Institute of Actuaries of India

Subject ST4 – Pension & Other Employee Benefits

October 2015 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:

(a) The sponsor covenant is the ability and willingness of the sponsor to pay the contributions to support the pension scheme. [2]

(b) Methods to measure the sponsor's covenant and

(c) Their Advantage and Disadvantage

Method	Advantage	Disadvantage
Business Outlook An assessment of the business outlook in general and specific to the sponsor's sector	Relatively easy to obtain	Results are subjective and difficult to quantify
Financial Metrics Financial statistics and accounting ratios can be compared with similar companies and with previous years to spot any trends, particularly any deterioration	Simple to undertake	• Does not give an indication of the absolute level of risk • Financial statistics of other companies can be out-of date / infrequent • Group accounts may not provide information specific to sponsor
Implied Market Default Risk Where a sponsor has issued investments such as equities or bonds, market prices can indicate market view of sponsor's credit risks, and how views can change over time.	• Where securities traded, up to date information is easily accessible • Quantifiable measure of credit risk	• Risk to pension scheme will differ e.g. priority / security provided • Other factors determine market prices and hence yields • Only available if investments are regularly traded and prices quoted
Credit Rating Companies can pay a specialist agency to provide them with a credit rating	Based purely on financial circumstances of the company, eliminating impact of market forces Agency may have access to information not publicly available	• Only larger companies tend to have full credit ratings
Merton-type credit risk models A model is used to determine the probability of default based on the behaviour of the equities	Quantifiable measure	• Requires sponsor to have traded equity • Ratings not widely available (as securities not quoted)
Quantitatively derived credit risk Model deriving a credit rating or probability of default from standard accounting data and credit information	• Quantifiable output and wide usage	Relies on accounting information which may be out of date
Independent business review Report by an external credit advisory specialist, typically an accounting firm, insolvency practitioner or other niche operator	• Can take explicit account of interdependence of funding and sponsor covenant	Requires sponsor cooperation for access to confidential information

Risk based levy Credit assessment used by central discontinuance fund when determining levy to be paid.	Quick and easy method of obtaining a broad indication of credit rating	Only a one-year view

[5+5=10]
[12 Marks]

Solution 2:

i) The roles of government are likely to fall within the following categories:

- Provide benefits to some or all of the population
- Educate or require education about the importance of providing for the future
- Regulate to encourage or compel benefit provision by or on behalf of some of the population
- Regulate bodies providing benefits, and those bodies with custody of funds, in an attempt to ensure security for promises made or expectations created. [3]

ii) Government options

- Change the requirement so residents only have to use a proportion of their Accumulated funds to purchase an annuity
- Increase the age from which members must purchase an annuity
- Remove the requirement to purchase an annuity, leaving residents to invest their own accumulated funds (i.e. income drawdown)
- Encourage insurers to increase flexibility in their annuity products
  - ✓ …through legislation or voluntary participation
  - ✓ …e.g. by allowing people more choice over the form of their annuity
  - ✓ or potential to vary the payments
  - ✓ or share in the investment return/risk
- Allow residents to purchase annuities in phases
- this may appeal to people who wish to semi-retire
- Encourage insurers to reduce the cost of annuities
  - ✓ E.g. through tax breaks
  - ✓ Regulating expense loadings to drive efficiency
  - ✓ Or reducing the barriers to entering the market to increase competition
  - ✓ Or reducing any compliance burden (while still maintaining security for residents)
- Introduce a government-run annuity provider which can:
  - ✓ Offer the flexibility residents want
  - ✓ Insure at a lower cost…
  - ✓ as could be non-profit
  - ✓ and would be government-backed so no need to build in extra reserves for security
- Encourage employers to provide defined contribution to defined benefit conversion for employees
- Education to tackle the perception that annuities are expensive. [5]

iii) Factors

- Level of financial sophistication; residents with a high level of understanding are more likely to feel confident in investing their own accumulated funds.
- Attitude to risk; if residents are risk averse they are unlikely to take advantage.
- Other sources of income or assets:

    - ✓ If a resident has other pensions/assets to meet their income needs they are more likely to want to take a risk with their DC funds.
    - ✓ Or if their spouse has a stable income they may be willing to take on risk.
- Some residents may prefer the flexibility as they would prefer to have a higher income early in retirement
    - ✓ when they are more able to enjoy it
    - ✓ or to pay off a continuing liability such as a mortgage
- Residents with lower life expectancy than average are more likely to take advantage
    - ✓ …as the cost of an annuity will factor in a certain life expectancy and if a resident lives less long they could potentially fund a higher income
- Member's characteristics versus how annuities are priced e.g. unisex annuities may be less attractive to males
- If the annuity must include a spouse's pension and the member is single they are more likely to take advantage.
- What will happen to the personal account after the resident's death?
    - ✓ If the fund passes to the dependants to use as they please, residents who expect to have a greater fund than required to pay their own pension until death are more likely to take advantage.
- The simpler the process for managing the personal account, the more likely residents are to take advantage.
- Any difference in tax position between purchasing an annuity and investing in a personal account:
    - ✓ on income
    - ✓ after the resident's death
- The resident's personal view of future investment returns…
    - ✓ …achievable in a personal investment account
    - ✓ ... and inflation
- How the new flexibility is communicated to residents…
    - ✓ …if residents are unaware or do not understand they will not take advantage of it,
    - ✓ ... whereas supportive press comment may encourage participation
    - ✓ ... and availability / cost of good financial advice may be a factor
- Size of accumulated funds…
    - ✓ …those with small funds may face prohibitively large management charges
    - ✓ ...due to admin costs of regular drawdown.
- How well the existing market meets the resident's needs.
- If the resident wishes to semi-retire and take some income from their pension fund while still working they are more likely to take advantage.
- Any restrictions on how much residents may withdraw money from their personal investment accounts may reduce take-up [8]

iv) It is a defined contribution scheme. Under which the amount of benefit depends on factors including the amount you pay in, the fund's investment performance and the choices you make at retirement. [1]

v) Risk to both parties

- Main risk of inadequate benefits arises from:
    - ✓ poor planning so that the design does not meet the true needs
    - ✓ inflation reduces the purchasing power of contributions / benefits
    - ✓ investment returns are lower than expected
        - ▪ capital risk
        - ▪ investment income risk
        - ▪ reinvestment risk

  - risk of default
  - mismatching of assets relative to liabilities
  - expense and taxation risk on net return
  - opportunity risks
- ✓ guarantee risks when purchasing the benefits such as annuities
- ✓ capital risk of the fund approaching retirement

- Contribution risk under this scheme are:
  - ✓ the contributions are not made due to the financial circumstances of the subscriber
  - ✓ the contributions are linked to an inflationary factor, thereby introducing an inflationary risk [4]

vi) It is a defined benefit scheme. Where the benefits are defined in advance and the costs will not be known until all benefits cease to be paid.

Often contributions are paid in advance to meet the estimated cost of benefits. The estimates are based on financial and demographic assumptions. Typically, subscribers pay contributions at a fixed rate and the other party pays the balance of cost. [1]

vii) For a *defined benefit* scheme a key principle is to ensure that sufficient assets are available to meet the liabilities as they fall due. The risks that need to be managed include:

- Underfunding, ie insufficient assets have been set aside
- Liquidity of funds, ie sufficient funds but not in a form to pay benefits due
- Inadequate benefits, either due to design or inflation eroding the value.

For defined benefit schemes it must be remembered that cost and contributions are likely to be different. Costs will not be known until no future liabilities exist. This distinction introduces risks. Contributions will vary according to:

- The benefit options available
- The assumptions and model used.

<u>Other Risks</u>

- Incorrect benefit payments,
- Legislation changes increasing benefits
- Inappropriate advice to members and/or sponsors,
- Administrative costs, [4]

viii) Advantages of purchasing insurance

- The sponsor of a defined benefit scheme is exposed to a number of risks which will be transferred to insurer.
- If experience is poorer than the expected cost of the scheme to the sponsor will rise and its accounts will be impacted
- If the scheme insures all its pensioners, then all the risk relating to them will be passed to the insurer
  - ✓ i.e. longevity risk
  - ✓ Investment risk
  - ✓ and inflation risk (if applicable)
- The volatility of the scheme as a whole will be reduced

Disadvantages of purchasing insurance

- The purchase price has to cover insurance company expenses and a contribution to its profit
- There is an immediate liquidity constraint when buying the annuity
- Dealing with issues such as future addition of discretionary pension increases becomes complicated
- The scheme is still subject to volatility arising from the non-pensioners
- The scheme is subject to the risk of the insurer defaulting
- The solvency of the scheme might reduce placing increased reliance on the employer covenant due to both insolvency of the insurer and expected additional cost of insurance.
- The favourable experience will be passed to the insurer. However it is government sponsored scheme. It is unlikely to be favourable to government. As government objective is to provide as much as benefit to beneficiary. [6]

ix) Key features of contracts

<u>Group Life Insurance</u>

- Covers lump sum payments on death in service
- Typically a very competitive market, so minimal profit margins in pricing
- Usually charged for on a recurrent single premium basis
- A unit rate is determined at inception according to age and gender distribution
- And is applied to the total sum assured during the period of the guarantee
- A free cover level is usually offered
- i.e. insurer will provide cover for individuals in the group without medical evidence
- Experience / profit sharing is common for larger schemes
- For the spouses death in service pension the insurance cover may be achieved by insuring a larger lump sum out of which the spouses pension will be paid
- Alternatively the death in service spouse’s pension could be insured
- Stop - loss / catastrophe insurance (with an example)

<u>Non profit annuities</u>

- A lump sum is generally paid at retirement to an insurer to match a member’s retirement benefits
- May be an immediate or deferred annuity
- The annuity may be level, increasing at a fixed rate or in line with an index to match the promised scheme benefit to the member
- Payable for life
- With for example a guarantee period and / or widow’s benefit
- The cost will include loadings for insurance company profits, administration and contingencies
- The liability is transferred to the insurance company
- But can be purchased in either the scheme’s or the member’s name
- With-profit and unit linked products may also be available
- Which would enable the pension scheme to benefit from experience that is better than assumed in the annuity terms
- Reasonably competitive market/pricing may exist
    - ✓ ... and may not be able to match increases in scheme rules (e.g. LPI, discretionary increases etc) [6]

[38 Marks]

<u>Solution 3</u>:

i) Check that:

- Current ages < max scheme retirement age.
- Ages at joining >= minimum scheme entry age.
- Check the following and ask for an explanation of unusual findings:
  - ✓ Date of joining company = <date of joining scheme
  - ✓ Individual salary levels look reasonable
  - ✓ Individual salaries and average salary have not increased by an excessive amount since the last valuation
  - ✓ Individual salaries have not decreased since the last valuation, except for the eight senior employees
- Average past service consistent with last time, allowing for new entrants
- Average age consistent with last time, allowing for new entrants
- Number of actives last time + new entrants - exits (left service, retired, died) = number of actives this time
- Number of deferreds last time + scheme leavers - (transferred out, retired, died) = number of deferreds this time
- Reconciliation against payroll or external source to check completeness of data
- If accounting information available, check:
  - o Company and member contributions in the last year are approx equal to the pensionable salary roll multiplied by the relevant contribution rate.
  - o Average transfer out per transferring deferred pensioner looks reasonable

[5]

ii) Demographic Assumptions:

Total membership likely to be in the hundreds rather than in the thousands (i.e. the scheme is small) since over half of the liabilities at the last valuation related to only 8 senior employees so even in normal circumstances the numbers would be too small to give reliable statistics.

Random fluctuations would have a very significant impact on the measured rates.

When numbers are small it is possible to aggregate the experience of several years.

However, the data may not be homogeneous. Rates produced this way may conceal the effects of changes over time.

In this scheme there have been significant changes. The membership now has a very different composition from those three years ago.

<u>Withdrawals and early retirements</u>

It would be unwise to assume similar large scale movements from the scheme, unless the company anticipate further cut backs since withdrawal benefits are usually somewhat less valuable than those payable to stayers. However, if the scheme paid enhanced benefits to some or all of those made redundant, it may be prudent to include a margin if more of the same is anticipated.

<u>Mortality, marital statistics etc.</u>

Other experience of the current membership may also differ from the past because the members are doing different jobs and may come from different backgrounds.

<u>New entrants</u>

The large scale recruitment exercise may have been a one-off. It would be necessary to check with the company what their future intentions are.

If the SCR reduces as the number of new entrants increases then it would not be prudent to assume too many new entrants.

Other general reasons

There may have been changes in the way data is recorded.

There may have been errors in past data records.

Financial Assumptions

Salary growth

The large number of redundancies in one business area and the large scale recruitment in another is likely to have produced atypical salary growth. [8]

iii) (a)

- What is the impact of the pay cuts on pensionable salaries?
- Is pensionable salary basic salary or total?
- Has the reduction in basic salary been compensated by other payments which are pensionable?
- Pensionable salaries may be averaged over a period and may take account of pensionable salaries for a number of years prior to date of calculation.
- If pensionable salaries are averaged then they may be revalued in line with prices or average earnings.
- Is it expected that their salary levels will be restored or improved in real terms (short term)?
- What is their likely salary progression to retirement (longer term)?
- Are there any replacement (non pensionable) awards?
- Are there any plans to make such income or benefits pensionable?
- How close are the senior employees to normal retirement?
- What are their early retirement plans?
- Is normal and ill health early retirement benefits more generous than the value of accrued benefits?
- If so, it is usually/rarely given?
- Is trustees/employer consent required for early retirement?
- What is the state of health of individual senior employees?

(b)

- Safest course of action is to assume the following:
- Mortality: no-one dies before retiring.
- Withdrawals: no-one leaves service before retiring.
- Assumes that withdrawal benefits are less valuable than stayers' benefits.
- Early retirement: value the most costly option available as a right.
- Marital status: actual statistics (or 100% but recognise this might over reserve).
- Age difference of member and spouse: use actual details if available.
- Consider how post retirement mortality should differ from normal to possible.

[7]
[20 Marks]

Solution 4:

i)

- The rate of mortality of those who join the scheme and whether this is likely to change in the future.
- Mortality of spouses who would receive a pension.
- The proportion of members who join who have a spouse (however defined).
- The age of the spouse.
- The rate of interest or the investments return that should be assumed on the premiums prior to death.
- The rate of salary increase (depending on how cost is determined).
- The rate of investments returns to value the spouse's pension from the date of member's death.
- Expense and/or administration costs [3]

ii)

Mortality

Need to understand who are or will be members of this scheme and whether the profile is likely to change in the future and if there are any constraints on entry, e.g. if the scheme relates to an employment and members must satisfy a pre employment medical before joining.

We have no information on size or scope of the scheme so a reasonable starting point would be a standard industry or national mortality table if this exists.

If not, then a table for a similar country/industry could be used. This would be adjusted as the actuary saw appropriate to reflect the particular profile of those who will join the scheme.

If this is a new scheme it could well be a relatively ad hoc adjustment which would then be reviewed as experience develops

A similar approach is needed for the mortality of spouses.

However it is highly unlikely that a specific table would exist unless this was a well developed country.

Again a standard table with a relatively ad hoc adjustment is likely to be made which would then be reviewed with experience.

It is likely the actuary would take a cautious approach, i.e. over-reserving.

Proportion married

The actuary could ask for marital status of each new member and price accordingly.

However, it may be impractical to ask and verify this information and in particular keep an up to date record. (There is no indication of whether marriage needs to take place prior to joining the scheme).

Therefore a proportion married could be assumed based on an appropriate benchmark (e.g. proportion married in the working population).

This could be graded by age, however in practice this may prove difficult unless there are significant variations.

Rates of Interest

Prior to death an assumption needs to be made on the rate the provider of cover will earn on the invested premiums.

If they exist, a government bond of appropriate maturity term would be the ideal match., although there may be some local regulations/legislation requiring a particular type of investment.

Any higher rate of investment return presumably reflects an investment with a degree of risk, (e.g. corporate bonds or equities if this is a developed market)

For the spouse's pension, again, an appropriate government bond of appropriate term would be the basis of calculation.

Although in practice the benefit may be secured with an annuity. In either event an assumption needs to be made about the appropriate rate of interest at the future date of death.

Salary Growth

Salary growth is important if the benefit cost is not assessed on a one year basis.

Should look at the salary growth due to general inflation and merit increases separately.

Depending on the size of the membership it may be possible to assess from scheme statistics, otherwise general population statistics would be adopted.

Above would only be undertaken if salary growth significant to calculation.

Expenses

These would presumably reflect anticipated costs. [12]

iii)

Clearly each of the companies could have used different assumptions in order to price the business (on the assumption that these are not prescribed by legislation).

This could be because they were simply taking a more optimistic or pessimistic view of the likely outcomes or the investments returns were assuming investments in more or less conservative investment media.

This could be justified, for example, by a company which had a significant level of free assets or surplus or simply that it was looking to undercut rivals, or the implied profit margin could be different (e.g. If one was looking to loss lead in order to gain market share.

The quotations could be on a first year basis versus a term period (i.e. anticipating an increase or decrease in cost over future years which are spread).

The quotation could be contingent upon more strict criteria such as requiring a medical if salaries are greater than a set amount or in the event of death excluding certain specifics, or only for spouse at date of enrolment rather than subsequent re-marriages.

Given them the wrong data or they have valued the wrong benefits.

A company may have been able to re-insure some of the catastrophe exposure (i.e. cover in respect of particularly high levels of salary or for particularly large number of deaths associated with a single event) and have passed this on.

Overall costs could be lower. [5]

[20 Marks]

Solution 5:

Factors

- Decision may be constrained by requirements of legislation
- ..or the Scheme rules
- ..or expectations from the past (eg previous benefit improvements such as increases for pensioners)
- The need to be fair between the different parties
- ..to include an appropriate allocation of surplus to the different classes of beneficiary
- ..which may take account of how the surplus has arisen
- ..and likelihood of it recurring in future
- ..particularly if improvements are being granted that affect future accrual of benefits or future member contributions

Examples

- Benefit increases / improvements
- ..to be prioritised by category
- ..or age, length of service
- ..for active members: enhance accrual for past service, for future service, give credit for any non-pensionable past service such as waiting periods, or periods before the scheme began, or service prior to a take over
- ..for pensions in course of payment: review benefits to take account of inflation
- ..for left service members: review benefits to take account of inflation
- Secure assets by switching into bonds
- Consider impact of buying out/securing some liabilities
- Introduction of new benefits / options
- ..extension of dependant benefits
- ..new options which have a financial value
- ..such as retirement at an earlier age with a lower (or no) reduction for early payment
- Reduction in member contributions over a period
- ..but bear in mind that if this is only for a 3 year period, this needs to be communicated clearly
- ..so as to avoid creating expectations for the future
- Reduction in employer contributions over a period
- Or return of surplus to sponsoring employer
- ..perhaps subject to tax
- Each subject to an appropriate communication to members to justify surplus going to the company
- ..e.g. to explain that the employer bears risks in sponsoring the scheme and meeting benefit promises. **[10 Marks]**

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