Institute of Actuaries of India

Subject ST4 – Pension & Other Employee Benefits

September 2016 Examination

INDICATIVE SOLUTION

Introduction:-

The indicative solution has been written by the Examiners with the aim of helping candidates. The solutions given are only indicative. It is realized that there could be other points as valid answers and examiner have given credit for any alternative approach or interpretation which they consider to be reasonable.

Solution 1:

(i) Defined Contribution Scheme

Under these schemes Contribution is already defined but the benefits depend upon the contribution paid an investment earned on the contributions.

In its basic form, the amount which the employee and employer contribute to a DC scheme is fixed and the benefit is totally dependent on the accumulated value of those contributions. The members may be able to choose the type of assets used for investment.

Defined Benefit Scheme

Under these schemes Benefit is already defined and members are often required to contribute at a fixed rate towards the cost of their benefits, with the employer meeting the balance of the cost.

DB schemes usually provide benefits are usually based on the member's salary and the period of membership of the scheme. Some schemes base the benefit on an individual's career earnings (a career average scheme), which are usually revalued in line with an index of earnings or prices to reduce the eroding effect of inflation

Hybrid Scheme

A hybrid scheme offers elements of defined benefit and defined contribution provision, for example:

- a main benefit that is defined contribution in nature, with a promise the benefit will be at least a defined benefit amount
- a main benefit that is defined benefit in nature, with a promise the benefit will be at least a defined contribution amount.

[3]

(ii) (a) Issues that need to be considered for accumulating the contributions

- Could add the investment return earned on investments during the period
- However if trustees are investing primarily for the DB promise, high equity content of portfolio may result in volatile returns (including negative)
- Also more complex to administer e.g. need to have an interim figure for the period since the last performance figures were measured
- May prefer for presentational reasons to use a less volatile figure e.g. return on cash deposits
- Or even a fixed rate
- Or actuary could declare a bonus rate each year, as for a with profits fund
- Or could use on external index

- Or to allow members some choice as to how to invest their "pot", and credit the actual return on selected investments

[4]

(b) Issues that need to be considered Converting fund in to pension

- The annuity is based on age/sex of the member.
- Annuity needs to take into account the benefits that the plan provides e.g. spouse's pension
- Would probably use an average marital assumption, rather than taking into account actual marital status — in keeping with the idea of the fund as a fall-back underpin
- Could use rates derived from actual market If doing this, may want to link with an investment roll-up that insulates members from adverse market movements e.g. yields on long bonds
- Alternatively use fixed rates e.g. consistent with commutation factors
- More appropriate in conjunction with a fixed rate for contribution roll-up
- Discretionary pension increases or other benefits complicate matters: balance the need not to be overgenerous to members with the need not to charge members for benefits that they may never receive in practice
- Need to bear in mind that members may have rights to a transfer payment for example to an insured contract — means that you may not wish accumulation / conversion terms to diverge too far from market rates

[3]

(iii)

- Could use standard deterministic approach to estimate projected benefits
- Satisfactory if either the money purchase or final salary benefit is the benefit that is predominantly payable
- And always appropriate for a discontinuance valuation
- However if the two benefits are fairly similar in value (either always, or for specific significant decrements), this approach may significantly understate the average benefit payable — the average of the greater of two benefits is larger than the greater of the averages
- It is possible to undertake stochastic projections, to investigate how large the average benefit is as a percentage of the deterministic projection
- Alternatively, approximate this using sensitivity analyses on a deterministic projection
- Or simply do deterministic projections on more conservative assumptions
- The approach used for determining the money purchase underpin may result in mismatching between assets and liabilities
- e.g. equity investment to meet DB liabilities, with money purchase benefit based on unchanging interest / annuity rates
- May mean that trustees wish to hold an explicit or implicit mismatching reserve
- If contribution rates are low could ignore the underpin calculation

[6]

(iv)

- Conversion factors may be influenced by competition, industry standards or legislative requirements.
- Scheme Trust Deed and Rules may require certain terms.
- If there are no such restrictions, the starting point is usually that the scheme should suffer neither profit nor loss.

Interest Rates
- The factors are to remain stable for long periods so the valuation rate of interest or an average rate of return could be used.
- The rate of interest could be chosen to reflect the expected rate of return on the investments (assuming that the scheme is funded) – this avoids additional costs to the scheme.
- If the valuation rate of interest is used, care should be taken if this is a conservative one although it may be appropriate to use if the intention is to fund for a surplus which may be used to improve pensioner benefits.

Mortality
- In theory, should consider the mortality of those who are likely to exercise the option.
- Should also consider the use to which the cash may be put (what is the likely take up of the option?) e.g. are there any tax advantages of taking cash instead of pension?
- Could assume that the option will be exercised against the scheme i.e. only be exercised by those members in ill health.
- In practice it may be that all members exercise the option and that standard, valuation, mortality can be used.
- As the factors are required to be stable, a suitable allowance for future expected changes in mortality should be made.
- Does legislation allow male and female factors to be different? If so, does the sponsor want them to be the same?
- In many societies male and female mortality differs, one sex tends to live longer than the other. The actuarial value of the pension to be commuted will therefore also differ.
- If the factors are to be different then the factors can more accurately reflect the value of the pension being commuted.
- If the factors are to be the same need to make assumption about proportion of men/women taking this option can be based on age (mortality tables are) or could decide to use a broad brush approval.
- A stable basis is unlikely to be cost neutral, need to determine the extent to which the sponsor wishes to subsidise/penalise the members exercising the option will determine the extent to which the basis needs to be reviewed and the frequency of reviews.

- For case of administration may use a smooth progression from age to age.

[6]

(v)

How to analyse mortality

- group the data
- by age, sex and member class
- for age use age-bands which are credible …
- … for instance, in-service members may have to be grouped together or even treated as not credible …
- … while pensioners may still need to be grouped in fairly wide age bands, especially for older ages
- for each group compared the actual deaths with the expected number of deaths based on the exposed to risk
- consider calculating a confidence interval (e.g. if the analysis will be used to determine a mortality age rating or other type of adjustment) so that the potential error involved is clear
- comment on many unusual events e.g. flu epidemic

[4]

(vi)

Other Items which would be analysed (i.e. actual v expected)

- expenses
- investment performance generally (e.g. of the scheme's matching assets)
- investment performance of the scheme's actual investments
- salaries
- pension increase in payment
- pension increases in deferment
- withdrawals
- new entrants
- early retirements
- Ill health early retirements
- any transfers (bulk or individual)
- Proportion of pension commutated for cash
- How the scheme's liability profile had changed

[4]

[30 Marks]

Solution 2:

(i)

For the next 10 years it is likely that contribution income in SOAP fund will exceed benefit outgo. The government could use the excess to build up a reserve fund or they could use it to finance other expenditure.

After 10 years there is a need to ensure that income from contributions is at least equal to benefit outgo, unless the government intend to supplement the scheme from other resources.

[2]

(ii)

We shall consider the following choices available to the sponsor of SOAP

- pay-as-you-go
- funding
  - lump sum in advance
  - terminal funding
  - regular contributions
  - just-in-time funding
  - smoothed pay-as-you-go

[2]

(iii)

(a)

- Guarantees a minimum benefit for everyone who can afford to pay the contributions
- No flexibility over contributions − problem for the poorer paid/those with less disposable income
- Individuals may not survive long after retirement so a lump sum may be more valuable than a regular income
- The money could be invested to provide an income in retirement Or could be used, say, to buy a farm which would support the individual and their dependants
- If individuals do have a long life, the lump sum may be used up before they die
- Benefit is simple to calculate
- Benefit is simple to pay
- Contributions are simple to calculate

- But records of the number of contributions will have to be kept
- People are not likely to contribute unless the benefits appear to be worthwhile and achievable
- >58's get a very high return for their contributions
- The scheme may reduce the numbers falling back on state support
- Over time inflation may erode the value of the benefit making it less attractive
- However, Deflation may result in the contributions becoming onerous
- It may be difficult to achieve a complete contribution record due to periods of unemployment or sickness
- If the contributions can be paid at any age the income is likely to be variable and difficult to predict
- Few people may survive to age 68 and there is no death benefit
- The scheme is unfair if contributions continue beyond 30 Years

[4]

(b)

- Allow a range of contributions or benefits
- Allow contributions to be paid on behalf of others
- Consider providing a pension at retirement instead of the lump sum Or require a pension to be bought
- Include provision in the scheme for the level of the benefits and contributions to be reviewed
- Consider allowing a proportionate benefit payment in certain circumstances
- Be prepared for there to be supplementary payments to the fund when necessary and transfer surplus money out as appropriate
- Alternatively set up and maintain a working fund
- Consider the addition of benefit payable on death to the spouse or dependants or making the scheme compulsory Ensure that a maximum of 30 years contributions are Payable.

[4]

(iv)

- Need to look at the likely position when full benefits will be payable (in 10 years' time and thereafter) Does the social security ministry have any information on the likely take up of the scheme?
- Do the contributions have to be made out of earned income?
- Look at mortality tables appropriate to the sector of the population who will participate in the scheme.
- Look at other countries
- Consider trends in mortality
- Look at employment statistics
- Try to assess the ages at which contributions are likely to be paid.
- Look at the age profile of the relevant population.
- If the contributions can be made at any age, it will be necessary to consider the likely income and outgo over a number of years.

- Investigate likely costs of administering the scheme

[4]

(v)

- The size and age profile of the membership of the scheme should be examined.
- It will take many years before accurate information on the likely take up for the mature scheme can be assessed.
- The benefit payable during the first 30 years is generous and so take up by those over age 38 now is likely to be very high.
- This may not be repeated once the scheme matures.
- Information will be available regarding the take up at younger ages but, if the contributions can be made at any age, if younger individuals do not subscribe it will be difficult to assess if they intend never to join or if they are just waiting until they are aged 38.
- Surveys of the eligible population should therefore be undertaken.
- Trends in mortality need to be investigated.
- The age profile of the relevant population should be monitored.
- Birth, death and emigration trends will all be relevant.
- Employment trends must be monitored

[4]
[20 Marks]

Solution 3:

(i) Money Purchase Scheme

- Investments are generally earmarked to each member, so investment should ideally match that member's particular circumstances.
- Legislation may impose restrictions on the investment choices available.
- Members ideally require an investment that matches to annuity requirements close retirement.
- Further away from retirement, members may take the opportunity to invest in riskier assets in order to aim for a greater return.
- Members may want a real return over long term
- Must decide whether to use one investment medium for all members or try to tailor the investments to the individual
- One option available to tailor investments (if permitted) in a developed economy is to use "lifestyle" funds where equity type investments are used for younger members switching slowly to bond and cash type investments as retirement date is approached.

- This assumes the economy is developed such that equities can be readily traded and they provide a real investment return.
- In a less developed economy such an approach is unlikely to be viable.
- This overcomes some, but not all, risks (e.g. early retirement may result in a mismatch of investments to annuity costs).
- If a non-insured vehicle is used, a unitised vehicle is easier to administer/communicate than a portfolio of stocks.
- An alternative option to tailor benefits is to offer members a choice of investments
- Need to strike a balance between administrative simplicity, meeting the needs of staff, cost and the ability of staff to understand the choices.
- The investment risk is borne by the member rather than the Scheme which puts the onus on the provider/trustee to see that investment performance is appropriate for members as a whole.

Final Salary Scheme

- Investments should reflect the liabilities of the scheme as a whole.
- Depending on size, legislation requirements and nature of markets may have an insured contract, a managed/unitised fund or a segregated portfolio of stocks.
- Must assess split of available asset types to provide the best (or least worst) match of the liabilities of the scheme.
- If membership of the scheme is young an equity biased investment is usually appropriate in a developed market whereas if the profile is more mature, a Bond biased investment is more appropriate.
- In less developed markets the investment choices may be much less wide.
- Liquidity, i.e. contribution vs. outgo will influence investments.
- The investment risk is borne by the scheme and hence ultimately the sponsoring employer. Can reasonably consider the employer’s tolerance for risk in setting strategy.
- Could move away from a broadly matched position if they think this will profit the scheme (e.g. if surplus exists).
- There may be legislative requirements that require investment in a particular way (e.g. surplus regulations or minimum funding requirements).
- Diversification

[7]

(ii)

Points to cover are

- What are the available investment media. Is there a real practical choice available.
- What is degree of member knowledge - are members sufficiently financially aware to be able to make informed, realistic investment decisions?

- What advice/information is available to members. At the very least, communication material will be needed and should be made available to members where they have a choice.
- Sponsor should possibly provide source of advice to members.
- How much choice and what are the cost implications.
- The level of detail will probably depend on the sophistication of the economy.
- Should switches be permitted, and if so at what cost (if any).
- There could be a default option for members who do not wish to exercise choice. This default option should be a realistic and reasonable option appropriate in the majority of cases (e.g. a lifestyle arrangement)
- Sponsors may be liable to complaint from a member if their choice has been unsuitable and no comment was made on that choice when taken, advice was not made available.

[4]
[11 Marks]

Solution 4:
(i)

- To be appreciated, benefits should meet employee needs
- e.g. income in retirement, income in other circumstances e.g. death
- may use Net Replacement Ratio to assess
- Employer will wish to provide competitive benefits, to help attract/retain employees
- May offer different/no benefits to different types of employee.
- Employer will want to reflect employer culture e.g. paternalism makes generous defined benefit plan more likely
- Types of benefits will reflect custom & practice in country / industry
- Benefit design will reflect government influence e.g. compulsion to provide a benefit, tax incentives for certain benefit types, maximum limits on tax incentivised benefits)
- Need to provide benefits that are simple to administer
- Need to provide benefits that are simple to understand and which can be communicated clearly to employees
- Facilitating other business needs e.g. business reorganisations, mergers, downsizing, opening career paths for younger employees
- Benefit design needs to meet financial requirements of employer e.g. cost level, predictability
- Other points/considerations
  - stability of cost
  - staff turnover
  - employee contributions
  - integration into any state provided benefits
  - DB and DC — appeal to different type of employee
  - size of employer
  - type of employer

- availability of options

[8]

(ii)

Benefit Design

Defined benefit — costs unknown in advance

Mitigation: defined contribution — costs known, but may not be competitive, meet employer's desire for paternalism etc.

Funding in advance

Risk under PAYG that employer will not have sufficient funds to meet cashflow requirements
Mitigation: fund in advance, requires actuarial projection of benefits to establish suitable funding levels Assumes that this is permissible/tax efficient

Funding Level

Actuarial assumptions prove to be too optimistic, costs increase

Mitigation: use more conservative basis when assessing employer costs

… or cost on various scenarios, to help understand the range of possible costs

Might want to avoid the possibility of overfunding and creating surplus which the employer cannot use

Valuation Frequency

If valuations are infrequent, large changes may arise between valuations

Mitigation: more frequent valuations e.g. annual

Investment / Insurance

Risk of asset-liability mismatch

Mitigation: as far as possible, choose assets that match liabilities e.g. real assets for real liabilities assuming they can be bought.

Risk of poor investment return

Mitigation: "appropriate" balance between risk and return

Risk of insufficient liquid assets to meet benefits when due

Mitigation: project benefit payments net of contribution receipts, and ensure assets will provide sufficient income.

Risk of death strains in service and/or retirement

Mitigation: buy appropriate insurance contracts.

Risk of options in benefits.

Mitigation: make options cost neutral or subject to employer consent.

Maladministration

Risk of mismanagement of pension plan e.g. misappropriation of plan assets, incorrect payments to/from plan legislative intervention due to non-compliance

Mitigation: good administrative practices, audit, professional advice

Others

Most difficult to mitigate

- Interference via government
- Political risk
- Effect of accounting standards
- Employment risk-benefits of "wrong" type
- Mitigate by choosing hybrid

[12]
[20 Marks]

Solution 5:
(i)

- Trustees have a duty to ensure sufficient contributions are paid so that scheme benefits can be paid as they fall due and a viable ongoing employer is needed to achieve this

- For an ongoing pension scheme any deficit could be viewed as an unsecured debt on the Sponsor
- This deficit will rank alongside other creditors of the sponsor
- If a pension scheme winds up there may be a deficit that will not be paid
- The trustees will need to assess the security of accrued benefits and the differing priorities of various categories of members
- To aid setting the general investment strategy and in particular how "safe" the backing assets need to be e.g. Government Securities
- To aid setting a prudent valuation basis and in particular any adjustment needed to the discount rate to allow for the underlying risks
- To understand how much the employer can actually afford to pay and over what reasonable period the contribution schedule should extend
- Relating the employer's ability to pay to their willingness to pay
- Any trust deed & rules requirements
- Assessing the impact of any statutory minimum contributions
- Allows consideration of alternatives to cash payments e.g. charge on company assets
- Assessing trustee demands for earlier payments of contributions to make good any deficits
- Trustee decisions to trigger wind up or forcing cessation of future benefit accruals

[8]

(ii) <u>Methods</u>

- Trustees can adapt a number of conventional credit quality assessment techniques to assess the strength of the employer's covenant — these include;
- Assessment of the sponsor's general business outlook and those specific to the sponsor's sector
- Use of financial statistics and accounting ratios from published accounts e.g. interest cover and comparisons with similar companies and comparisons with previous years figures to determine any trends
- Ask for access to management accounts
- Assessment of the market view if the sponsor has issued equities or corporate bonds e.g. excess yield over government bonds or Merton model but only a small number of pension schemes will have access to this information
- Independent credit ratings from specialist credit rating agencies giving an assessment of the sponsor defaulting on its financial obligation and its subsequent insolvency but again only larger companies tend to have full credit ratings
- Commission an independent business review from an accounting firm or insolvency practitioner

<u>Monitoring the covenant</u>

- Reviewing publicly available financial information on a regular basis e.g. published accounts and undertake regular reviews of the sponsor's covenant using qualified professionals
- Discussing the sponsors financial position regularly with the finance director
- Ensuring the sponsor notifies the trustees of any changes in circumstances that could affect business prospects and hence member's security
- Take account of any risk based measures imposed on the sponsor e.g. levies

[7]

(iii)

- It may mean that any deficit is financially unmanageable
- The trustees may request the sponsor to make up the deficit more quickly if the scheme's financial position deteriorates
- However difficulties can arise if the employer cannot afford the contributions
- It could be argued a weaker sponsor should be permitted to defer contributions to ensure the company stays in business but trustees should request increase to contributions as prospects for employer improve
- Alternatively the pension scheme could arrange to have a charge on certain assets if a specified event occurs
- For example an employer insolvency or failure to achieve a specified funding level
- The charge could be on a property or other assets and be provided by the sponsoring employer or by a third party such as a bank
- Legal and actuarial advice should be considered
- It may enable the trustees to pursue a riskier return seeking investment strategy or enable the schedule of contributions to be structured in a way that would otherwise not have been acceptable to the trustees
- The guarantee should only be considered over a short period and reviewed at each valuation

[4]
[19 Marks]

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