

EXAMINATIONS

September 1999

Subject 304 — Pensions and Other Benefits

EXAMINERS' REPORT

1 With an Accrued Benefit Funding Method:

The Actuarial Liability for active members is based on pensionable service accrued to the valuation date or the end of the control period as appropriate.

The Actuarial Liability for former members is the present value of future instalments of pensions in payment and related contingent benefits and the present value of future payments in respect of deferred pensioners.

The Actuarial Liability includes an allowance for expenses expected to fall on the fund after the date to which the calculations relate.

The Control Period is the period over which the SCR has been calculated to remain constant.

The Standard Contribution Rate (SCR) is derived from the definition of the Actuarial Liability.

If the SCR is paid and assumptions are realised then the Actuarial Liability at the beginning of the Control Period plus contributions paid and investment income received less benefits paid will equal the Actuarial Liability at the end of the Control Period.

The SCR is the total contribution rate (employer and employee).

It is normally expressed as a percentage of pensionable pay.

The treatment of liabilities not directly linked to pensionable service is left to actuarial judgement subject to the need for consistency between successive valuations.

This was a straightforward bookwork question, which most candidates answered well.

2 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.

Or could base premium on expected long term gilt yields.

When valuation premium could take account of terms of payment guarantee period, frequency of payment etc.)

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.

The answers to this reasonably straightforward question were mixed. A surprising number of candidates failed to mention the mortality assumption as a key element of the basis.

3 (i)

- Require separation of any funds required to provide the benefits from the sponsor's other assets or require pensions to be funded
- Require trustee control of funds
- Require individuals or organisations that manage or invest any funds to be authorised
- Require regular checks of the adequacy of separated funds
- Restrict the types of investments that can be used for funds
- Require regular disclosure to potential recipients of the adequacy of funds and the ways in which those funds are managed and invested
- Require individuals who are involved in, or who advise on, the administration of the benefit provision or the investment of related funds to report on malpractice to a State regulator
- Place outstanding benefit obligations as a high priority debt in the event of insolvency
- Require financial guarantees from a parent company or shareholders or government makes good
- Compel sponsors, managers, investment managers and any other relevant party to hold insurance against inadequacy of funds in the event of insolvency, negligence, fraud or any other appropriate event
- Require letters of credit to be provided for schemes from banks
- Require minimum credit ratings from organisations whose finances may affect the availability of funds
- Place a levy on relevant parties to provide compensation as an alternative to insurance against inadequacy
- Supervise the finances of commercial benefit providers
- Supervise the marketing by commercial benefit providers
- Introduce guidance note provided by government or actuarial profession

(ii)

- Approach will avoid the erosion of the value of the deferred pension through inflation.
- May be considered fairer by government than existing arrangements.

- Members' salaries will not be in the control of the sponsoring employer after members leave service.
- Hence employers cannot control costs (as they can with salaries for their own employees).
- The system would be open to abuse, with employees arranging with a new employer (or even establishing their own company) to receive a high rate of pay shortly before retirement.
- Cover requires salary to be averaged to reduce abuse.
- Administration would be very complex, with employers having to communicate to establish the correct pensionable salary (with procedures to avoid abuse).
- Schemes could not windup/terminate as they do not know their obligations.
- Other members' benefits would be vulnerable to the actions of unconnected employers.
- Better approach would be to index-link benefits to price inflation or national average earnings inflation.
- Earnings inflation may give leavers higher benefits than stayers, if company pay rises are below average.
- May wish to consider a fixed upper limit to annual index-linking, to protect employers from runaway inflation.
- Any change will result in increased cost for employers.
- Government needs to consider whether this will discourage employers from providing pensions.
- At least consider making the change non-retrospective, by applying it only to future leavers or benefits derived from future service periods.
- Could consider reducing resting period as a fairer way of improving rights
- May not be in employment at retirement: same decisions needed
- Need to consider what happens on early/late retirement

Part (i) was bookwork for which most candidates were well prepared.

Part (ii) produced a mixed response. Candidates who were able to explain why the proposal was unworkable for employers, and could damage occupational pension provision scored well.

These candidates were also able to suggest workable alternatives.

4 Consider those who are actives throughout intervaluation period

New entrants excluded as:

- pay during early/probationary period may distort picture
- Part year earnings may confuse picture

Similarly for exits

Might argue for an adjustment for those who joined during year immediately before start period

Let $PS_x = S_x - B$

Where S_x is salary in year of age x to $x + 1$

PS_x is Pensionable Salary in year of age x to $x + 1$

B is Basic State Pension

Expected Pensionable Salary in t years' time is:

$$PS_{x+t} = S_x \frac{s_{x+t}}{s_x} - B(1+j)^t$$

Where j is assumed increase in BSP and salary scale incorporates promotional scale with salary escalation superimposed

So need to compare S_x with S_{x+t}
and a separate comparison of actual and expected BSP

So if appropriate may need to add back BSP

If total salaries at last valuation of all those aged x at last valuation is TS_x

Therefore, expected salary at current valuation date is $TS_x s_{x+3}/s_x$
is then compared with the actual amounts of salary at the valuation date

need now to consider how to split between promotional rises and general salary inflation can do this by the following means

- are promotional scales used appropriate either by information from the employer
- or by considering the profile of average salaries at the last and the current valuation date

Note: use of average salary profile needs care as not generally theoretically correct

- might analyse different groups separately if data is available/reliable.
- might adjust split to allow for a too shallow or too steep scale
- consider progress of national average earnings

The quality of answers to this question was variable. Many simply reproduced a bookwork answer and missed many of the marks available. Those who scored well described the analysis of salary experience, explained problems that might make the analysis unreliable in this particular situation and how these might be overcome.

5 (i) Methods of rolling up 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
- Note: the above assumes that the minimum is perceived as a fall-back minimum, rather than the predominant benefit: otherwise it's possible to allow members some choice as to how to invest their "pot", and credit the actual return on selected investments
[This is a rather unusual approach but candidates were credited for identifying that the approach exists and for developing the idea.]

Converting fund to an annuity

- Would be 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

(ii)

- 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 as de minimis.

Part (i) of the question required the description of a workable approach for calculating a

defined contribution underpin to a defined benefit. Better candidates suspected that the contribution level might be low enough for the underpin not to bite for many members, and suggested simpler approaches. These candidates also linked the choice of accumulation method with the choice of pension conversion method.

Many candidates suggested producing an Asset/Liability Model (ALM) to assess the value of the underpin in part (ii). They reproduced substantial bookwork on ALM despite the question stating a brief answer was required. Better candidates identified that a full ALM might be unnecessarily complex if the underpin was unlikely to bite often and that simpler methods were possible.

6 (i) Security

Security is the ability to meet benefit expectations in all circumstances, not just for an ongoing scheme but, for example, on discontinuance or the sale of a company.

Accumulating assets in a fund separate from the employer's other assets by advance funding can provide security of pension benefits, if the fund covers the liabilities.

The level of security depends on the funding plan.

The rate at which the fund is accumulating is the main consideration of the security offered by the funding method adopted.

The security provided by a separate fund also depends on the investments held, in general high risk investments will provide lower security.

An unfunded promise provides no security in itself unless the organisation promising the pension is assured of continuing existence (for example the government).

Book reserving can in theory give some security if the pension reserves are treated as liabilities of the company in events such as insolvency.

The degree of security offered depends on where in the order of priorities the pension benefits fall and on the realisable value of the company's assets. Consider competitors' practice and the opportunity cost of capital to the employer.

Stability

Stability is the ability of a funding method to produce a contribution rate which is not unduly distorted by fluctuations in experience.

Fluctuations in experience reflect the deviations of the actual experience from the assumed.

Advance funding can allow a company to pay for pension benefits gradually, and in a stable manner.

However, the various methods of calculating advance contributions do not all produce stable contributions.

In practice, a funding method may produce stable contributions under one circumstance (for example a pension scheme open to new members) but produce unstable contributions in another (for example a pension scheme closed to new members).

The stability of the contribution rate (expressed as a percentage of members' salaries) will depend on the assumptions made being borne out in practice.

PAYG may produce a stable level of outgo if the level of the benefit is relatively uniform amongst the beneficiaries and the age of the retirement doesn't vary significantly between individuals.

Therefore, reasonably stable benefit outgo may be possible for State provision, but will be less likely from non-State provision.

However, even in relation to State provision instability may result from a lack of uniformity of the age profile of the population.

Also in terms of the stability of the contribution rate, there is also dependence on the stability of the size of the working population.

Though any growth in the contribution rate due to demographic effects will be countered to the extent that the earnings of the working population grow at a quicker rate than the benefits.

Book reserving can in theory allow the same stable recognition of pension cost as advance funding.

However, the cash outgo required to provide pensions is unlikely to be stable.

Increasing age

This could occur if an employer is not recruiting new employees or if membership of a scheme is closed to new entrants (even if there are new employees).

Whether an advance funding or book reserving method can deal with an increasing average age will depend upon the precise method adopted.

Under PAYG the benefit outgo will not be affected by increasing average age.

However if an increase in average age is due to a lack of new entrants the reduction in the number of beneficiaries may mean that the total cash outgo is reduced in the long term.

Realistic

Advance funding can provide for a realistic cost of pension benefits.

Again, this depends on the method of advance funding.

Some methods involve low contributions now and high contributions later, others involve the reverse.

If a funding plan involves low contributions now and high contributions later the employer may gain an unrealistically low impression of pension cost in the short term.

PAYG can give rise to unrealistic impression of pension costs in the short term.

Book reserving can allow the same realism as advance funding.

Liquidity

Advance funding provides good protection against cashflow problems provided that the assets held are marketable, produce cashflows when required, or if there is an adequate contribution flow.

PAYG depends on the contributions flow or source of income. If benefits are higher than the available cash, they may need to be cut back or the income increased.

Book reserving does not explicitly solve the liquidity problem. The fact that the pension benefits are recognised as a liability on the balance sheet does not mean that cash on realisable assets are available to meet pension benefits as they fall due.

Legislation

You may be forced to fund by the Government.

Tax concession for funding.

There may be investment restrictions.

- (ii) When considering the possible investment policy of different schemes, the same general issues need to be considered, namely:
- the liability profile (the nature and the term)
 - the funding position (for example whether in surplus or deficit)
 - any local restrictions (e.g. asset class) and minimum funding levels.
 - the size of the fund (and whether increasing, static or decreasing)
 - the employer's attitude to risk (including currency risk)
 - the expected cash flow (and the consequent liquidity requirements).

A new scheme with no accrued benefits will initially have little in the way of scheme assets. However, very little in the way of benefits will be paid out, so that scheme assets will grow very rapidly in size from the incoming contributions.

The term of the liabilities will also be longer when the scheme begins, hence the term of the appropriate assets will reduce with time.

The likely consequences of poor investment performance are less for a scheme with little past service and so a high return and high risk investment policy may be more acceptable for a new scheme. The nature of benefits is important in assessing the suitability of the assets.

Because liabilities are related to salary inflation then the volatility of the assets relative to the liabilities will be reduced if the investment return is also dependent on that form of inflation.

For a new scheme the cash flow position will be positive. In this case, the fund will be less concerned about yield, liquidity and marketability.

If investments are directly matched to liabilities, the uncertainty of future financing requirements can be reduced.

While this reduces the probability of a large deficit, two problems may arise that may cause such an apparently safe investment policy to be unacceptable to trustees:

- The cost of reducing the probability of a large deficit may be so high in terms of the lower expected returns that such investments typically provide that a small deficit may be inevitable. Indeed there may already be a deficit under the sort of valuation basis that will reflect these lower expected returns.
- Similarly, the reduced uncertainty may also mean that a surplus, and benefit improvements, is unlikely.

For this reason, it is often sensible to follow a policy of deliberately mismatching or at least of only partly matching cashflows in order to benefit the higher expected returns provided by riskier asset classes.

The historical evidence shows that the longer the time period, the greater the probability that equities will outperform fixed income.

This is also consistent with economic theory which suggests that there should be a higher return on equities as payment for the extra risks, including default and volatility.

Many schemes will be faced with a trade-off between:

- increasing their equity exposure in order to increase their surplus in the normal course of events but running the risk of a significant deficit if things turn out worse than expected, and

increasing their exposure to gilts for example in order to reduce the risk of a significant deficit if things turn out worse than expected (but in the normal course of events the surplus will be smaller or may not even arise at all).

Part (i) closely followed bookwork, and resulted in similar answers from many candidates.

Part (ii) was also bookwork, but resulted in more variable answers.

- 7** (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

(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

Other

Most difficult to mitigate

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

Part (i) was a fairly broad question. Good candidates put some structure to their answer, dealing with general employer considerations, such as the need to attract recruits, and then going on to deal with specific issues relating to specific types of benefits.

Part (ii) was again a broad question which can be answered at many levels, but which is well covered by the core reading for the subject.

The quality of answers to both parts was variable.

8 (i) Assumptions would be needed on the following items:

The investment return that will be earned on the fund before age 75

This would reflect the nature and type of investments which can be used by the fund.

The annuity terms that are likely to be available at age 75.

This requires a prediction of underlying interest rates in 15 years time.

The insurance company future expense loadings and future mortality rates.

The administration expenses during the period.

The actuary would need to consider building in allowance for improvements in mortality.

Could also assume that the scheme will be selected against; i.e. those in poor health will select draw down and 100% spouse's pensions.

If individual details are not available the actuary may need to assume an average age difference between spouses.

For pensions that increase in line with inflation an assumption about long term inflation or net return above inflation is required.

For a pension to be sustainable you would not allow for mortality before age 75.

In order to maximise flexibility could use more optimistic assumptions for the maximum and less optimistic for minimum.

(ii) Further information required would cover items such as:

What is the individual's current personal position. What sex are they, are they married, do they have children.

May be a tax efficient way of transferring capital to dependants if they don't buy an annuity.

What investment choices does an individual have with their fund.

If choices are restricted little chance of making an investment profit.

Is the individual in good or bad health.

If the member is in good health then the annuity may be good value as they expect to live longer than average converse is true if individual in poor health.

How large is the pot (small funds limit flexibility)

How important is the pension in the individuals overall wealth
this will indicate level of risk they are prepared to take with their fund.

How financially aware are they and what on the cash flow needs
(periodic/irregular).

Cost of pensions will increase relatively because member has survived.
Mortality drag.

What happens to the fund on death before age 75.

What is the cost of providing an equivalent level of life cover.

What are current interest rate levels
and what changes are expected in the next 15 years.

Can an annuity be bought at anytime or is it a one off decision to pay the pension from the fund until age 75.

Does the individual want future flexibility regarding the structure of the annuity e.g. pension increases and spouse's pensions.

What are the expenses of certifying the minimum and maximum pensions and how are they paid for.

What are the other expenses associated with running a fund.

- (iii) Maximum pension would be based on a single life non increasing pension.

Assuming 9% p.a. up to 75, 8% p.a. after age 75 (anything reasonable accepted)

$$\text{max pension} \times (a_{\overline{15}|} + v^{15}a_{75}) = 250,000$$

$$\text{max pension} \times (8.06 + 0.275 \times 6.30) = 250,000$$

$$\text{max pension} = 25,500$$

Minimum pension would be based on a joint life index linked pension

Assuming real return of 3% p.a. (anything reasonable accepted)

$$\text{min pension} \times (a_{\overline{15}|} + v^{15}a_{75:72}) = 250,000$$

$$\text{min pension} \times (11.94 + 0.642 \times 12.87) = 250,000$$

$$\text{min pension} = 12,400$$

Many candidates found this question challenging. Many attempted it as their last question, and time pressure was evident in many solutions. As a result the general quality of answers was rather poor.

General Comment

The overall standard on this paper was weak. Candidates continue to produce bookwork responses to non standard situations and missed many of the marks available.

Many also let themselves down by a lack of examination technique. Questions asking candidates to "outline or describe" factors will give marks for identifying a relevant issue and demonstrating how it is relevant. Too many candidates fail to demonstrate the "how" clearly and hence score substantially lower than they are capable of achieving.