

Actuarial Society of India

Examinations

**November 2006**

**ST4 - Pensions and Other Employee Benefits**

Indicative Solution

**1 Indicative solutions :**

- a) Reasons for not valuing the pension benefits as highly as the company:
- i. 35% represents average cost, not value to the candidate.
  - ii. May be calculated on conservative assumptions.
  - iii. Likely that typical executive is older; DB is typically worth more for older members.
  - iv. Probably the candidate does not want to stay until age 60, so the candidate is interested in the value of the benefit earned in the short term
  - v. An accrual of 45ths is not high enough.
  - vi. There might be earnings cap.
  - vii. Is not tax efficient.
  - viii. Final salary benefit will be worth on big salary rises but the candidate is more concerned about protection in the event that his or her career is not financially successful than about additional rewards if it is.
  - ix. Plan was in deficit at the previous valuation, and the position might be worse now
  - x. In the country there might not be any legal obligation on the company to fund properly (MFR is not adequate)
  - xi. Will the company still be in existence in 25 years?
  - xii. Will the company keep the scheme open until then?
  - xiii. Will the company be able to meet any deficit if company closes the scheme?
  - xiv. There might be lots of pensioners who would take higher priority over the scheme's assets.
  - xv. Part of the candidate's job may be advising the company on how to minimise its pension obligations and might want to avoid conflict of interest.
  - xvi. Maybe the candidate does not want such a high pension, preferring non-pension investments.
  - xvii. The candidate's immediate priority might be cash remuneration and intends to build up pension later in career, for example to pay off mortgage, pay school fees, etc.
  - xviii. If not married, some aspects of defined benefit schemes like dependants' benefits, etc are of not much value.
  - xix. If married, the pension provisions might not be suitable, e.g., if the scheme does not provide pension for spouse on death, etc.
- b) Alternative forms of retirement provisions:
- i. Cash remuneration.
  - ii. Occupational DC scheme.
  - iii. Approved personal pension plan.
  - iv. Shares.

**[Total 10]**

## 2 Indicative solutions :

- a) Implications of improvement in post-retirement mortality:
- i. An increasing expectation of life means the pension is paid for a longer period and hence the cost of the pension increases.
  - ii. Insurance companies price annuities using up to date estimates of current and future mortality hence the cost of an annuity increases.
  - iii. An actuarial valuation should allow for the best estimate of mortality in retirement. If mortality is underestimated the overall cost of the pension benefit could be significantly underestimated.
  - iv. Standard mortality tables may be out of date in terms of amounts and the shape of the decrement. A simple adjustment might be considered too crude.
  - v. If available, more up to date mortality tables should be used. But even these need adjustments to allow for improving mortality.
  - vi. Improvement factors might be different for males and females.
- b) Future benefit design possibilities:
- i. Increase Normal Retirement Age for future benefits.
  - ii. Limit early retirement options especially if the terms are not actuarially neutral.
  - iii. Consider reducing the amount of the pension benefit as the cost is increasing, e.g. reduce future accrual rate.
  - iv. Consider introducing a cash benefit rather than a pension benefit for members (i.e. transfer the post retirement mortality risk from the scheme to the member).
  - v. The pension scheme could be switched to a defined contribution arrangement with the member ultimately bearing the mortality risk.
  - vi. Appropriate credit for other suitable possibilities, but to subject contribution of trust deed and rules and considerations.
- c) Implications of improvement in pre-retirement mortality:
- i. Improved longevity means that the cost of lump sum death in service benefits reduces.
  - ii. Insuring the benefit should represent good value due to competitive market.
  - iii. The trustees may consider self insuring, as the mortality risk is reducing.
  - iv. The employer may consider improving the death in service benefits as the cost is decreasing.
  - v. The pre-retirement mortality valuation assumption is not a very significant demographic assumption (unlike the post retirement assumption).

- vi. But it is still important to not overstate the mortality as it will understate the pension liabilities.
- vii. Spouse's death in service rates will allow for the improving pre-retirement mortality of the member, which will reduce the cost/liability.
- viii. But will also allow for the increased longevity of the spouse, which will increase the cost/liability.

**[Total 10]**

### 3 Indicative solutions :

Benefit definition for part-time employees:

- i. Could treat part-timers in exactly the same way as full-timers, by counting each year in full and applying this to final salary irrespective of hours worked.
- ii. But this would ignore the likelihood of changes in each employee's status, e.g. changes in the number of hours worked or moves between part-time and full-time service and would leave the finances of the scheme vulnerable to switches.
- iii. A more common approach would be to calculate service and final salary in terms of its full-time equivalent perhaps based on the numbers of hours worked against the full-time hours, on a monthly (or annual) basis.
- iv. Alternatively, calculate part-time benefit separately from full-time and add the two together but this could get complicated as hours worked expected to change frequently.

Methods of revaluation:

- i. a Fixed revaluation (e.g. 3% per annum). Nil revaluation falls into this group.
- ii. Advantage of fixed revaluation: Simplicity and less administrative cost.
- iii. Revalue in line with some published index (e.g. price inflation, national average earnings)
- iv. Advantage of revaluing in line with price inflation: Meets the needs of the employees.
- v. Discretionary revaluation (e.g. depending upon fund resources) can be either on top of the amount produced by using a formula or revaluation can be purely discretionary.
- vi. Advantage of discretionary revaluation: Employer will prefer the flexibility and use it to control costs.

The points to include in the report:

Final salary:

- a. Probably the most common defined benefit arrangement.
- b. Pension at retirement based on salary at retirement so in theory bears some relation to standard of living at retirement.
- c. But switches from full-time to part-time, etc., likely to frustrate this intention (similar issue for career average).
- d. members might be able to plan but approaches in (a) are unlikely to be well understood by employees.
- e. And a good communication program is essential, especially when employees are changing from one status to the other.

Revalued career average

- a. Fits well with members whose hours/earnings fluctuate as ultimate pension based on average annual (total) earnings over career.
- b. revalued each year in line with some index
- c. But, again, difficulties with members understanding benefit so member communication is an issue.

Money purchase

- a. Again, fits well with members whose earnings fluctuate.
- b. Member communication here relates to understanding investment choices and the options available at retirement.
- c. Employees may not feel able to decide on investment options.

General points

- a. Company will also want some say over expected cost of alternatives and risk implications .
- b. Cost not known in advance for final salary and revalued career average, as they depend on future investment returns, inflation, salary increases, life expectancy, etc.
- c. Defined benefit arrangements could be useful for recruiting or retaining employees.

Options to counter these risks and control costs:

Risk reduction

- a. Set investment strategy such that returns maximised with acceptable level of risk
- b. Structure scheme so that a lump sum emerges at retirement with members using this to purchase an annuity in the open market,

removes longevity and post-retirement investment risk from employer.

#### Cost reduction

- a. Have members contribute this can be either a fixed percentage of pay or a percentage of the total contributions to be paid.
- b. Have a qualification period up to 12 months service as an employee before eligible to join the scheme (and no backdating when join).
- c. Reduce amount of pay which is pensionable, e.g. basis pay only or if any element of pay is a performance related bonus, make it non-pensionable,
- d. Monitor items such as early retirements to ensure any generous terms are not being abused.
- e. Reduce the benefits e.g. reduce the accrual rate.

[Total 15]

#### 4 Indicative solutions :

##### a) Rules based approach:

###### Advantages:

- a. Certainty - The transfer amount would be on a prescribed / definitive basis.
- b. Consistency across schemes - The transfer amount would be the same from whatever scheme the transfer was paid .
- c. Possibly enhancing the reputation of Pension Schemes and allowing the amount of the transfer payment to be used for other purposes e.g. pension & divorce.
- d. Protection for trustees as they cannot be criticised for the choice of calculation basis.
- e. Protection for the actuary as he/she cannot be criticised for choice of calculation basis.

###### Disadvantages

- a. The approach will need to have a body responsible for setting the rules (e.g. government or the actuarial profession).
- b. The calculation may need independent monitoring to ensure compliance.
- c. There may be contention in setting the rules and a possible theoretical challenge to the overall model, together with possible political pressure.

- d. There may be slowness in revising the rules as appropriate.
- e. The method does not allow any professional judgement.
- f. There may be credibility risks if transfer values fail to secure benefits.

[Total 4]

**b) Principles based approach:**

Advantages:

- a. Professional advisers have flexibility to apply actuarial judgement hence can ensure any transfer payments satisfies the basic definition of a cash equivalent transfer value
- b. Can be responsive to market conditions
- c. Can ensure the scheme specific matters are taken into account (e.g. life expectancy, any discretionary benefits)
- d. There should be limited political interference
- e. The actuarial profession can provide practical guidance to scheme actuaries

Disadvantages

- a. Potential for significant variation across different schemes, even as a result of small differences in interest rate assumptions and may not reflect changing market conditions very quickly
- b. Possible pressure from sponsors to keep transfer payments down and reduce overall costs
- c. Scope for dissent as to the interpretation of principles (e.g. within the actuarial profession)
- d. Greater difficulty in monitoring compliance

[Total 4]

**c) General considerations:**

- a. Transfer values should be calculated having regard to market rates of interest i.e. the market rates of return on equities, gilts or other assets as appropriate although bond based measures may be considered more appropriate by some actuaries and financial economists Need also to allow for the yields expected to be available on the future reinvestment of investment proceeds
- b. Allowance may be made for the cost of calculating the transfer value
- c. Pension increases promised in the scheme rules must be allowed for. Transfer Values must also include an allowance for any discretionary post retirement increases unless trustees direct otherwise. In particular, the trustees have a duty to act impartially between different classes.

- d. Other assumptions (e.g. mortality) may be in line with those used in the funding valuation or maybe more realistic best estimates together with any .scheme specifics. or individual circumstances as appropriate
- e. A reduced transfer value may be paid reflecting the solvency position of the scheme
- f. The transfer value should be equitable in relation to and consistent with any transfer value previously received. The basis adopted for incoming transfers should be consistent with out-going transfers

[Total 3]

**d) Issues, that a member should consider before opting for a transfer value:**

- a. Does the transfer value genuinely represent fair value compared to the alternative deferred pension?
- b. If the transfer value is rules based the prescribed transfer value basis should give confidence that it represents fair value.
- c. Does it reflect prevailing market conditions?
- d. Does it provide full value for money for any previous transfers into the Scheme?
- e. Has it allowed for any discretionary benefits (e.g. pension increases)?
- f. If the transfer value is principles based, the transfer value should allow for scheme specific matters e.g. discretionary benefits.
- g. Has the transfer value been reduced to reflect the current solvency position of the Scheme? If so it may be better to defer taking the transfer until the solvency position improves, or simply opt for the deferred pension which might not be reduced.
- h. Is the Scheme likely to continue to the members retirement date? This is important as it affects the value of the alternative deferred pension
- i. What is the financial strength of the sponsor?

[Total 4]

**[Total 15]**



## 5 Indicative Solutions

- a) The following points need to be included;
- i. It is rational to set aside money for future benefits payments if the investments available are expected to give a positive real rate of return i. e. the investment return exceeds the rate of benefits growth (ie earnings inflation)
  - ii. The relevant criterion is not the absolute real rate of return available but the opportunity cost. From the point of view of a Company, this involves considering the internal rate of return available from its marginal project (ie the work that will be carried out if additional finance is available). If the return available from a Company's marginal project is greater than the returns available from pension funds investments after allowing for tax, then that company should not fund in advance.
  - iii. The decision of whether or not to fund in advance may be influenced significantly by factors such as need to ensure security of members' benefits or to benefit from any financial incentives. Once the decision to fund in advance has been taken the pace of funding will depend on alternative investments for the Sponsor's money.
  - iv. Assessing relative rates of return can be complicated. The potential rate of return that may be achieved will vary from time to time and will depend on the amount of money being considered and the taxation position.
- b) The options available are;
- i. A flat scale ie members and the employer (or only the employer if non-contributory) pay a pre-determined flat rate of the pay but not necessarily the same rate.
  - ii. Age related scale, for each age or over a range.
  - iii. Service-related scale
  - iv. Matching Scale ie members can decide how much to contribute over within a range and the employer pays the matching amount.
  - v. Any combination of the above four methods
- c) The usual main reason to value a scheme (to check the adequacy of funds build up against benefits promised) does not apply since assets equal the liabilities, however there could be need for actuarial valuation for the following reasons;
- i. For setting the contribution rate when the scheme is first set up.
  - ii. For checking whether extra money needs to be held if the scheme has a DB underpin.
  - iii. For checking whether any extra money needs to be held if the employer guarantees a minimum rate of interest on the DC fund.

- iv. For assessing the anticipated benefits for planning for the need for changes to the contribution rate.
- v. For checking whether any extra money needs to be held if the scheme pays pensions from the fund rather than by securing annuities.
- vi. For checking any statutory restrictions on contributions not leading to excessive benefits.

**[Total 15]**

## 6 Indicative Solutions

- a) The rights of beneficiaries may be viewed as what the individual would receive if they;
  - i. Left the scheme voluntarily: this is the absolute minimum level of benefits that a member would expect to retain on ceasing to be a member voluntarily.
  - ii. Remained in the scheme until retirement (but without further accruals): such benefits relate to past service but the same being a function of final salary.
  - iii. The members would view the benefits based on potential future service but related to the pensionable pay at the point of severance.
- b) The options are;
  - i. Continuation without any further accrual.
  - ii. Transfer of liabilities to another pension scheme with in the same sponsor.
  - iii. Transfer of funds to the beneficiary to extinguish the liability. (1/2 mark)
  - iv. Transfer of funds to an insurance company to invest and provide a benefit.
  - v. Transfer of liabilities to an insurance company to guarantee the benefits.
  - vi. Transfer of liabilities to a Central Discontinuance Fund operated on a national or industry-wide basis.
- c) Transfer of liabilities to an insurance contract:

There may be desire to ensure that the benefits are not subject to future experience or there may be legislative or self-imposed scheme requirement to do so. In such cases it may be necessary to transfer the liabilities to a provider who will accept the risk of future experience and guarantee a benefit. This may be possible by purchasing an immediate or deferred annuity with an insurer. There may however be lack of insurers willing to accept the risks associated with guaranteeing deferred annuities. Those that may be willing to do so, will charge premium for

the risk. This route is often more expensive than other options because the insurance company will want to ensure, as far as possible, that it does not make a loss from the contract. The additional cost associated with guaranteeing a benefit may mean that the funds are not sufficient to provide the benefits that could have been targeted under one of the other forms of provision. This might therefore lead to a reduction in the level of benefits.

**[Total 10]**

## 7 Indicative Solutions

- a) The Best Estimate assumptions can be considered to be the set of assumptions that has equal probability of overstating or understating the values. Different actuaries are quite likely to arrive at different sets of best estimate assumptions, based on their particular views about future experience. The key issue is that such assumptions are fully justifiable. Further there is not necessarily a single set of best estimate assumptions to suit every type of valuation. For example a short-term discontinuance valuation of a scheme may be affected by short-term current market conditions. An ongoing valuation of a pension scheme is likely to use more stable long-term assumptions.
- b) Different best estimate assumptions also arise due to difference in the nature of benefit provision, the assets held, the personal features of the beneficiaries (eg mortality risk) and other circumstances that differ from scheme to scheme. As an illustration, consider the allowance for future withdrawals from a benefit scheme. This is more likely to be a stable, long-term assumption which is not unduly influenced by short-term changes in company fortunes and/or economic cycles. However a scheme to provide, say, an annual Christmas Bonus to staff is more likely to focus on expected withdrawal rates in the short-term, including any redundancy programmes, when forecasting its costs for the financial year. A higher long-term is expected on real assets, such as equities, compared to fixed interest assets or cash. The “best estimate” investment assumption should correspond to the investment strategy of the benefits scheme. Examples of personal features of the beneficiaries that may affect the assumptions chosen include: mortality, marital status, age of spouse/dependents, individual attitude to risk and financial circumstances.
- c) Suitability of “best estimate assumptions”: There are reasons why “best estimate assumptions” may not be appropriate. A more cautious, or possibly a more optimistic, view may be more suitable. The reason why a value needs to be determined, or the needs of the client, will usually dictate the strength of the basis on which values should be produced. A basis may build a margin of prudence so that there is a higher probability of overstating the liability values than understating them. This may reflect a client’s desire to be cautious about future experience to reduce the risks associated with the scheme having

insufficient assets to meet the liabilities. There are risks if the assumptions are too cautious or too optimistic: if the funding basis is too optimistic, the contributions may be inadequate to meet the benefits. The sponsor may need to make good any shortfall when it can least afford to pay additional contributions. This in turn may affect the security of the benefits. If the funding basis is too cautious, the scheme may be judged by the sponsor to be too expensive. This may lead the sponsor to cut benefits or even discontinue the scheme. The client's needs and attitude to risk determine the degree of prudence that should be built in to the valuation assumptions. Funding for final salary pension scheme provides a good illustration of a client's possible attitude to the risks associated with the funding assumptions. Trustees may be most concerned with the benefit security and require a cautious approach to funding. The sponsor may be most concerned with cost control and wish to minimize costs, requiring a less prudent basis than Trustees.

**[Total 15]**

## **8 Indicative Solution**

There are two essential components of any asset liability modelling process; (i) a stochastic investment model and (ii) a liability cashflow projection model. Irrespective of the what method is followed, broadly the process will be;

- i. Specify the Objectives
- ii. Decide on the time horizon for simulation.
- iii. Test the strategy by performing number of simulations.
- iv. Measure the achievement of the objectives.
- v. Vary the item being optimistic, repeating the simulation and measurement process each time.
- vi. Make a decision on most appropriate strategy/ies.
- vii. Explain and discuss the results with the client, identifying the strategies that the client wants.
- viii. Test these particular strategies more thoroughly (for example under different assumptions) in order to check that they remain reasonable.
- ix. Give final advice helping the client to reach a decision.

**[Total 10]**

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