

EXAMINERS' REPORT

November 2023 examinations

Subject F104 — *Retirement and Related Benefits* 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 stable population pyramid is a triangular population pyramid
- Indicating that the population is neither increasing nor decreasing.

ii.

- The state will need to evaluate the impact of an unchanged tax base
- Against the cost of more people receiving the basic grant after age 63.
- May need to increase taxes
- Or borrow (tax future generations)
- Or reduce the grant
- Or increase the eligibility age to 65
- In the longer term, workers may realise that their private retirement savings are insufficient
- Given that the costs of retiring have been extended by 2 years on average
- And the basic monthly grant is at a level too low to be the primary source of income.
- Particularly if reduced
- Workers may voluntarily choose to increase their level of private savings
- By contributing at higher rates or
- Working for longer.
- If working careers are extended the state will receive taxes for a longer period on average
- Which will serve to alleviate the pressure induced by the mortality shock.

Examiner comments: Performance on this question should have been better given that it was partly bookwork and otherwise straightforward. Most candidates failed to get more than 50% for part (i). In part (ii), candidates that followed a logical approach scored well. Marks were awarded for consideration of the impact on the private sector provision.

QUESTION 2

i. Assumptions about the spouse

- Sex
- Age (or age gap between main member and spouse)
- Mortality assumptions
- Typically that any spouse at retirement is the same as the spouse at the time of the main member's death ie no remarriage

ii.

- Getting information upfront may also allow for variations in the annuity rates for the main member if:
- The spouse is a lot younger than anticipated
- A different sex to what is anticipated

- Whereas now the only option is to reduce the spouse reversionary percentage once the member dies and you know the details of their partner
- In addition, this change would allow for the pension to be provided on a named spouse basis
- This prevents losses arising from remarriage of the main member/ie if the person remarries after retirement, their new spouse is not entitled to the reversion

iii.

- Under the current system you may never know about spouses who predecease the member.
- Poor data may make setting the assumptions in i. difficult so getting the additional information may reduce model and data risk
- Pricing upfront for big age differences may make things reputationally easier than applying a penalty to a recently bereaved partner.
- But that doesn't actually reduce the risk if the penalty were being properly applied.
- Stopping a spouse's benefit on remarriage after retirement does reduce the longevity risk a bit, but this is
- Reputationally damaging if a widowed spouse is left without a pension
- arguably defeating the purpose of the benefit.
- These changes also have drawbacks.
- Administratively more complex
- Start of the pension payment may be delayed while waiting for this additional information
- However, the relative risk posed by the spouse's longevity depends on the size of the reversion/The smaller the reversionary percentage, the more the longevity risk relates to the longevity of the main member.
- This measure does little to address longevity risk caused by an inappropriate mortality table choice
- Or underestimating mortality improvements

Examiner comment: This question was not well answered. Quite a few candidates thought the additional information was about the marital status whereas it was actually about the spouse, given that the member was married. Most seemed unaware that this information is not usually available to the fund until after the main member's death.

QUESTION 3

i.

The process to follows:

- Specify the objectives for establishing the model.
 - The trustees want to reduce the investment risk.
 - This could relate to asset volatility or
 - More close matching between assets and liabilities.
- Establish a time horizon for the modelling process.
 - It is likely that the trustees will seek to minimize investment risk over the full duration of the liability.
 - However there may be real world limitations to consider
 - E.g. if the duration of the liabilities is wrong there may be a lack of matching assets
- Gather information relating to assets and liabilities.
 - The data used in the valuation should cover the data requirements for the modelling process.
 - And be clean and checked
- Perform a large number of simulations.
 - The model should project the cash flows related to the assets and liabilities.
 - In the same process, balance sheet items are projected at distinct points over the time horizon.
 - A large number of simulations should be carried out
 - Possibly using distributions associated with economic assumptions.
 - This will enable a distribution of the various outcomes to be determined, and
 - The objectives can be measured on the basis of different strategies in the context of the resulting distribution.
- The model results can then be used to directly compare various strategies
- And to select the strategy that most closely meets the objectives.
- Preliminary results can be discussed with the client
- And the model can be rerun more accurately once options have been narrowed.

ii.

- A lot will depend on what the strategy was before
- If only a minor change, the trustees/sponsor are likely to be disappointed as the perceived value-add would be small
- If a significant change with improved outcomes on the objective function
- The trustees are likely to find the proposal acceptable
 - Since they have a fiduciary duty to the members/ would be most conservative
 - And hence want a matched investment strategy
 - However they would seek to protect the potential for benefit increases and enhancements
 - That may have been established in the past

- And supported by a more aggressive investment strategy.
- However, they may be concerned about the transition strategy
- As well as the communication of a significant change to both the members
- Sponsor's reaction may depend strongly on regulation
- And accounting standards
 - Reduced downside risk means lower risk of a deficit for which the sponsor is responsible
 - But also upside potential (benefit to the sponsor due to surplus arising)
 - May be very limited as no active members so no reduction in contributions is possible
 - And most countries would not allow the sponsor to remove a surplus from the fund
 - Under these circumstances, a more secure investment strategy would be favourable.

Examiner comments: Overall, the performance in part (i) was better than part (ii). Candidates that knew the theory behind the process of establishing an ALM managed to score most of the marks for part (i). Most candidates failed to relate back to the specifics of the question. For part (ii) many candidates referred to liquidity and risk levels rather than considering the reaction of sponsor and trustees.

QUESTION 4

i.

- A reconciliation of the total number of members and changes in membership
 - Making sure that all exits are accounted for under the circumstances
 - To avoid including liabilities in respect of benefits already paid.
 - Check for the existence of new members
 - Against employer records such as payroll,
 - To ensure no liabilities are erroneously excluded.
- Check that contributions paid over the period are in line with salary data
- Check for data fields that that may not make sense
 - For example date of birth or service dates
 - Or unexplained changes in member records over the period.
- Check maximum and minimum benefit levels based on the benefit design.
 - And salary data

ii.

- Any legislation requirements with respect to assumptions must be considered first.
- Any policies or agreements in place between the members and employer must be accounted for.
- Basis used at previous valuation
- And approach used when setting the prior basis

Economic assumptions

- Interest rate
 - Prevailing economic conditions
 - Together with investment strategy
 - Given the low interest environment, it may be appropriate to add an equity risk premium,
 - Particularly since inflation is rapidly increasing.
 - The impact of taxes and expenses on future returns must be accounted for.
- Inflation
- And salary inflation
 - The type and extent of benefit inflation must be considered
 - If pensioners and active members are in the fund, they will most likely experience different benefit inflation.
 - Any policies in place with respect to the level and regularity of pension increases.
 - Discussions with the employer relating to expectations for salary increases
 - Especially given the recent recession and forced exits
 - The inflation rate should be informed by a comparison of yields on real and nominal government bonds.
 - Some adjustments might be necessary given that interest rate increases often lag inflation.

iii.

Other factors that could contribute to a deterioration in the financial position are:

- If actual returns earned by the assets were lower than previously assumed
 - This might have been the case since there was a recession during the period.
 - Even though low interest rates will have increased bond market values,
 - Equity performance may have been poorly affected.
- If salary or pension increases were higher than previously assumed
 - Although this seems less likely given the economic environment over the valuation period.
- If the number and level of benefits paid out were higher than expected
 - This is possible if there is an actuarial loss on early exits
 - Especially since there were a series of forced exits during the period
 - which are often accompanied by extra costs since they are involuntary.
- Once off changes to legislation or fund rules may have caused an increase in liabilities
 - Without a corresponding increase in assets
 - for example a minimum benefit level is introduced.
- If there are pensioners in payment, fewer deaths than anticipated will have resulted in a strain.

iv.

To determine the impact of forced exits

- The cost of an early exit must be determined, and
- The actual number of exits must be compared to the expected number of exits.

The cost of an early exit:

- The actual value of the benefit paid with respect to each exit
- Should be compared to the corresponding liability (reserve) established at the previous valuation date
- And brought forward to the exit date.
- If the actual value paid is higher than the reserve held
- Then there is a cost per exit.
- If the cost per exit is as expected, then the overall impact can be determined only by comparing the actual and expected number of exits.
- The expected number of exits is determined by applying the assumptions from the previous valuation
- To the membership at the previous valuation date.
- Where there are more or less exits than expected
- And the benefit is higher than the reserve
- A deficit will arise and vice versa.
- In this instance there most likely will have been more exits than expected

Examiner comments: This question was poorly done across all subsections. In part (i) candidates tended to miss the point about the forced exits and making sure membership changes were correct. Some responses were too detailed and redundant. The latter parts of the question showed gaps in the ability of candidates to apply the theory to the specific situation proposed in the question.

QUESTION 5

i.

- Legislation may compel it,
 - Either in Hafna itself or in the territory where BigCo is domiciled.
- There may be beneficial tax treatment
 - In Hafna, which could benefit both the employees and the company
 - Or in BigCo's home territory which could benefit BigCo
- Recruiting and retaining the right staff (sorting)/ The design of the benefit structure can attract the right recruits
 - E.g. higher retirement savings components tend to attract more risk averse members
 - DB funds tend to attract people more likely to give long service
- Rewarding good behaviour (incentives)
 - Performance bonuses/vesting scales
- Managing employee retirement/incentivising older workers who are less productive to leave
 - Use a retirement fund
- Controlling for externalities
 - E.g. giving medical leave to stop people coming to work sick
- Reducing administration and other costs
 - If the subsidiary is large (or BigCo has substantial bulk buying power)
 - A package of equivalent value can be offered at a reduced cost
 - E.g. group life insurance often cheaper than in retail
- Eliminating adverse selection and asymmetric information
 - Because employers know a lot about employees/have control
 - May be able to offer a benefit no otherwise available
 - E.g. salary advance
- Consistency across the organisation

ii. The following design elements may be different

- In order to integrate with social security benefits in that country
 - NRA
 - Accrual rate
 - Definition of pensionable earnings
 - Level of risk benefits
- In order to maximise tax incentives
 - Definition of pensionable earnings
 - Structuring of the contribution rates between member and employer
 - Whether risk benefits are offered in or out of the fund
- In order to comply with legislation and regulation
 - Eligibility criteria and membership categories may be influenced by rules regarding discrimination
 - Whether additional voluntary contributions are allowed.
 - Non-retirement benefits e.g. withdrawal benefits may be governed by regulation
 - Penalties may be strictly governed
 - E.g. use of vesting scales

- Level of mandation
- Costs may be subject to regulatory caps
- Which may result in complexity being reduced to keep costs low
- Guarantees may be required e.g. DC underpin on member's contributions
- Degree of choice allowed likely to be regulated
- E.g. commutation levels
- Market practice and local custom
 - Each company will want their fund to appeal to workers in that market who may have different preferences resulting in emphasis in different areas
 - The legal environment may strengthen this effect
 - E.g. if more than one legal spouse allowed
 - Administrative capability in each country may differ
- Different economic and demographic environments
 - Real returns may differ in the markets
 - Depending on how open the economies are
 - Which will affect affordability
- Cost of the benefits influenced by expected longevity
- Could be very different in each country depending on medical advancements
- Inflationary pension increases matter less in environments when inflation is low.
- Characteristics of members
 - BigCo is a holding company so likely to have lots of executives, managerial staff
 - We are not told what SubCo could do and the profile of the average member could be different
 - E.g. if SubCo is in manufacturing
 - Would probably expect a younger workforce
 - With lower earnings
 - and more males than BigCo
 - This would influence what could be afforded and
 - What benefit designs members would find most appealing.

iii. Terminal funding definition:

- At the time the benefit will start to be paid
- A contribution is made so that a provision can be set aside for the full expected benefit cost in the fund

iv. Advantages of terminal funding relative to regular contributions

- Under Terminal funding, the timing of the contributions depends on the timing of the exits
- If no past service credits are given (most likely since a new company)
- And members may not transfer money from other funds in
- It will take many decades for exit benefits of a reasonable size to build up
- Which means that in the early years of SubCos operations, contribution levels are likely to be low
- Easing liquidity requirements
- This also allows for better retention of funds within the business

- Ie reduced opportunity cost
- If transfers from other funds allowed in, this deferral effect would be diluted particularly if transfers in are large
- If SubCo outsources the pension benefits ie purchases a pension for each member at retirement
- Then there may not need to be a fund at all
- Which can reduce the costs associated with running the fund
- Including the management time required to run a fund.

Examiner's comment: Part (i) was related to a specific bookwork list which seemed to be known to the candidates. However, few gave the necessary application to the question that was required to score well. For part (ii), candidates needed to realise there were two countries and two companies. There was plenty to say and most candidates scored well. Part (iii) was bookwork and generally well done. Candidates seemed to struggle with part (iv) because they did not view this question in the context of the larger question.

QUESTION 6

i.

- PV of TOTAL benefits
- Based on projected earnings at retirement
- Less the value of the contribution rate multiplied by
- Total future earnings from the attained age to retirement

ii.

$$AAAL = 0.75 \times S \times \left(\frac{1+e}{1+i} \right)^{65-x} \times a'_{65} - C \times S \times a_{\overline{65-x}|}$$

Where

- S = the member's annual salary
- X = member's current age
- a'_{65} is the present value of the annuity benefit starting at age 65
- $a_{\overline{65-x}|}$ is the present value factor for earnings from 60-65
- Hence probably using a discount rate of i-e

iii.

- The AAM is a prospective method that takes account of all future expected salary increases
- which makes sense since the replacement ratio should reflect salary at retirement date.
- The AAM determines the liability with reference to a fixed contribution rate
- Which after being calculated should not have to be recalculated.
- This is applicable in the case of a DC fund since the contribution rate is fixed until retirement date.
- The required level of assets backing the liability will take into account the level of contributions being paid.

iv.

- Annuity risk
 - The income earned at retirement depends on the annuity rate used to convert capital into income.
 - Annuity rates are affected by longevity and interest rate changes
 - Increases in longevity make annuities more expensive.
 - Variation in interest rates cause annuity prices to be unpredictable.
Annuity risk can be mitigated by
 - Investing in assets that closely match movement in annuity rates (for example bonds) closer to retirement
 - Working and saving for longer to counteract the effects of longevity.
- Investment risk
 - Investment return earned may not keep up with salary increases
 - and could be volatile.
 - Investment in high quality real assets, such as equities or property over the long term will mitigate the impact of increasing benefits.
 - Lower risk and more matching close to retirement will mitigate volatility when it is least desirable.
- Contribution risk
 - Contributions lower than required to fund benefits at the targeted replacement ratio.
 - Contributions can be technically determined and increased to desired levels
 - Although this might not be affordable for members.
- Expense risk
 - Expenses might be higher than expected or increase faster than expected
 - This effect erodes return in a defined contribution fund.
 - Trustees should monitor expenses and
 - Negotiate with suppliers if expenses become inappropriately high.
- Funding risk
 - At any point in time the implied liability could be underfunded due to other risk factors
 - Employers sponsor's will not be responsible for deficits
 - Funding risk will need to be mitigated by one or more of the mitigating factors applicable to risks already discussed.

Examiner comments: This question was reasonably well done with most candidates having strong knowledge of the theory relating to the Attained Age method of funding. In part (ii) most candidates failed to incorporate the information in the question and then wasted time on unnecessary definitions. Part (iii) was better in that most candidates touched on the most important risks.

QUESTION 7

- i. The two major types are:
 - Buy-side and sell-side
 - Buy-side regulations pertain to restricting the products that may be purchased for a particular purpose
 - To only those that meet certain standards
 - E.g. at retirement, an individual may only purchase a product that is classed as an annuity
 - Sell-side regulations restrict providers from selling products that do not meet certain standards
 - E.g. the maximum charge on a product may not exceed a certain percentage.
- ii. Common behavioural biases:
 - Paralysis – failure to make any choice at all and just landing up in the default
 - Blindly applying heuristic rules/ equal allocations to each option/choosing the middle option
 - Herding behaviour
 - Chasing winners
 - Choosing a more expensive option believing it must be better
- iii. Factors to consider when reviewing an investment default
 - Changes to the profile of the membership
 - Both in total and for those in the default
 - Age and expected retirement age– provides an indication of investing time horizon
 - And fund unlikely to have an NRA given no link with an employer
 - Income or earnings
 - May need to use contribution or size of fund as a proxy
 - Can be a proxy for financial sophistication
 - Other funds
 - Voluntary scheme but we don't know much about retirement funding in this country
 - E.g. if other mandatory arrangements
 - If members are not fully relying on this fund then they could possibly tolerate more risk
 - Sex (and changes to composition of your membership)
 - Women tend to be more risk averse than men
 - Risk aversion indicators
 - e.g. occupation, hobbies
 - Contribution rates past and expected
 - To assess cashflows into the fund
 - Use of funds on retirement
 - Total assets in the fund and assets in the default
 - Some options may only be suitable for larger assets under management
 - Alternative choices available in the fund
 - Historic performance of existing default and alternative default options

- Expenses - would want good value for money
- Compliance with regulation and legislation
- The existing default should be goal-directed. How can its performance be assessed relative to that goal.
- Commonly this is an analysis of returns relative to a benchmark
- Risk metrics would also be considered e.g. standard deviations of returns
- Practicalities involved in any change
 - Simplicity – trustees would want a new default to be as simple as possible to communicate
 - Similarly for the transition arrangements
 - Would existing money move to the new default investment choice or only new contributions?
- Expectations
 - Of the membership regarding the default: what was communicated and has the product reflected what was communicated?
 - What is the future experience of the default expected to be
 - On a variety of model assumptions
 - Measured relative to the investment goal
- Any other factors specified in the regulation

Examiner comments: This question was well done by candidates who had managed their time well. There was some evidence of time pressure.