Mercury might need to adjust the weights of homogenous groups in their data to better reflect the market covered.
- Mercury is dependent on commercial property investors contributing data to the index

iii.

- The data is segmented, depending on data volume
  - by geographical area and size of house
  - by time of sale: per month or quarter
  - by age of house

(Alternatively, hypothetical modelpoints are created by geography and house size and actual sales are allocated to those modelpoints.)

- Average price per segment is calculated per time period and a chain-linked index is produced
- Remove outliers (prices that are very high or very low)
- Smoothing or grouping of segments is applied when data is sparse
- For producing a combined index, the bank may fix the weights of different segments

***Examiner comments***

- i. *Bookwork question, where those who knew this part of the syllabus scored well.*
- ii. *Application question, with marks lower than in (i), but several candidates scoring well.*
- iii. *Most candidates did not appreciate that the scenario for barometer indicies given in the notes is now applied to a different setting. Most candidates wrote around the bookwork, without applying the work to the given scenario.*

**QUESTION 7**

- One year is too short a period to compare investment returns – the pension fund has a very long-term investment objective
- The offshore unit trust is invested in overseas assets which is not a good match for a retirement liability
- And in fact much of the excess return could be due to currency movements – which can be extremely volatile

- Of the funds that are available for selection, the member may have chosen a very conservative portfolio (eg cash/money market) and needs to change to a more aggressive portfolio if appropriate.
- Regulation may restrict the range of investments the fund can invest in (particularly wrt offshore) – thereby limiting potential returns.
- Are the unit trust returns quoted net or gross of fees - the fund credit return is net of all fees and costs yet the 12% may be advertising gross returns
- Differences in tax treatment of returns earned by pension funds versus what he would have paid on savings in this “High Growth” fund need to be considered.
- Differences in the calculation of 6% and 12% return need to be considered. It cannot be compared if differences in the timing of cash flows were not considered.
  - Advertised returns can be time-weighted, while the member’s returns for the year according to his/her statement is likely to be money-weighted.
  - If the member contributed regularly over the year, then the second part of the year would have affected his return more than the first part of the year.
- The investment objectives of the fund and the unit trust are likely to be very different
  - The pension fund objective is likely to be to beat inflation by a certain percentage over the long term
  - Whereas the unit trust objective is likely to beat some overseas market index or combination of indices
- So pension fund returns should be compared to the objective (ie inflation) rather than market index returns
- The unit trust may be a small fund with a small number of holdings, which is likely to produce much more volatile returns than a larger more diversified (even high-growth) fund – future returns may be very different from last year’s.

***Examiner comments***

*Answers were disappointing. To score well, it was required that the candidate draw from different chapters and perspectives, covering fund objectives, matching, member perspective, pension fund environment, fees, tax.*

**QUESTION 8**

- i.
  - a. Strategic risk is the risk of the strategic benchmark performing poorly relative to the value of the liabilities or the matched benchmark.
  - b. Active risk is the risk that an asset manager will under-perform compared to their allocated benchmark as they move away from the strategic benchmark in an attempt to maximize returns.
  - c. Structural risk results from a mismatch between the aggregate of the individual fund manager benchmarks and the total (strategic) benchmark.

- ii. 100% Inflation-linked bonds, matching the term and currency of the liabilities.
  
- iii.
  - The strategy could be allowing for more risk to be assumed than the insurance company has an appetite for or can bear.
    - ...Which may be because a proper ALM and/or risk budgeting exercises were not undertaken when compiling this strategy.
    - *Action:* The company needs to investigate whether the riskiness of the investment strategy is aligned to their risk budget through e.g. a risk budgeting exercise (and/or a larger ALM exercise).
    - *Action:* Revise the allocation of the risk budget to strategic and active risk.
  - The portfolio is exposed to strategic risk:
    - Inflation-linked bonds may be the best match for the liabilities in terms of its nature and term, but its allocation is limited to 80%.
    - Nature: A sudden inflation spike would leave the portfolio partially unprotected, especially if equity falls during the same period.
    - The given strategy does not include term and currency - if bonds don't match liabilities by term and currency the funded position is at risk of deterioration.
    - Equity markets may have performed poorly.
    - *Action:* Amend the strategic asset allocation strategy to allow for a greater allocation to assets matched to the liabilities in terms of term, nature and currency (i.e. inflation-linked bonds of suitable term and currency).
    - *Action:* Providing the manager with details on the liabilities will enable him to select bonds which are closely matched to the liabilities in terms of its nature, term, and currency.
  - The portfolio is also exposed to active risk:
    - The asset manager can deviate from the strategic benchmark by 10% per asset class. It may be that he was overweight in the poorer performing asset class.
    - *Action:* Reduce the active risk allowance, not allowing the manager to deviate from a benchmark too much.
  - Other than the active money positions, Management did not properly communicate their risk appetite via a formal mandate to the asset manager.
  - ...No benchmarks against which performance was to be assessed was provided.
  - ...The manager may thus have accepted more risk than acceptable through his stock selection decisions.
    - *Action:* Put in place an investment mandate that properly defines the company's risk appetite and any restrictions that apply to the asset manager.
    - *Actions:* A regular performance assessment process must be put in place so that corrective action can be taken as soon as possible.
  - The manager may have made poor stock and sector selection decisions.
    - *Action:* Appoint another manager if after further investigation this is confirmed.
  
- iv.
  - Benchmarks against which performance of the two assets classes will be measured.
  - Any restrictions on the approach to stock selection decisions.
  - Restrictions on the use of derivatives.
  - That active money positions of 10% per asset class may be assumed.

- Defining the admissible assets, e.g. prohibiting investment in asset classes other than inflation-linked bonds and equity.
- A cap on the maximum permissible holding in individual assets.
- Ethical, social or governance limitations.

*Any other valid item.*

### **Examiner comments**

*Parts (i) and (iv) were fairly well answered which is expected of a question examining bookwork knowledge. Most candidates failed to make reference to term and currency in part (ii). In part (iii), candidates failed to go into enough detail to demonstrate depth of understanding. Wording is often poor and candidates are encouraged to ensure they are able to express themselves properly using the correct terminology. Few referred back to the risk examined in part (i) and rather made general but too few or irrelevant observations.*

## **QUESTION 9**

i.

The LDI approach:

- Asset allocation is determined in whole or in part relative to the liabilities – the approach is used to manage the mismatch between assets and liabilities by setting a benchmark directly linked to the actual liabilities.
- Where the nature of the liabilities is expected to change frequently the benchmark will be dynamic rather than static (i.e. it will be reviewed weekly / monthly).
- Under an LDI approach it is possible to closely match the interest rate sensitivity (duration) of the liabilities, the inflation-linkage of the liabilities and the shape of the liabilities.
- LDI approaches can focus on cashflow matching or balance sheet hedging (aligning asset and liability sensitivities for changes in interest rates and inflation expectations).
- LDI approaches commonly incorporate the use of swap portfolios or long-duration bond management.

Possible LDI strategies:

- Interest rates:
  - The value of future fixed rate cashflows is determined by the discount rate. The greater the duration, the greater the sensitivity of the value to changes in interest rates.
  - Interest rate risk can be addressed by investing in instruments which match the duration and value of the fixed rate cashflows payable.
  - Investments that can be used to match duration include fixed rate bonds, and interest rate swaps.
- Inflation:
  - The value of inflation-linked liabilities will be sensitive to changes in inflation expectations (e.g. salary inflation).

- Inflation linked risk can be addressed by investing in assets with the same sensitivity to inflation expectations as the liabilities.
- Investments that can be used to match inflation liabilities include inflation-linked bonds and inflation swaps.
- Longevity:
  - The value of the liabilities will be linked to mortality expectations; lighter mortality leads to pensions being paid for longer.
  - Investments that can be used to manage longevity risk include longevity swaps, longevity insurance policies and longevity bonds.

ii.

ALM stages:

- Clarify the key objectives;
  - additional elements required may include objectives about ongoing solvency levels before the ten year horizon, and valuation bases to be used (e.g. statutory or realistic).
  - Agree on suitable assumptions;
- Historic inflation, asset class returns and correlations are required to fit distributions to be used for the stochastic model.
- Collect member data for the liability projections, and check the data for errors, consistency over time, against other records etc.
- Obtain guidance from trustees for discretionary benefits e.g. pension increase policy.
- Starting with the current investment strategy, project asset and liability cashflows, values, contribution rates and solvency levels to the ten year horizon for thousands of randomly-generated scenarios;
  - Assess outputs against trustee objectives.
- Repeat the prior step with alternative investment strategies, until at least one appears to be satisfactory.
- Summarise and present the results to the trustees.

iii.

Information presented:

- Key output by year up to the ten-year horizon by strategy, including:
  - Net cashflow (to demonstrate how well asset proceeds match the shape of the liabilities by term)
  - The values of assets, liabilities, and solvency level at various distribution points e.g. 10%, 50%, 75%, 90% confidence levels and expected values.
- The results may be summarised in graphic form e.g. of the solvency level projection over time for the above selected percentiles by strategy (this should show an expanding funnel of doubt over time).
- In addition, as a summary, the 90%ile of solvency over time for various strategies can be shown on the same graph – this will show which strategies reach 100% solvency level by the ten year horizon at required confidence level.

- Summary of key assumptions used.
- Summary of the membership data.
- Sensitivity analysis for demonstrating to the trustees the impact of actual experience differing from assumptions made, and demonstrating which assumptions are most important.
- Recommendation on a few strategies for further consideration.

***Examiner comments***

*This question was done reasonably well overall.*

*Part (i) was bookwork, and many students knew their work well enough to score well. Some students were careless in suggesting a “swap” could be used to mitigate a particular risk, without indicating the type of swap or giving any other information about it.*

*Parts (ii) and (iii) were done well by most students.*

**QUESTION 10**

i.

- Both allow for some growth in the value of the share to compensate for inflation
- However the (net) capital gain to which tax is applied after these allowances is likely to be very different under each method.
- For example over a particular period inflation may be very low and/or equity market growth may be very high in which case the fixed (40%) allowance is expected to be greater.
- Method A can be argued to give a closer allowance in terms of trying to compensate for inflation
  - But will be more complicated for investors and tax practitioners to calculate
  - Method B is very simple to calculate and apply
  - Both methods can be abused by investors by selling just enough of their shares each year to avoid paying CGT by making full use of their annual allowance, and then repurchasing those same assets (‘bed and breakfasting’).
    - If the level of allowance is too high, it erodes the effect of the CGT in collecting tax revenue.
    - If it is too low, it could have a detrimental impact on poorer households.
    - ...and also increases administrative complexity (more reporting, more audits etc.)
    - The threshold level needs to be reviewed regularly, adding to the authority’s administrative tasks.
- Neither method directly rewards investors for long term investing (needed for economic growth and tax revenues over time)– it may be better to have an offset which increases with the term of the investment



ii.

- If income is taxed but capital gains not (or at a lower level), investors will prefer assets which produce lower levels of income and over high-income investments.
- If on the contrary, if capital gains tax is higher than income tax, investors will prefer income generating assets over as those whose return is made up more of capital gains.
- For tax-exempt investors, there will be no direct preference for either class of assets. But differences in prices from the actions of tax paying individuals may influence their demand for certain assets.
- A tax allowance for income/interest, e.g. for pensioners, would cause investors to prefer income-producing assets
- Differences of taxation may make vehicles through which investments are done relatively more attractive - e.g. retirement annuities or endowment policies

***Examiner comments***

- i. *This part was done poorly, perhaps in part being the last question of the paper. While tax rules can be seen as static, marks are generated by considering the actions of investors, different outcome of the markets and perspective of the tax authority.*
- ii. *This part was relatively easy and candidates who got to this part scored moderately.*

**END OF PAPER**