Actuarial Society of South Africa

EXAMINATION

20 October 2023

Subject F204 - Pensions and Other Benefits Specialist Applications

EXAMINER'S REPORT

Overall this was not considered a difficult exam, and gave sufficient opportunity for candidates to demonstrate mastery of the subject matter. There were many marks available, allowing for well-prepared candidates to score well.

QUESTION 1

The question asked candidates to advise a Board of Trustees on the establishment of a default annuity strategy for a defined contribution fund. This question was not difficult and was reasonably well answered.

i. Briefly outline the context that has led to the trustees being required to establish a default annuity strategy. [5]

- An annuity strategy was needed as members moved from the regulated protection of the retirement fund during the accumulation phase into open retail annuity market
    - Leading to them taking the risks at retirement on their own
    - Risk of poor advice
    - Poor decisions
    - High charges
- Extremely important decision at retirement – large once-off sum – decision not easily reversed
- Required to establish a default annuity strategy in terms of Regulation 39
    - Applies to pension funds, pension preservation funds and retirement annuity funds.
    - Also applies to provident fund members from 1 March 2021, after compulsory annuitisation was introduced
    - As this fund is a pension fund. Reg 39 applies
- Overall aim is to propose annuities that would be appropriate and suitable for the specific classes of members who enrolled in them.
- Fees and charges are to be reasonable

ii. Discuss the features of a living annuity that make it attractive to retirees. [4]

- Any balance of capital is payable to the nominated dependent on death of the pensioner.
    - This is an attractive feature for a living annuity as this removes the risk that a pensioner dies soon after retirement and loses the balance of wealth.
- The mechanism of the living annuity is easy to understand and the annuitant has control of many of the features of the annuity,
- which makes it relatively more attractive than a life annuity where control is largely in the hands of the life insurer.
- The pensioner can select the level of income to draw.
    - This may be particularly attractive for a person in poor health who may be able to access higher levels of income than he or she would under a life annuity.
    - The level of income drawn is flexible. This means that the income the pensioner chooses to draw can be increased or decreased as the pensioner's spending needs change.

    - If the annuitant has an alternative source of income or wealth, the annuitant can minimise drawings from the living annuity upfront and protect the capital in the living annuity for as long as possible.
- The pensioner can still purchase a life annuity later – by deferring annuitisation. Again, providing more flexibility through the living annuity option – might provide a perceived best-of-both-worlds situation.
- High investment returns directly benefit the annuitant. There is no upside limit to this.
    - The pensioner can also choose what the living annuity is invested in to try and maximise these returns, based on the level of risk the annuitant is willing to take.

iii. Discuss the major risks of living annuities to annuitants which are addressed by these criteria and briefly outline the conditions that must be met for a living annuity to be chosen as part of the fund's default annuity strategy. [10]

Major risks:

- Retirement savings being depleted too soon
    - as pensioners are choosing their drawdown rates
    - Initial rate chosen could result in income higher than that quoted on for a life annuity, making the living annuity more attractive, but potentially unsustainable
    - and may not have the expertise to know what rates are appropriate for sustainable income for life
    - Pensioner may have to live on a reducing income that is too low to cover expenses
    - And expenses likely to increase with inflation and increased need for medical assistance
- Poor investment returns on capital
    - The pensioner has no guarantees or protections against this risk
    - And a decreasing time horizon for asset values to recover
- Excessive fees and charges
    - This is a competitive market but there are many options to choose from.
    - It is difficult for a retiree to know what is good value
    - This is effectively a retail product with needs being met and advice and decisions at an individual level – this is costly

Criteria/Conditions:

- The additional risks introduced by the living annuity need to be addressed more stringently if the living annuity is being presented as a default option within the fund
- Sustainable income
    - The fund must measure the sustainability of income, considering whether particular level of income will continue to be paid for the lifetime of the pensioner,
    - assuming income increases with inflation.
- Monitoring sustainability
    - The fund must establish a mechanism to monitor the sustainability of the income from the default living annuity
        - The fund must communicate a reasonable drawdown rate and income at inception
        - Subsequent communication must be annual and must provide information on the performance of the annuity and updates on its continued sustainability

iv. Discuss the shape of the curve [3]

- The capital value in the living annuity is affected by the following main factors:
    - Investment returns (increases or decreases the capital value)
    - Income drawdown (decreases the capital value)
        - Income remains level or increases with inflation
    - Expenses (decreases the capital value)
- For the first years, the investment returns earned on the capital balance exceed the amount being withdrawn as income, and the value of the fund increases
- As the level of income drawn increases, it reaches a point where it exceeds investment income and the fund value starts to decline
- The extent to which these effects take place are dependent on the actual levels of returns earned and income drawn, which are not fixed, as suggested by the curve.

v. Discuss the trustees' suggestion [8]

- The trustees are clearly correct in that the higher drawdown rate would result in a higher income for retirees.
    - This higher income would persist, assuming the drawdown rate sets the initial income and there are inflationary increases to income thereafter and no other changes
- Given that the amount of capital value available does not change for either option, the higher income will obviously result in the capital lasting for a shorter period of time
- Retirees will likely find the higher income attractive
    - Would probably choose the maximum allowed
    - Depending on other wealth or income sources
- Would be important to communicate the consequences of the decision to retirees
    - Must be done anyway at the point of retiring (and earlier through retirement counselling)
- Retiree would still make the decision – higher drawdown would be possible for a person who expected to have a shorter lifespan than the average
- Assuming investment returns (after fees and expenses of 1.5%) of 9% p.a. and allowing for income to increase at inflation of 7% p.a., the capital might be expected to fund income for 29 years at a starting drawdown rate of 4.5%.
- This ignores maximum drawdown limit of 17.5% as the fund tends to zero.
- If the initial drawdown amount is 5.5%, the fund is expected to be depleted after +-22 years.
- This represents a reduction of around 7 years in the sustainability of the capital (paid for about 76% as long), in exchange for a 22% increase in income.
- Could agree to the trustees suggestion and on the understanding that the importance of the decision be stressed during the consultations pre-retirement.

QUESTION 2

i) Explain what a LDI strategy is and how it is typically implemented in a retirement fund [6]

- An LDI strategy structures assets to provide cashflows to meet a given set of liability cashflows as and when they fall due
- In a retirement fund an LDI strategy is generally used for pensioner liabilities as these cashflows are reasonably predictable
- Taking into account the pensioner demographics and pension increase policy.
- The LDI strategy will narrow the potential outcomes as far as future pension increases are concerned (on the upside and the downside)
- The fund will usually appoint an expert LDI manager
- The assets will remain in the name of the fund
- Since most pension increase policies target a pension increase relative to inflation, an LDI portfolio will typically consist of a mixture of nominal bonds, inflation linked bonds and money market investments
- The LDI portfolio will hedge the pensioner liability against interest rate movements, as the value of the portfolio will move in line with the liabilities
- Provides immunisation against inflation risk
- The Fund is still exposed to mortality risk and the risk of changes to the pensioner data (the more accurate the pensioner data at the outset the better)

ii) Discuss the points you would make in response to the Trustee's concern, including how a LDI strategy might prevent lower future pension increases [5]

- Balanced portfolio returns have been lower over the last few years and it has resulted in lower pension increases than was historically the case
- However, the actual pension increases granted are still ahead of the pension increase target over the longer term
- This is not unique to the Fund
- Given the low excess assets in the pensioner part of the Fund, there is little scope of supporting pension increase from surplus or reserve assets
- Future pension increases will depend entirely on future investment returns, in particular by how much real investment returns exceed 4.0% per annum
- Given the current volatility in investment markets and the likelihood of lower returns in the short to medium term
- The Trustee is justified in his concerns
- An LDI strategy will offer protection against poor investment outcomes (e.g. a real return of less than 4.0% per annum) but will also limit any upside returns (e.g. the 120% of inflation increases granted in the last 15 years)
- The LDI strategy will lock in increases in line with inflation. The exact percentage will depend on market conditions during the period that assets are transitioned to the LDI manager
- The Trustees therefore need to be comfortable with giving up some potential upside (pension increases at 120% of inflation) in order the gain some downside protect (pension increase of zero or significantly below inflation)
- Could consider a partial LDI strategy (ie level pensions for LDI and invested in more growth assets for increases – but risk and funding level should be considered.

iii) Discuss how the implementation of an LDI strategy will impact on the valuation basis used for future valuations and the impact on any other actuarial calculations [4]

- Post retirement interest rate assumption in respect of pensioners will be based on real yields. Could price of a yield curve or use a duration based approach.
- Should be very close to the LDI portfolio value
- Post retirement interest rate assumption of active members would be similar to the above, but adjusted for the expected longer duration of a new retiree.
- The determination of the capital to transfer to the pensioner assets on retirement should also be based on real yields at the date of retirement.
- The determination of commutation amounts might also be based on real yields at the date of retirement, especially if the active member assets are restructured to take into account the LDI strategy for pensioners.
- This will require a more frequent (monthly) update of actuarial factors to take into account changing yields
- Ideally, the liability cashflows provided to the LDI manager should also be revised regularly (quarterly of monthly say) to check that the LDI strategy still covers the liabilities
- This will also highlight issues with mortality and data over time

iv) Set out the additional issue that need to be considered in whether to implement an LDI strategy in respect of the active members. [5]

- Active member benefit cashflows are less predictable which makes it hard to cashflow match them. In particular:
- When a member will retire is not known with certainty. This impacts on the timing of the future cashflows.
- The amount of pension a member will commute for a lump sum is unknown. This impacts the amount of the cashflow.
- Future salary increases cannot be hedged against accurately under an LDI strategy.
- The retirement dates of members will also influence the future contribution receipts which will also impact on the LDI strategy.
- To implement an LDI strategy in respect of active members will therefore require a number of extra assumptions about retirement dates, marital status, salary increases, commutation percentages, withdrawal rate etc which are unlikely to be met in practice. The LDI hedge is therefore likely to not be particularly effective.
- This is however mitigated to an extent in the Fund as the active members are mostly close the retirement age
- The expected future return on the active member assets will also be lower under an LDI strategy which will result in a higher required employer contribution rate. Employer might not be happy with this

v) Set out the main differences for the Trustee. [4]

- LDI aims to address investment risk relative to the liabilities.
- Annuities provide protection against investment risk, mortality risk and expense risk to some extent. The main remaining risk is the Fund's exposure to the solvency of the insurer as the policies are owned by the Fund
- Under LDI, the Fund still owns the individual assets and can unwind the structure relatively easily in future.
- With annuities owned by the Fund, the structure can be unwound but often with difficulty and at a financial cost to the Fund.
- Investing in annuities will be more expensive compared to LDI due to the extra guarantees provided and the insurer's cost of capital and profit charges.
- With a funding level of 100.8% (or even the 106.2%) it is unlikely that the Fund will be able to afford annuities that target increases in line with inflation and even more unlikely to afford annuities that guarantee inflation related increases. An LDI strategy does not require the 'once-off' purchase, potentially more time to invest for inflationary increases.

vi) Discuss the steps that the Trustees can take in order to reduce the investment risk up until the implementation of the LDI strategy and any future investment risk faced by the Fund. [7]

- The investment risk in respect of implementing a LDI strategy stems from the mis-match between the current (active member) strategy of a balanced portfolio and the LDI portfolio which is effectively sensitive to real interest rates
- A reduction in the balanced portfolio (primarily a reduction in equities) will reduce the assets available to secure the LDI assets.
- A reduction in real interest rates and to lesser extent nominal interest rates, will increase the cost of securing the LDI assets.
- A worst case scenario would be both the events above happening at the same time. Unless further financing is then sourced, the end result would be an LDI strategy that targets a lower percentage of inflation.
- The Fund could implement broad hedges using derivative against both the above outcomes while the transition is completed
- Or alternatively the Fund could transition from the balanced portfolio to the LDI portfolio over a period of time (with a possible acceleration if conditions are more favourable).
- Future investment risk is as described above but will be spread out, and smaller amounts, as an when members retire.
- Not cost effective to hedge with derivatives over time.
- Could consider a gradual reallocation of the balanced portfolio over time to include more inflation linked and nominal bond as members age to provide an approximate hedge against the investment risk

Credit would have been given for mentions of enhancement strategies using derivatives, but it was expected that most candidates would not have seen this yet.

QUESTION 3

i. Explain the calculation and the purpose of each component. [9]

There were many marks available for this question, and candidates didn't have to write all the points that follow – it was just necessary to write enough valid points to score 9 marks.

Actuarial Liabilities

- The actuarial liabilities for each individual would be the value that the Fund actuary believes that the Fund would need to set aside at a particular point in time in order to provide for the benefits (related to past pensionable service) that has already accrued to a member
- The actuarial liability would be determined taking into account:
  - Members age
  - Past pensionable service
  - Pensionable salary projected to retirement including allowance for expected salary increases
  - the likelihood of survival to retirement age
  - expected mortality after retirement
  - expected future pension increases after retirement
  - assumption around benefits for spouses and/or dependents
  - assumed investment return (discount rate) on assets backing the liability
  - generally the actuarial liability would be determined on best estimate assumptions with no margins, 50:50 chance of success
- the actuary would project the salary for each member and determine the expected pension based on service at the calculation date.
- The pension would then be projected into the future.
- The future expected pensions would be discounted using the assumed investment return to the date of calculation.
- There would be an allowance for the probability of surviving to the date of payment of each of the pension amounts and would take account of the benefits in terms of the rules should the member exit the fund before
- This is likely to be the core of any transfer or conversion value in because this is the best representation of the amount that the Fund believes it needs to hold for each individual at a point in time.
  - It makes sense that if the individual is converting that the fund can afford to offer members at least the amount being held at the calculation date given that the Fund is being relieved of its obligation in this respect

Solvency Reserves

- Because the accrued / actuarial liabilities would be determined on best estimate basis with no margin of conservatism the fund would wish to hold a margin to protect the funding position in the event that future expectations are not met
  - Solvency reserves therefore provide an explicit level of protection against the future being worse than expected
  - Solvency reserve could be set to protect against long term investment returns being lowered than expected, inflation and pension increases being higher than expected or pensioners surviving longer than expected

- Solvency reserves can be calculated on a discontinuance matched method or on a stochastic method
- Under discontinuance matched method the actuarial liabilities are calculated using assumptions that take account the likely costs of buying out or matching the liabilities
  - The difference between the liabilities on a solvency basis and those determined on a best estimate basis will be set aside as a solvency reserve
- Under the stochastic method the reserve is determined to be the additional assets that the Fund should hold in order to reduce the likelihood of future deficits to a specific percentage probability.
  - Eg. A reserve set such that there is a 90% chance of being more than 100% funded over the next 10 years
- In the case of a conversion the members converting would essentially be assuming all future risks
- The member taking all future risks is likely to need additional reserves to offer some protection against downside risks if they are to achieve the same reasonable benefits expectations
- The Fund is being released from future risks and no longer has the need for solvency reserves and hence should be happy to transfer these to the members

ii. Explain the reasons for the different conversion values for individual members. [7]

- In order to understand how actuarial liabilities differ across different members we need to consider the factors/inputs that affect each of the above components of the actuarial liability.

Defined benefit pension

- The defined benefit pension is based on the formula set out in the rules.
  - The accrual rate or rate of annual pensionable salary that will be applied for each year of service is fixed for all members of the Fund.
- The variable components would therefore be:
- Members' years of pensionable service
  - the higher the service the higher the pension
- Members' pensionable salary
  - the higher the salary the higher the pension
- Members could only expect comparable benefits if as a start their salary and service were the same

Capitalised value of the defined benefit pension

- Having determined the pension based on the individual members service and salary the pension would then need to be capitalised using the annuity factor.
- The factor is determined based on the actuary's assumptions for future pensioner mortality,
- the assumed rate at which pensions will increase and
- the expected investment return (or discount rate) that could be earned on the assets backing the pension liability.

- The capitalisation factor would apply at the normal retirement age and would therefore be equal for all members with the same normal retirement age.
  - In general, likely to have a capitalisation factor applicable for male members and a potentially higher factor applicable for female members
  - on the basis that females are expected to live longer than males and as such the fund would require more capital to cover the future pensions of the a female member.
- Members could therefore only expect to compare benefits with members who have the same normal retirement age

Present value of the capitalised pension

- The present value of this capitalised amount is then affected by:
  - The actuary's chosen discount rate which is the assumed rate of investment return between the date of calculation and the normal retirement date.
  - The assumed rate at which salaries will increase.
  - Assumes salary at the calculation date but salary projected to the retirement date.
- Model can be simplified to use a net rate where you consider the difference between the salary increase rate and the discount rate
- The rates chosen by the actuary would however apply equally to all members of the fund and would not be a source of difference.

- Members current age
- The current age of a member determines how much time the fund has to save for the retirement benefits.
- The higher the age the higher the present value because there is less time available for the fund to save for the retirement benefits.

iii. Discuss the general considerations for apportioning surplus between the two stakeholders and comment on for the method that was used. [6]

  - Once the actuary has set aside sufficient assets to cover both the actuarial liabilities and solvency reserves the extent of any surplus that remains can be determined.
  - There is no legislative requirement to specifically include a share of surplus in the conversion values
  - But there would be a requirement to deal with any future surplus that arose in the Fund in line with the requirements of Section 15C of the Pension Funds Act.
  - If surplus was not allocated at the time of the conversion then it would have needed to be allocated at some other future point in time.
  - There is also no single legislated method to allocate surplus but there are a number of general principles that could be applied:
  - These would essentially follow similar principles to the requirements that would have been developed for the Surplus Apportionment Scheme in terms of the Second Amendment to the Pension Funds Act.
  - Information Circular 3 of 2013 issued by the Registrar of Pension Funds provided some guidance.

- In summary, it requires that where the Rules of a Fund do not specifically set out how the surplus will be apportioned then it must be apportioned on some basis that takes account of the interests of all stakeholders.
- It notes as a general rule that the two most important criteria to be considered would be the reasonable benefit expectations of members and the level of risk borne by each of the stakeholders.
- On the basis that the reasonable benefit expectations would have been considered in deriving the best estimate liabilities and the solvency reserves the apportionment of the remaining surplus could consider the level of risk borne by the various stakeholders.

- The surplus could have been apportioned entirely to the Employer, however
- The Authority would not be supportive of an approach that simply allocated all surplus to the Employer
- as it is generally not true that the Employer always carries all the risk in a defined benefit arrangement.
- Pension increases to pensioners are dependent on affordability and are not guaranteed and as such pensioners face the risk of their pensions not meeting inflation.
- Active members have some exposure to risk on the basis that their minimum individual reserves are determined on a basis that takes into account market factors.
- A fund may also consider how the surplus had potentially arisen and consider whether it was possible to apportion the surplus in line with the factors that contributed to the surplus.
- Practically this may be difficult to do.
- Contributions being the main source of cashflow into the fund would have led to an accumulation of assets in the Fund which ultimately may have contributed to the surplus.
- An apportionment based on contribution levels is simple to determine and implement

iv. Explain why the apportionment method chosen was the most reasonable method. [4]

- There is no single correct or legislated method

- Surplus can be allocated through an equal rand value across all members and pensioners
- This would not be appropriate
- Not equitable to members who had been in the Fund for many years and potentially contributed more to the surplus
- Not equitable to members with higher salaries who paid higher contributions
- It could be allocated based on the total contributions made by each member or
- based on their share in the total fund (in this case their share of the total fund is represented by their actuarial liabilities).
- Under method chosen the higher the members' actuarial liabilities the higher their share of the surplus enhancement.
- This may appear to benefit older members with higher service and higher salaries but this is possibly the most equitable method available.

- Other methods could involve further adjustments to the solvency basis and as such an even more extreme solvency margin but this is likely to bias younger members.
- You could argue the younger members are likely to have shorter periods of service and as such have not contributed as much to the fund over the years when compared to the older members with higher service.
- The older members with greater years of service and higher salaries contributed more to the funds and potentially more to the build-up of past surplus.
- The method chosen was therefore reasonable

v. Describe how the projected benefit reserve would be calculated, including the basis for each key assumption. [4]

- The projected benefit enhancement would have aimed at targeting but probably not guaranteeing that the members' benefits in the DC Fund would be no less than the benefit in the DB Fund.
- The calculation would have been aimed at balancing the formula:

  - Initial conversion value + future contributions + "Projected Benefit Enhancement" together with future investment returns
  - =
  - Capital value of the projected defined benefit pension at retirement

- The capital value of the projected defined benefit pension would be determined by assuming a level of future salary increases and
- taking into account all years of future service until the member's date of retirement.
- This is the benefit that the member might have expected to receive if they remained in service in the DB Funds until retirement date.

- This is being compared to the initial transfer value from the DB Funds plus the future contributions
- which have been projected based on the same projected salary to retirement date
- together with expected investment returns on these amounts.

- To the extent that the expected capital value of the defined benefit pension is greater than the initial transfer value together with future contributions and investment returns earned on those amounts, then a top-up or enhancement could be determined to equalise these amounts.
- It is likely the assumptions adopted would be as follows:
- Discount rate and pensioner mortality assumptions used to determine the capital value of the pension would be the best estimate rates as used in the actuarial liabilities;
- The assumed salary increase assumption would likely have matched the rate used in the actuarial liabilities and would be equal on both sides of the equation;
- The investment returns assumed on the DC fund could be based either on the discount rate used in the valuation or could be set based on the intended investment strategy of the DC fund

vi. Determine the "projected benefit reserve" for each of the sample members. [6]

Assumptions		
Salary Increases	5%	
Discount Rate	10%	
Investment return on DC	10%	
Net rate DC contributions	4.76%	
Annuity capitalisation 65	20.00	
Contributions to DC	15%	
NRA	65	
	Member 1	Member 2
Age	30	50
Past Service	1	10
Salary	100,000	450,000
Actuarial Liability	8,500	895,000
Calculations:		
DB NRA:		
Future Service	35	15
Salary Projected	551,602	935,518
Service Projected	36	25
Pension	397,153	467,759
Capitalised	7,943,062	9,355,177
DC NRA		
Opening	8,500	895,000
Contribution start	15,000	67,500
PV contribution factor	17	11
FV contribution factor	474	44
FV contributions	7,114,723	2,974,369
FV opening	238,871	3,738,637
Total FV DC	7,353,593	6,713,006
Difference	589,469	2,642,171
Discounted	20,976	632,515

Enhancement	**20,976**	**632,515**

vii. Comment on the results from vi. [3]

Credit was given to sensible comments in general about what results would have been expected, given the profile of the sample members, so that a candidate who did not get the calculation in vi. could still gain marks.

Results are as expected:

- Younger member has a lower salary – all results related to salary so lower salary implies a lower projected benefit reserve
- Underlying contribution rate required to fund the db benefit increases with age. Replacing with flat dc contribution implies contribution for older member will not be sufficient to cover the accrual of benefits to the same level of db fund – implies a higher projected benefit reserve will be required.
- The value of the projected benefit reserve for the 30 year old will be discounted for 35 years, the reserve for the 50 yr old will only be discounted for 15 years – discounting alone will result in a lower value for the younger all else being equal