Institute of Actuaries of India

Subject SA4 – Pensions & Other Employee Benefits

May 2009 Examination

INDICATIVE SOLUTION

Q. 1)

1(a) i) The scheme is substantially contributed by the members. The employer's contribution is minor and limited in amount.

- The uniform allowance is not an element of the Pensionable Salary and is an unusual feature of the scheme
- DB schemes have open ended liability on the employer. Here it is on the employees which is an unusual feature

- A Defined Benefit (DB) scheme should either be wholly contributed by the employer or the employer should be a major contributor to the scheme, for the following reasons;
  - A DB scheme provides for cross-subsidy amongst members as it distributes resources of the scheme differently among the different types of members.
    - For example, higher resources are taken by higher aged members as the cost of same pension benefit is more for them due to shorter accumulation period in their case
    - Similarly, high fliers take more resources as the rate of increase of benefits is faster for them
    - Early leavers will take lower resources generally as their benefits are lower than the value of their contributions

- Where as DB scheme is substantially contributed by members only (as is the case in this scheme), the lower aged members contribute for higher aged ones, members with low salary increases pay for high fliers, early leavers pay for longer service ones and similar.

1(a) ii) Why current contribution rate does not reflect the value of accruing benefits :-

- The contribution rate is contribution based on group concept applicable over a period and across all members. It is not expected to be accruing cost of any specific member over any given period.

- The rate is, therefore, likely to change periodically as and when an updated valuation is made

- The current contribution rate is likely to include a temporary adjustment to take account of any surplus or deficit revealed at the last valuation of the scheme

- The extent of the adjustment depends on the amortisation period used

- However, this rate will not be stable if the average age/sex/salary distribution changes, e.g. if the rate of new recruitment falls

- Standard contribution Rate with a suitable method is likely to meet the criterion of reflecting the cost of accruing benefits

- Each assumption is unlikely to be actualized in equal measure, however refined the estimation process is. Hence, any contribution rate is unlikely to reflect the actual cost of providing the benefits over a given accounting year/s. The assumptions together with the valuation method virtually set the pace of funding

- The assumptions in the funding basis may be have deliberate element of prudence leading to the contribution rate looking high in the immediate. However, it may lead to reduction in contribution rate in future, as over the period of total services the cost of benefits has to be met by the value of the contributions.

- On the other hand, the funding basis may be optimistic (as against prudent) to keep the contribution rate low. In that case it may lead to increase in the contribution rate in future

- If the pace of funding has been faster for a longer period, the early retirees/ leavers will pay more than the cost of their benefits as the benefit of lower contributions subsequently will not be available to them. If the pace of funding is slower then reverse will be the case.

- There may be issues when the early leavers compare the contributions they paid with the value of leaving service benefits.

- Even the Standard Contribution Rate with appropriate method as basis may not be appropriate for each employee due to following reasons:

    - the rate is a global rate for the scheme as a whole and is not appropriate across each and every age, the younger members will subsidise the older ones

    - mortality rate differs by sex and hence males subsidise females or vice versa. This may be true due to death in service benefits even if annuities are purchased from a life insurer at same rates(i.e. annuity rates do not differ by sex)

    - the rate may assume a withdrawal rate in which case for stayers it will be **lower** and for leavers it will be higher

    - if no allowance is made for leavers, the possible problems of comparison with the value of leaving service benefits are magnified

    - rates cannot allow for actual experience (salary increases, date of exit and cause of exit) of each individual

1(b) An approach which expresses the approximate cost of benefits as percentage of the salary:

- It may not be possible to work out separate rates for each individual as the rates cannot allow for actual experience of individuals for salary inflation, withdrawal, mortality, family particulars etc

- Separate age related rates may probably be determined
- For administrative simplicity, the rate may be separate for each age band of, say 5 years.
- As the scheme is large enough, further grouping may be done as under :
    - Separate tables may be needed for executives/managers/others, particularly in relation to allowance for salary increases following promotions
    - Separate rates may be worked out for males/females and then weighted to reflect mix of employees
- Two sets of assumptions need to be considered – financial (or economic) and statistical (or demographic)

Financial Assumptions:

- Investment return :
- Prudent vs best estimate?
- better more akin to best estimate as substantial cost borne by employees
- market-related vs long term?
- rates could fluctuate markedly if based on actual conditions
- easier to communicate if long term assumptions used
- may be set by looking at what has happened in the past over long periods
- based on actual assets held or matching assets for member of that age?
- easier to determine rates if there is one discount rate for all members
- consider different rates for pre and post retirement as for post retirement benefits annuities will be purchased where rates would depend on medium to long term Govt. securities.
- Pre-retirement could consider higher return expected from other asset classes e.g. corporate bonds, equities according to the investment policy followed by the trustees
- Should allow for investment management expenses, if borne by the scheme
- More likely adjust investment return assumption derived from past experience to be consistent with inflation

o Inflation :
- Though scheme benefits are not linked to inflation, the same may need to be considered to ensure consistency of other financial assumptions of the scheme
- Look at published data, the views expressed by Reserve Bank of India and other relevant sources

o Salary increases:
- split two components – general increases and promotional increases

- general increases to be consistent with price inflation and investment return
- the company management may also give their views on future increases
- past experience of the company may also be looked into
- mix of employees to be considered and changes in the mix over time
- increases in national average earnings may also be considered particularly as it is a public sector company

Statistical :

Mortality (Pre-retirement) :

- There may not be enough data to produce its own table
- However, data for public sector employees, if available may be considered to have its own table
- If public sector data / table not available, consider other published table where experience may be expected to be similar
- Published table need to be adjusted in view of company's own experience for which scheme data may be adequate
- Allowance may be made for future improvements
- Consider whether geographical issues are there- probably not as the company may have offices all over the Country
- Separate rates may be used for managers, administrative staff and workers

Promotional Salary Scale:

- We may need to discuss with company management on this issue
- Past experience may need to be reviewed
- As well as present promotional scales

Pre-retirement decrements:

- These may not be important
- Their impact may be negligible
- In public sector, pre-retirement decrements are not on high side, particularly after first few years
- Company's own past experience may be looked into
- As well as of entire public sector

Proportion married/age differences

- National average may be considered , particularly among the employees

Mortality Rate (Post-retirement)

- Need to consider published table and the adjustment made by life companies as the company is purchasing annuities
- Allowance for future improvement in mortality may be considered

1(c) Different contracts offered by the Life insurer and their suitability for the scheme:
In case of Deposit Administration Plan (DAP) , the insurer maintains an account of the scheme to which contribution paid by you will be credited, benefits paid will be debited and at the end of each financial year interest will be credited. The funds of all such schemes with the insurer form a **pooled** fund which is invested mainly in government securities, Corporate bonds and money market instruments. The plan provides guarantee of capital and a smooth return.

Expenses are generally charged implicitly by reducing investment return declared by the insurer at the year end. Surrender terms are generally not clear.

In case of Unit-Linked products, the contributions are paid into unitized funds and the unit prices are linked directly to the value of the underlying assets. The insurer maintains several funds with different investment objectives and exposure to equity investment and you can choose a fund for your scheme. You may switch also whenever you want. Expenses are generally explicitly charged. Surrender terms are clear. Benefits are paid by realizing units.

These plans mainly differ in respect of the following:

- Guarantee of investment return and hence their influence over investment strategy
- Investment choice
- Investment return
- Investment risk
- expense charges
- surrender terms

Features of the scheme:

- The scheme is large
- It does not have high turnover and hence the cash flow of the scheme can largely be projected
- The scheme is matured one and has large number of members retiring every year. The scheme purchases annuities and hence large sums are required every year.
- There may still be positive cash flow into the scheme in view of large active members
- The scheme is wholly contributed by the members. The trustees, therefore, may not wish to take investment risk.
- Profile of the scheme. i.e. average age , outstanding term etc

Recommendation:

- Looking to the size of the scheme, self investment is better as life insurer would like to have some profit margin
- However, these days in view of the competition , attractive terms are offered by Life insurers. Unit-Linked funds with low exposure of equity may be considered
- The extent of equity exposure may depend on the cash flow projections of the scheme.

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Q2

(1)

(a) The objective of AS 15 (rev.2005) is to prescribe the accounting and disclosure for employee benefits. The Statement requires an enterprise to recognise:

(a) a liability when an employee has provided service in exchange for employee benefits to be paid in the future; and

(b) an expense when the enterprise consumes the economic benefit arising from service provided by an employee in exchange for employee benefits.

The Scope

1. The AS 15 (rev. 2005) is to be applied by an employer in accounting for all employee benefits, except employee share-based payments.

2. The AS 15 (rev.2005) does not deal with accounting and reporting by employee benefit plans.

(1) **(b)** The Category of Employee Benefits to which AS 15 (rev.2005) applies are;

(a) short-term employee benefits, such as wages, salaries and social security contributions (e.g., contribution to an insurance company by an employer to pay for medical care of its employees), paid annual leave, profit-sharing and bonuses (if payable within twelve months of the end of the period) and non-monetary benefits (such as medical care, housing, cars and free or subsidised goods or services) for current employees;

(b) post employment benefits such as gratuity, pension, other retirement benefits, post-employment life insurance and post-employment medical care;

(c) other long-term employee benefits, including long-service leave or sabbatical leave, jubilee or other long-service benefits, long-term disability benefits and, if they are not payable wholly within twelve months after the end of the period, profit-sharing, bonuses and deferred compensation; and

(d) termination benefits.

(1) **(c)** Post-employment benefit plans are classified as either **defined contribution** plans or **defined benefit plans**, depending on the economic substance of the plan as derived from its principal terms and conditions.

Under defined contribution plans:

(a) the enterprise's obligation is limited to the amount that it agrees to contribute to the fund. Thus, the amount of the post-employment benefits received by the employee is determined by the amount of contributions paid by an enterprise (and also by the employee) to a post-employment benefit plan or to an insurance company, together with investment returns arising from the contributions; and

(b) in consequence, actuarial risk (that benefits will be less than expected) and investment risk (that assets invested will be insufficient to meet expected benefits) fall on the employee.

Under defined benefit plans:

(a) the enterprise's obligation is to provide the agreed benefits to current

and former employees; and

(b) actuarial risk (that benefits will cost more than expected) and investment risk fall, in substance, on the enterprise. If actuarial or investment experience are worse than expected, the enterprise's obligation may be increased.

Under the given scheme the formula for contribution as well as benefits is determined under the Act/rules. Given the benefits, if the current contribution rate as provided in the Act is not found sufficient, the Government is likely to be inclined to raise the contribution by amending the Act/rules. This will then have to fund the deficit if any as these pertain to past service.

While a view can be held that as the contribution rate is determined as per Act/rules, the scheme from an employer's point of view should be taken as DC.

At the same time one could argue that as employers need to comply with enhanced contribution rate if that is enforced by amending the Act/Rules and as these will pertain to funding the deficit for past service, this "implied guarantee" part should be taken as DB.

This view gets strengthened by provision in AS 15 (rev. 2005) under Section 26 as;

"Examples of cases where an enterprise's obligation is not limited to the amount that it agrees to contribute to the fund are when the enterprise has an obligation through:

(a) a plan benefit formula that is not linked solely to the amount of contributions; or

(b) a guarantee, either indirectly through a plan or directly, of a specified return on contributions; or"

(1) **(d)** Actuarial gains and losses may result from increases or decreases in either the present value of a defined benefit obligation or the fair value of any related plan assets.

Causes of actuarial gains and losses include, for example:

i unexpectedly high or low rates of employee turnover, early retirement or mortality or of increases in salaries, benefits (if the terms of a plan provide for inflationary benefit increases) or medical costs; (1/2)

ii the effect of changes in estimates of future employee turnover, early retirement or mortality or of increases in salaries, benefits (if the terms of a plan provide for inflationary benefit increases) or medical costs; (

iii the effect of changes in the discount rate; and

iv differences between the actual return on plan assets and the expected return on plan assets.

(1) (e) Indicative Solution:

The common aims of the most of the accounting Standards are;

- Recognizing the realistic costs of accruing benefits,
- Avoiding distortions resulting from fluctuations in the flow of contributions from the employer to the pension scheme,
- Consistency in the accounting treatment from year to year (although not necessarily from company to company),
- Disclosure of appropriate information.

The problems that might occur if the reported cost was stated to be the contribution paid to the scheme;

- If the actual contributions paid vary from year to year, the reported cost, and therefore company profit, will be volatile even though the true cost of the benefits accruing might be stable.
- The cost would be deliberately manipulated to try to increase reported profit which could depress security of benefits through inadequate contributions.
- Different companies might be advised by different actuaries, giving rise to different contributions to meet the cost of the same benefits, unless the accounting standards required the use of a prescribed method and assumption.
- Over time, funding advice could change eg a different method and/or assumptions might be used, giving rise to misleading trends in profit.

Q. 2

(2) (a) The sources of surplus/deficit and their likely magnitude;

1) Investment growth: the investment performance of the assets will have a significant effect on the valuation result.
2) Inflation of salaries: the rate of earnings inflation will affect the reserve held in respect of active members. The level of pension increases is also important for the scheme as number of pensioners is large.
3) Contributions received: The difference between contributions paid and cost of benefits accruing will be a major source of surplus or deficit.
4) Legislative benefits changes and/or changes in tax laws: depending on the changes, this can have major effect on the financial status of the fund.
5) Bulk transfers changing the funding level or membership mix: Relative size of the transfer value paid or received on account of such movements can affect the financial status of the Fund.
6) Decrements for mortality, withdrawals and retirement: The number of deaths in a large scheme like this, are fairly predictable but the withdrawal and early retirement rates in different employer entities may affect the financials.
7) Marital statistics: This will have a very minor effect on the valuation results.

(2) **(b)** Over a period of time the actuarial liability changes due to the accrual of benefits, the reduction in the period of discount, benefits outgo and deviation in experience affecting such liabilities. The Actuarial Liability (AL) can therefore be expressed by the recurrence relation;

AL1 = AL0*(1 + i) +SCR1 - B1 + LD1

Where;
AL1 is the Actuarial Liability at time 1

AL0 is the Actuarial Liability at time 0

i is valuation rate of interest

SCR1 is Standard contributions from time 0 to time 1 based on expected experience.

B1 is the expected benefits payments between time 0 and time 1

LD1 is the growth in the liabilities due to differences between experience and assumptions.

(2) **(c)** Although the analysis of surplus concentrates on the past service aspects of the balance sheet, some thought should also be given to any changes in the cost of future benefit accrual.

In particular the stability of retirement benefit costs under the chosen valuation method may depend on the stability of the age/sex structure of the membership.

The validity of such assumptions for the scheme as described in the question is very important, particularly if there are number of employer entities and each will have its own employee profile.

For example if the PUC method is being used to determine the future contribution rate, it will be known that the PUCR will rise in future if it is known that the flow of new entrants is to be restricted and that the existing members remain in the scheme until retirement.

(2) **(d)** The group immediate annuities will cover some or all of the pensions in payment. The valuation method would usually be to take the value of the contract to be equal to the value of liabilities.

Immediate annuities are assets of the scheme if they have been bought out in the name of the Trustees. The liability has been extinguished if the benefit was bought out in the name of the member.

The rationale for adopting this approach is that the assets match the liabilities and the scheme is immunized against deviations from the assumptions used to place a value on the liabilities.

This may be appropriate for some purposes if the annuity in payment is payable in precisely the same circumstances and at precisely the same

level as the corresponding pension benefit.

However, there remains the credit risk as if the insurer from which the annuities have been purchased becomes insolvent, then the liability either in part or in full comes back to the employer.

(2) **(e)** Paid up non-profit deferred annuities are normally valued on the same basis as the liabilities they cover. The Non-profit deferred annuities are usually bought in wind up situations and therefore usually in the name of the member. Thus in this situation the liability in the scheme is extinguished and they are not an asset of the scheme.

With profit deferred annuity contracts are not much in common. However where these exist the promised benefits are normally valued using same methods and assumptions as for other liabilities but also including an assumption for future bonus additions.

However, if the policy is likely to be surrendered a different approach would be adopted – the surrender value would be taken as the market value of the asset and an assessed value determined using the method adopted for the scheme as a whole. The corresponding liabilities would be valued using valuation assumptions.

In the case of a large scheme as given in the question, the deferred annuity assets, if at all these exists, are likely to be small and therefore prudent approach of using the Surrender Value might be used.

(2) **(f)** The examples of accrued benefits funding methods are;

1) The Projected Unit Method

The Actuarial Liability for active members either as at the valuation date or as at the end of the Control Period is calculated taking in to account all types of decrements. In such calculations pensionable pay is projected from the relevant date up to the assumed date of retirement, date of leaving service or date of death as appropriate. This method is also known as Projected Unit Credit Method.

2) Current Unit method

The Actuarial Liability for active members is calculated taking in to account all types of decrements. In calculating the Actuarial Liability as at the Valuation date pensionable pay is not projected. While calculating it as at the end of Control Period, pensionable pay is projected to that date. In such calculations, allowance is made for increases in the benefits between the relevant date and the assumed date of retirement, date of leaving service or date of death as appropriate.

3) Partly Projected Unit method

The Actuarial Liability for active members is calculated as for the Current Unit Method except that, where pensionable pay is not projected in that method, some but not full allowance is made in the Partly Projected Unit Method.

4) Defined Accrued Benefit method.

The Actuarial Liability for active members either as at the Valuation date or at the end of the Control Period is calculated on the assumption that the scheme will be discontinued on those dates.

(2) **(g)** The funding valuation assumptions are always prudent as against best estimate required under Accounting Standards for expensing and disclosure on P&L and Balance sheet.

In deciding on a set of best estimate deterministic assumptions an actuary is effectively trying to find the mean of a probability distribution for each factor. Prudence can be introduced by taking a margin above or below the mean, depending on how the particular factor affects the cash flows.

In deciding whether a funding valuation assumption is prudent all the assumptions have to be taken together. For example, if a degree of prudence were introduced in to each assumption, the actuarial basis when taken as a whole may be more prudent than what had been intended.

(2) **(h)** It depends on whether most of the employees are male or female. If male then the answer is four years' difference as this places a greater value on the contingent widow's pension.

If most employees are female then the answer is three years for the same reason.

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