

Actuarial Society of South Africa

EXAMINATION

2 November 2012 (am)

**Subject F204 - Pensions and Other Benefits
Specialist Applications**

EXAMINERS' REPORT

QUESTION 1

i) **The FD has asked you to explain why Company X's service cost under the IAS19 valuation is 14% of salaries whereas the previous statutory actuarial valuation determined that Company X must contribute at 18.0% of salaries. Outline the points you would make in your response to the FD.**

- Closed DB fund would invariably mean AAM is used for statutory valuation.
- IAS19 prescribes PUCM for valuations.
- Contribution rate under AAM > PUCM all other things be equal.
- Statutory valuation basis might be stronger than IAS19 basis, due to:
 - Change in economic conditions from 2009 to 2011
 - Deliberate move to be more conservative in statutory basis. Not allowed in IAS19 basis. May reflect conservative investment strategy in a closed DB fund that is only 100% funded
- Statutory contribution rate may included a deliberate margin to build up reserves (e.g. solvency reserve)

ii) **Based on the above information, do the following:**

- Estimate the assets, active member liability, pensioner liability and the overall financial position of the fund as at 31 December 2012.**
- Estimate the components of the actuarial gain / loss for the year to 31 December 2012.**
- Determine the Net Periodic Pension Cost for the year**
- Reconcile the amount shown in Company X's balance sheet over the year. State any further assumptions that you make.**

a) Asset, active member liability, pensioner liability and financial position 31.12.2012

- Estimated asset as at 31 Dec 2012:
EE Cont (5%) = R10m, ER cont = 18% / 5% * R10m = R36m
Assets:
 $R4\ 000m \times 1.08 + (R10m + R36m - R180m - R50m) \times (1.08)^{0.5} = R4\ 128.8m$
{Estimated investment proceeds = R312.8} – (A)
- Estimated active member liability as at 31 Dec 2012:
EE cont of 5% = R10m. Implies ER service cost of 14% about R28m. Total cost of one year service is R38m
Expected liability assuming IAS19 assumptions as at 31.12.2011 hold true:
 $R1\ 000m \times 1.10 + (R38m - R50m - R40m) \times (1.10)^{0.5} = R1\ 045.5m$
{Interest cost = R97.5m} – (B)
Allow for higher salary increase as at 31 Dec 2012:
Estimated active member liability = $R1\ 045.5m / (1.07) \times (1.08) = R1\ 055.3m$

- { Actuarial loss due to salary increase = R1 055.3m – R1 045.5m = R9.8m } – (C)
- Estimated pensioner liability as at 31 Dec 2012:
 Expected liability assuming assumption hold true:
 $R3\ 200m \times 1.10 + (R40m - R180m) \times (1.10)^{.5} = R3\ 373.2m$
 { Interest cost = R313.2m } – (D)
 Allow for lower pension increase as at 31 Dec 2012:
 Estimated pensioner liability = $R3\ 373.2m / (1.06) \times (1.05) = R3\ 341.4m$
 { Actuarial gain to pension increase = $R3\ 373.2m - R3\ 341.4m = R31.8m$ } – (E)
 - Financial position as at 31 Dec 2012:
 - Assets: R4 128.8m
 - Liabilities: R1 055.3m + R3 341.4m = R4 396.7m
 - Deficit = R267.9m
 - Key assumptions (valid alternatives may apply):
 - Contributions, benefit outgo, pensions paid and capital in respect of retirees spread evenly throughout the year
 - New pensioner during the year receive a full pension increase as at 31 December 2012
 - Salary increase as at 31 December 2012 is the same for all members
 - Benefit outgo value is on average equal to the IAS19 liability held for a member i.e. not profits or losses arise on exit.
 - Expenses are met directly by the Company
 - Valuation assumptions as at 31 Dec 2012 the same as 31 Dec 2011 (no change in corporate and government bond yields)
 - Actual experience to 31 Dec 2012 is consistent with the above estimates
- b) Actuarial gains and losses components
- Actuarial loss due to higher than expected salary increases (C above): R9.8m
 - Actuarial gain due to lower than expected pension increases (E above): R31.8m
 - Expected asset as at 31 Dec 2012:
 $R4\ 000m \times 1.12 + (R10m + R36m - R230m) \times (1.12)^{.5} = R4\ 285.3m$
 { Expected investment proceeds = R469.3m } – (F)
 - Actuarial loss due to lower return on assets: $R4\ 285.3m - R4\ 128.8m = R156.5m$
 (or A less F above)
 - Total actuarial loss $R156.5m - R31.8m + R9.8m = R134.5m$
- c) Net periodic pension cost
- | | |
|--|----------------|
| • Service cost (net of member conts.): | R 28.0m |
| • Interest cost (B plus D above): | R410.7m |
| • Expected return (F): | -R469.3m |
| • Recognised actuarial loss: | <u>R134.5m</u> |
| | R103.9m |
- d) Reconciliation of asset recognised on the Company balance sheet
- | | |
|-----------------------------------|---------|
| • Deficit recognised 31 Dec 2011: | R200.0m |
|-----------------------------------|---------|

- Net period pension cost: R103.9m
- Company contributions: -R 36.0m
- Deficit recognised 31 Dec 2012: R267.9m

iii) Discuss the key issues that the Trustees of the fund would need to consider in respect of the FD's proposal.

- Trustees must act in terms of the rules and the best interests of the fund and its members.
 - Any transfer would be subject to S14 of the Act. PMB is minimum transfer.
 - TV usually based on ARV. Given IAS19 liability > PMB would expect ARV exceeds PMB as well?
 - R300m incentive plus PMB may exceed ARV.
 - Trustees have a duty to put any reasonable proposal to members.
 - Consider terms offered for any previous transfers or conversions in fund and Company X's other funds.
 - Proposal would improve funding position of the fund. Trustee must ensure that it is not at the expense of transferring members.
 - Look at hedging asset values in respect of active members and consider liquidity if payments to Fund Y need to be made. Discuss with Company
- Trustees would need more information regarding
- Will transfer be voluntary for each member or based on some agreed acceptance 75%?
 - Would need to get details of how incentive is applied and provide members with enough information to make an informed decision.
 - If only part of the members transfer, will Company X meet any resulting financial strain on the fund (e.g. higher contribution rate if older members remain)

iv) The FD has requested that, on the assumption that all active members accept the transfer offer, that you re-do the following:

- (a) Estimate the assets, active member liability, pensioner liability and the overall financial position of the fund as at 31 December 2012.
- (b) Estimate the components of the actuarial gain / loss for the year to 31 December 2012.
- (c) Determine the Net Periodic Pension Cost for the year
- (d) Reconcile the amount shown in Company X's balance sheet over the year.

(e) Comment on the change in the amounts recognised in Company X's balance sheet in respect of the fund and in respect of Fund Y above.

a) Asset, active member liability, pensioner liability and financial position 31.12.2012

- Estimated asset as at 31 Dec 2012:
As in ii) above but less R820m = R3 308.8m
- Estimated active member liability as at 31 Dec 2012:
Estimated active member liability = R0m
- Estimated pensioner liability as at 31 Dec 2012:
Unchanged at R3 341.4m
- Financial position as at 31 Dec 2012:
 - Assets: R3 308.8m
 - Liabilities: R3 341.4m
 - Deficit = R32.6m

b) Actuarial gains and losses components

- Total actuarial loss unchanged at R134.5m

c) Net periodic pension cost

Cost of curtailment of active member liability = R820.0m – R1 055.3m = -R235.3m

i.e. a gain on curtailment of R235.3m

- Service cost (unchanged): R 28.0m
- Interest cost (unchanged): R410.7m
- Expected return (unchanged): -R469.3m
- Recognised actuarial loss: R134.5m
- Curtailment cost: -R235.3m
-R131.4m

d) Reconciliation of asset recognised on the Company balance sheet

- Deficit recognised 31 Dec 2011: R200.0m
- Net period pension cost: -R131.4m
- Company contributions: -R 36.0m
- Loss recognised 31 Dec 2012: R 32.6m

e) Comment on the change in the amounts recognised in Company X's balance sheet in respect of the fund and in respect of Fund Y above.

- The deficit recognised in Company X's balance sheet as at 31 Dec 2012 has reduced from R267.9m to R32.6m. This is due to the gain on curtailment of the active member liability of R235.3m.
- The ESA in Fund Y would however reduce by R300m to cover the cost of the incentives

- In terms of IAS19 this would be a past service cost in Fund Y (check – it is a settlement of the fund liability?)
- The overall impact of the FD’s proposal would be a reduction in the retirement funds asset in the balance sheet of Company X of R64.7m (R235.3m less R300m)

QUESTION 2

i) Explain how the four economic assumptions provided were derived, stating any additional assumptions that are required.

- Inflation of 5.78% is from $(8.66\% - 2.25\% - 0.5\%) / (1 + 2.25\%)$
- To cater for the uncertainty between the inflation priced into the market and the expected long-term inflation that is required for a valuation
- Discount rate of 10.29% is from $8.66\% + (65\% \times 2.5\%)$
- This assumes a (commonly used) long-term asset split of 65%/35% between equities and bonds (which is also the current split)
- Assumes that this is net of associated investment expenses
- Salary increases of 7.78% comes from inflation plus 2%
- Historical salary experience shows that this gap is 1% to 2% above inflation.
- 2% is at the high end, which may be because there appears to be no allowance for additional promotional increases.
- The equity premium (or risk premium) is the additional historical return that equities have provided. It is usually between 2% and 3%.
- Pension increase are 90% of 5.78% or 5.20%.

ii) Explain how the valuation assumptions would differ for an IAS19 valuation of the Fund.

- The method for deriving IAS19 valuation assumptions is set out in the accounting standard
- IAS19 distinguishes between a discount rate to apply to the liabilities and an expected return on the assets
- IAS19 economic assumptions are based on current market yields on high quality corporate bonds
- In a South African context, often government bond yields would be used
- Best estimate assumptions are required for IAS19
- The employer’s auditors may give input into the IAS19 assumptions
- Discount rate is 8.66%

- Expected return on the assets is 10.29%
- Inflation of 6.27% = $(8.66\% - 2.25\%) / (1 + 2.25\%)$
- No allowance is made to cater for the uncertainty between the inflation priced into the market and the expected long-term inflation that is required for a valuation
- No solvency reserve would be calculated for the IAS19 valuation

iii) Estimate the average future employer contribution rate, as a percentage of salaries, to fund ongoing benefit accruals. State your assumptions

- Assume that the calculated 15% is the required retirement contributions
- And not adjusted for any other reason such as deliberate overfunding by the employer or for a contribution holiday
- Also that it funds for liabilities on the best-estimate basis, as opposed to the solvency reserve basis
- Since funding uses PUM, the rate will steadily increase as retirement benefits get closer, on average
- PUM total required contribution rate is 22% = 15% + 7%
- This applies on average to the liability-weighted average age of 40
- The total PUM rate at 65 is estimated at $22\% \times (1.1029/1.0778)^{25} = 39.12\%$
- The attained age method (AAM) is appropriate for a fund closed to new entrants
- The total attained age method AAM rate is estimated at $30.6\% = (22\% + 39.12\%)/2$
- Average employer rate is therefore $30.6\% - 7\% = 23.6\%$

iv) The employer's financial director has criticised the statutory valuation basis as being too strong and resulting in a higher employer contribution rate than the employer is happy with. Draft a short reply to the financial director's criticism

- A primary purpose of the valuation assumptions is to ensure ongoing financial soundness of the Fund
- Conservatism in the actuarial assumptions does not affect the cost of the benefits
- but alters the pace of funding of the benefits
- In South Africa employers are unlikely to wish to build up surpluses in a Fund
- because such surplus is not easily accessible by the employer in times of need
- The employer is thus likely to prefer a realistic valuation basis
- A sponsoring employer may prefer to have some consistency between the values and contribution requirements in reality and in the company's accounts

- Trustees will usually allow some flexibility to the employer over the timing of payments
- and the choice of funding method
- but subject to an adequate level of security being maintained
- A sponsoring employer will often want to keep the contributions stable so that it can budget properly for this employment cost
- Statutory valuation assumptions are the responsibility of the valuator
- The Financial Services Board may reject a statutory valuation if it feels that the choice of assumptions produce results that don't accurately reflect the Fund's financial position
- e.g. if the assumptions are too weak

QUESTION 3

- i) Demonstrate to the HR manager whether or not it will be possible under his design ideals to reach the targeted pension? (state any assumptions made)

Contributions to retirement:		
Employee	7.5%	
Employer	7.5% less risk and expense	
Risk and expenses total per annum	$R50\,000 \times 12 + R950\,000 + R681\,250 =$ $R2\,231\,250$	
Salary per annum	$R5\,312\,500 \times 12 = R63\,750\,000$	
Risk and expense rate	$R2231250 / R63750000 = 3.5\%$	
Net contributions to retirement	$7.5\% + 7.5\% - 3.5\% = 11.50\%$	
Target NRR at retirement:		
Term for savings	NRA 60 years – Starting 20 years = 40 yrs	
Accrual	2.5%	
Target NRR	$= 2.5\% \times 40 = 100\%$	
Salary increase relative to inflation	+0%	
Investment assumption	+2% being least risky of options given	
Assume:	Contributions annual – midyear and Salary increase mid year Risk and expenses rate remains 3.5%, increase with salary inflation only	
Projection:	(option to calculate future value or escalate PV) – could assume year end contributions hence set out result below	
PV contributions at year end factor	$= (1 - V^{40})/i = 27.35548$	
Adjust for mid year	$= 27.35548 \times (1+i)^{0.5} = 27.62768$	
Future value factor	$= 27.62768 \times (1+i)^{40} = 61.00301$	
Future value of contributions	$= 61.00301 \times 11.5\% = 7.015346$ (can use a notional salary if desired)	
Annuity at NRA 60 years:	$= 10000/(55.56 \times 12) = 14.9988$ use 15	
NRR	$= \text{FV contributions} / 15$ $= 7.015346/15 = 46.77\%$ (46.8%)	
	OR	
NRR	$= (\text{FV}/10\,000) \times 55.56 \times 12$ $= 7.015346/10000 \times 55.56 \times 12 = 46.77\%$	
Therefore NRR is unlikely to be achieved		
Total		

ii) Under his ideal structure what contribution rate would be required by the employer to meet the target? (state any assumptions made)

Same assumptions and scenario as before		
NRR target desired	100%	
Annuity at NRA 60 years from above	15	
Required future value	= 100% x 15 = 15	
Future value factor from above	= 61.00301	
Total required retirement savings contribution	= 15 / 61.00301 = 24.59%	
Employer Contribution	= 24.6% - 7.5% + 3.5% = 20.6%	

iii) Explain to the HR manager the elements, and their interaction with each other, that would affect the design and targeted benefits under a defined contribution structure and how in theory these could be adjusted to better meet the target?

- Age at entry
- Retirement age = term of savings
- Contribution rate
- Risk and Expense contributions – net retirement savings
- Investment returns, net of fees
- Investment strategy/targets/ life-stage models versus constant targets etc
- Actual versus assumed returns
- Salary increases – when looking at NRR salary increase progression is NB, smoother over the term the more neutral this as a factor
- For the same level of overall increases - higher early increases means higher early nominal contributions and greater compounding effect (higher NRR – numerator), higher later increases means higher salary at the end in the NRR denominator without the compounding effects
- Average age of employees, age at joining relative to the age assumed for design
- Savings accumulated for new entrants, preservation, previous vehicles benefit designs
- Younger the assumed entry age, longer the expected savings term – higher the NRR
- Older the NRA, longer expected savings term – higher NRR and lower the required capital due to reduced life expectancy in retirement
- Greater investment returns greater NRR
- Higher net contribution towards retirement higher NRR

- Annuity pricing/capitalisation factors, cheaper the pricing the higher the initial pension and hence higher NRR
- Salary increases affect the level of contributions, higher increases closer to retirement do not allow sufficient period over which contributions can accumulated

iv) **The FD has noted that the design should be determined on the basis of a maximum total contribution by employees and employer of 18.5%. He also points out that on average employees are currently 35 years and have savings of R150 000. Using the information provided demonstrate how changing each of the design elements, starting from those set out by the HR manager and then to the FD's recommended contribution rate etc, could contribute to achieving the maximum replacement ratio for an average employee? (state any assumptions made)**

Same assumptions as before		
Order should be show old scenario using new age, savings. Then show under FD contribution. Next either change NRA to 65 or change return investment option and final change depending on order above		
Start with HR director design:		
NRA	60 years	
Ave age	35 years	
Term to retirement	25 years	
Current savings	R150 000	
Ave salary (Monthly provided *12/850)	R75 000 per annum	
PV factor (year end)	Annuity certain 25 years @ 2% = 19.52346	
PV factor (mid year)	Adjust as above for 0.5 year = 19.71772	
FV factor	PV adjusted 25yrs @ 2% = 32.349017	
Future value contributions	$32.349017 \times 11.5\% \times R75000 = R279010$	
Future value current savings	$R150\,000 \times (1+i)^{25} = R246\,091$	
Future value total	R525 101	
Pension	$= R525101/15 = R35\,007$	
NRR	$= R35007/R75000 = 46.7\%$	
FD allows for higher contributions:		
New contributions	$= 18.5\% - 3.5\% = 15.0\%$	
Future value contributions	$= 32.349017 \times 15\% \times R75000 = R363\,926$	
Future value total	$= R363\,936 + R246\,091 = R610\,017$	
Pension	$= R610\,017/15 = R40\,668$	
NRR	$= 54.2\%$	
Increases NRR but not yet at 100% target		
Could either increase NRA to 65 or increase returns first		
Increase NRA		
NRA	= 65 years	
Ave age	= 35 years	
Term savings	= 30 years	

PV factor (year end)	Annuity certain 30 years @ 2% = 22.39646	
PV factor (mid year)	Adjust as above for 0.5 year = 22.61931	
FV factor	PV adjusted 30yrs @ 2% = 40.97175	
Future value contributions	$40.97175 \times 15\% \times R75\ 000 = R460\ 932$	
Future value current savings	$R150\ 000 \times (1+i)^{30} = R271\ 704$	
Future value total	R732 636	
Annuity	$= 10000 / (69.44 \times 12) = 12.00$ (rounded)	
Pension	$= R732636 / 12 = R61\ 053$	
NRR	$= R61053 / R75000 = 81.4\%$	
OR		
<i>Target higher absolute return portfolio</i>		
NRA	60 years	As above
Ave age	35 years	
Term savings	25 years	
Return	4%	
PV factor (year end)	Annuity certain 25 years @ 4% = 15.62208	
PV factor (mid year)	Adjust as above for 0.5 year = 15.93146	
FV factor	PV adjusted 25yrs @ 4% = 42.47066	
Future value contributions	$42.47066 \times 15\% \times R75\ 000 = R477\ 795$	
Future value current savings	$R150\ 000 \times (1+4\%)^{25} = R399\ 875$	
Future value total	R877 670	
Annuity	= 15 (rounded)	
Pension	$= R877\ 670 / 15 = R58\ 511$	
NRR	$= R58\ 511 / R75000 = 78.0\%$	
<i>Target higher absolute return portfolio and increase NRA to 65</i>		
NRA	65 years	
Ave age	35 years	
Term savings	30 years	
Return	4%	
PV factor (year end)	Annuity certain 30 years @ 4% = 17.29203	
PV factor (mid year)	Adjust as above for 0.5 year = 17.63448	
FV factor	PV adjusted 30yrs @ 4% = 57.19564	
Future value contributions	$57.19564 \times 15\% \times R75\ 000 = R643\ 451$	
Future value current savings	$R150\ 000 \times (1+4\%)^{30} = R486\ 510$	
Future value total	R1 129 961	
Annuity	= 12 (rounded)	
Pension	$= R1\ 129\ 961 / 12 = R94\ 163$	
NRR	$= R94\ 163 / R75000 = 125.6\%$	
Maximum NRR under available info is 125.6%		

v) **On the basis of the results make recommendations as to the design of the benefit such that there is a greater likelihood of achieving the HR manager's stated target retirement benefit.**

- It will not be possible to achieve the 100% target under the HR managers design;
- It was shown that all else being equal a total contribution (incl. expenses) of +-28.0% would be required;

- The FD has indicated this is not possible but a contribution of 18.5% (15% net retirement) is possible. The contributions should be increased to this level.
- This alone would still not be sufficient;
- The company would need to increasing the term available to save (increasing NRA)
- And/or take a little more investment risk (higher absolute return mandate);
- Neither increasing the NRA to 65 or targeting a higher investment target 4% alone would be sufficient
- A combination of these would meet/exceed the desired objective
- *BONUS - Some compromise would be possible perhaps NRA 63 yrs and 4% investment return target or NRA 65 years and 3% investment return target*

vi) In providing any benefit projections and communication to individual members of a defined contribution fund indicate the factors that must be considered and the items that must be included when designing the communication.

- Requirements of the pension funds act
- PF circulars (130)
- Professional Guidance notes on benefit projection
- FAIS Act
- Methods of projection
- Assumptions and their likelihood or otherwise / sensitivity
- Data used in projection
- Caveats

vii) The issues that need to be considered specifically with respect to the closure of the old DB fund

- Check the rules and provisions for employer to give notice
- Specific rules regarding wind up and treatment of members
- Pension Funds act has specific provisions
- Deregistration or liquidation
- Only way to remove all risks
- but that could have significant immediate cash requirements
- Enhancement for loss of cross-subsidies?
- if there is a shortfall on wind up relative to minimum benefits
- Unless fund from ESA
- Section 14 transfer before liquidation?

- Potential Labour relations, reputational risks for employer within industry, difficulties in attraction of new staff

viii) The process for the appointment of a liquidator

- Liquidation of the fund is subject to Section 28 of the Pension Funds Act
- It is the Trustees responsibility to appoint the Liquidator
- If not an already approved liquidator then application must also be made by the intended liquidator to be approved by the Registrar after which he can be appointed to the Fund
- The Registrar will then approve the appointment of the liquidator to the Fund
- The Liquidation Date will be the date on which the FSB approves the appointment of the Liquidator.
- The liquidator will then assume the responsibilities of the Board of Trustees and the provisions of the Act continue to apply to the Fund
- As from the Liquidation Date no payments may be made from the Fund other than Tax, FSB levies, insurance premiums and pension payments. No payment may be made without prior authorisation of the Liquidator.
- The Liquidator remains fully responsible for the Fund until the submission of the Final Liquidation Accounts and the Fund is then finally liquidated/de-registered.