

# **EXAMINATIONS**

April 2000

**Subject 304 — Pensions and Other Benefits**

## **EXAMINERS' REPORT**

### **General Comment**

*Overall candidates scored well on this paper and there was little evidence of time pressure. Well prepared candidates were able to deal with the book work effectively and also to recognise where book work responses need to be adapted to the specific question. This is a key differentiator, particularly when reviewing candidates close to the borderline. It is also noticeable that many candidates confine their comments to reflect what actually happens in the UK. The questions are not country specific and there are marks available for commenting more generally. Examples include eligibility for and level of State benefits, how developed are the capital and insurance markets, how comprehensive is pensions and benefits legislation etc.*

*Specific comments on each question can be found in italics at the end of each model solution.*

- 1** Retirement benefit is likely to be the most significant issue, but the same considerations apply for pension on death or ill-health.  
The State can provide benefits directly to individuals.  
This could either be to all in the population/workforce (universal benefits) or only to those without adequate other sources of benefit (means-tested benefits).  
The State can educate people about the need to make adequate provision for themselves, if State benefits will not be adequate on their own.  
The State can encourage or compel individuals (or their employers) to make relevant provision.  
Encouragement could take the form of financial incentives or tax concessions.  
The State may restrict the level of incentives to avoid subsidising individuals who already have adequate provision.  
Compulsion could take the form of either a minimum level of benefit or minimum contributions, the cost being shared by employer/employee.  
The State can regulate private benefit arrangements to ensure that those arrangements deliver adequate levels.

requiring benefit promises to be funded in advance of retirement

requiring regular checks that the schemes have sufficient assets

requiring guarantees if a scheme cannot deliver its promises: e.g.

insurance or a levy

restricting the types of investments that schemes hold

requiring scheme managers/administrators/trustees to be authorised

restricting the way benefit schemes are marketed

requiring schemes to give regular information to members

restricting the charges that managers can deduct from the fund

restricting the types of benefit, such as imposing vesting for employees who leave service before retirement age.

*A relatively straight forward question on which candidates scored well. Better candidates recognised the state may be different from their home country and included non-retirement benefits in their answers.*

**2** (i)

1. Continuance of the scheme without any further accrual of benefits
2. Transfer of liabilities to another scheme with same sponsor.
3. Transfer of liabilities to an insurance company to guarantee the benefits
4. Transfer of liabilities to a central discontinuance fund
5. Transfer of funds to individual investment vehicles (e.g. employer's scheme or personal pension arrangement)
6. Transfer of funds directly to beneficiaries

(ii)

1. Avoids costs of disinvesting/transferring assets in the short term, so may make more funds available for members.  
No guarantee that benefits will all be paid — possibility of adverse future experience.  
Possibility of good experience resulting in surplus funds — but not all members will still be alive to benefit from this.
2. Sponsor may meet any future shortfalls, so gives more security than (1).  
Otherwise security depends on financial position of new scheme and how it is managed in the future.  
Any surplus in the original scheme may not be used for benefit of members of the original scheme.
3. Insurer accepts the risks of future experience, so this gives security.  
Insurer will charge a premium — result may be that less funds are available to go to the members.
4. In effect, a CDF may charge a lower premium than an insurance company, so more funds available for the members.

5. Ultimate benefit will depend on how each individual's fund is calculated, and then on future experience of the individual.  
Each member's benefits may be greater or smaller than the discontinuance benefits.
6. As (5), except that members will have more flexibility with their fund.

*Both parts of this question were generally answered reasonably well. Many candidates offered the alternative of transferring assets or liabilities to an insurance company but did not explain the differences.*

- 3 Assets are valued using a current bond yield. This may have no relation to how the assets (if any) are invested and could vary between the two valuation dates.  
Contributions (if any) to the arrangement could be made on a basis which bears no direct relation to the cost of accruing benefits  
For example there could be a fixed percentage of payroll or determined using a basis fixed by statute  
The cost of benefits could be different from those assumed  
For example if they are related to salary — salary growth at the company could be different from that assumed in the standard (prescribed by legislation) table  
or an individual may receive, for example, a promotion which increases the cost of their benefits  
or there may be options, either for the member or the employer which result in a higher rate of benefit being paid (for example, ability to retire early).  
The cost of benefits at retirement or leaving may need to be bought out, for example with an insurance company,  
and the rates may differ from those assumed at the previous valuation  
either because of changes in market conditions or because the assumptions prescribed bear no relation to prevailing costs.  
The benefit formulae could have been changed  
The actual investments, (if any) of the scheme could have performed quite differently from that assumed.  
For example if they are invested in property or different bonds from those specified in the legislation, actual returns would be different.  
Costs of administration etc., if these are met from the arrangement could be different from those assumed or indeed they may not be assumed.  
Normal statistical differences could occur, for example, mortality rates, actually experienced, re-marriage rates etc could be different from those assumed.  
There may have been a significant change in the membership of the arrangement, for example a disposal or an influx of new employees without a consistent alteration in the rate of contribution or assets.  
There could be an error in the calculation or data provided.

Surplus could have been refunded/allocated.

*This question was generally answered poorly. Many candidates simply set out an apparent book work list of sources of surplus or deficit. Further many observed that experience might have been worse than expected without exploring what they meant by "worse" and "expected". It did not take much to tailor those comments to the specific nature of the scheme and jurisdiction in question but only the best did this with conviction to score well. Only the best candidates extended their comments more widely to areas such as a possible contribution holiday, expenses, redundancy exercise or other corporate transaction.*

#### 4

- (i) 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 investment 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 investment return to value the spouse's pension from the date of member's death.

Expense and/or administration costs

- (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 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.

- (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 outcome or on the investment return 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 is 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

*Part (i) was answered well.*

*For Part (ii), as in question 3, many candidates listed generic issues around setting assumptions without tailoring comments to the specific scheme. Many also assumed this was a "typical" UK arrangement that provided a full range of benefits and elaborated their answers accordingly. As a result few scored more than half the marks available.*

*Part (iii) was generally answered well although answers were rather short for the amount of marks available.*

**5** (i)

Note to Examiners: Definitions should be virtually verbatim to gain these straightforward bookwork marks.

(a) **Entry Age Method**

The standard contribution rate (SCR) is found by dividing the present value of all future benefits by reference to projected final earnings for a member entering at a “normal age” by the present value of his total earnings throughout his expected future membership.

The actuarial liability (AL) is found by deducting from the present value of total benefits on projected final earnings for all members the value of the SCR multiplied by the present value of total projected earnings for all members throughout their expected future membership.

$$\text{Standard contribution rate (SCR)} = 240 / (100 \times 20) = 12\%$$

$$\text{Actuarial liability (AL)} = 1700 + 3800 + 8000 - 12\% (3000 \times 20) = 6300$$

(b) **Projected Unit**

The SCR is found by dividing the present value of all benefits which will accrue in the year following the valuation date, by reference to service in that year and projected final earnings by the present value of members' earnings in that year.

The AL is the present value of all benefits accrued at the valuation date by reference to projected final earnings.

$$\text{SCR} = 500 / (200 \times 20) = 12.5\%$$

$$\text{AL} = 1700 + 3800 = 5500$$

(c) **Attained Age**

The SCR is found by dividing the present value of all benefits which will accrue to present members after the valuation date, by reference to service after the valuation date and projected final earnings, by the present value of total projected earnings for all members throughout their expected future membership.

The AL is the present value of all benefits accrued at the valuation date based on projected final earnings (i.e. is equal to that under the projected unit method).

$$\text{SCR} = 8000 / (3000 \times 20) = 13.3\%$$

$$\text{AL} = 1700 + 3800 = 5500 \text{ (as per PUM)}$$

(ii)

**Entry Age Method**

The normal entry age is either estimated from actual membership assumed or calculated from the decrement table employed



The theoretical contribution rate required for a new entrant would increase with increasing entry age.

The contribution rate for the new entrant is generally insufficient to meet the costs of the future service for the present membership

Therefore the AL is greater than the present value of accrued benefits on projected final earnings and hence provides greater security than the Projected Unit or Attained Age SCR

The AL for the entry age method will exceed that for the attained age method, provided that the assumed entry age is lower than the weighted average age of the membership (and the discount rate is greater than the assumed rate of salary growth)

For stability it is necessary that the new entrants, if any, should have an entry age equal to the "normal age" which has been assumed.

It is therefore possible for the contribution rate to be stable even for funds that are closed to new entrants (or growing or diminishing in numbers)

If a scheme were to be set up to provide benefits for future service only, the new entrant contribution rate would usually be insufficient to meet the cost of future service benefits since the initial members would probably have a higher average age than the normal new entrant

### **Projected Unit**

The contribution rate will be stable if the age & sex distribution of the membership remains constant

This generally implies a continuing flow of new entrants

The value of the assets will equal the AL assuming the SCR has been paid and all the assumptions are borne out in practice

As such all the benefits for members are fully secured by the assets held

### **Attained Age**

The SCR for the attained age method exceeds that under the entry age method provided the average age is greater than that assumed for entry and exceeds the SCR of the projected unit method provided the average period to normal retirement is greater than 1 year

No account is taken of new entrants to the scheme.

As a result, if the scheme were closed to new entrants the contribution rate required should remain stable

If the scheme remains open to new entrants the method tends to overstate the contribution rate required because new entrants tend to enter at a younger age than the present age of the existing membership and this generally implies that a lower contribution rate is required for new entrants.

The AL for the attained age is not maintained by the payment of the SCR. Hence the SCR should not be calculated due to the ageing of the membership (if it is recalculated at later ages the SCR will overfund the liabilities)

*In Part (i) candidates were expected to produce a precise definition and well prepared candidates scored highly here. A number of candidates made simple arithmetical errors although these were not unduly penalised.*

*Part (ii) was answered surprisingly poorly. Again examiners expected precision in the responses but were surprised that candidates were often very vague in their comments or the answers were too short.*

## 6

### (i) **Advantages to member**

Not required to join scheme in short term allowing personal arrangement to continue.

#### **Advantages to company**

Avoid providing benefits until employee has been with company for extended period.

Avoids administration of providing benefits to short service employees.

Makes company potentially look good (it provides a benefit) without in practice providing much.

#### **Disadvantages to member**

Unless alternatives are available, it is highly likely that significant periods of service will remain unpensioned at the employer's cost. This, however, really depends on what is available during the ten year waiting period. For example, if the state provides significant benefits the employee may be not too disadvantaged.

Or if the employer is required to contribute to some personal arrangement, again the member may not lose out.

#### **Disadvantages to company**

If alternatives are not available for employees then if substantial numbers of employees do not receive decent pensions there may be a competitive disadvantage. If the above results in the employer having to make good hardship cases — the unpredictable cash flow this could cause is unlikely to be welcome.

### (ii) The impact will depend upon the number of employees and their turnover during the ten years.

If there is a significant number and turnover is high then additional benefits will be provided to employees who currently receive nothing if immediate entry is granted.

The company needs to consider whether this meets its business objective which could be purely competitive.

Should consider what benefits to offer for this period and separately, (see below) how these benefits accrue.

Could offer same defined benefit as for post 10 year service.

Alternatively a reduced defined benefit or money purchase or a combination. [credit for any sensible proposition]

In doing this the company should consider the needs of the employees to be covered balanced against the business rationale for introducing the benefit.

It should also consider the administrative implications.

This would include record keeping and the need to calculate and communicate benefits to employees.

Any benefit different from the current formulae (particularly money purchases) will significantly complicate administration and communication.

A way to avoid providing benefits for those who only stay with the company for a short period and target long-serving staff would be to grant benefits only after completion of ten years' service.

If turnover is low, i.e. staff generally stay, the practical impact will be no different from allowing immediate accrual of benefit.

The financial cost will obviously depend on the number and incidence of entitlement to benefit

and the level of member contribution required.

The maximum cost would be achieved by allowing all employees to join for benefits as soon as they are eligible and for benefit to accrue immediately (i.e. after completing ten years' service you have accrued ten years' worth of benefits).

Alternatively the least costly option is to allow the additional benefit to accumulate on a pro rata basis from some future date.

In extremes this would be credited only on staying until age 65 if this is permitted.

An alternative middle ground would be to accrue the additional benefit starting from the tenth year, i.e. over the current period of pensionable service such that the full ten years are allotted at age 65.

The company should obtain suitable statistics, ideally from its own staff records of employee turnover and the likelihood of joining.

Depending on the numbers they should also investigate whether features such as the mortality or incidence of marriage and mortality of spouses would be materially different for this group.

It is unlikely that these statistics would be available from company records and appropriate industry or country statistics if these are available should be used.

Company should consider impact of change on

- funding costs (i.e. cash contributions, if any)
- book reserving balance sheet
- accounting disclosures

- (iii) The following points should be presented in an appropriate form for senior management. Thoughts should be well ordered, should be presented in straightforward English and should outline issues relevant to management (in particular avoiding jargon and excessive detail).

a. **Transferability**

Should consider whether transferability is justified on competitive or legislative grounds

If it is legal requirement clearly it needs to be introduced, if not then it could be introduced on a partial basis to ease some of the practical issues provided this remains competitive.

The volume of likely transactions is a material point particularly if the calculation is complicated.

The company needs to decide if there are any rules over where the money should be transferred, e.g. only to an appropriate pension arrangement or could it be transferred to a savings account.

How much communication and education do employees need?

If scheme membership is not compulsory, i.e. they could opt out at any time, is there any moral obligation on the company to explain the consequences of effectively cashing out pension?

If employees do cash out, what should happen if they make an inappropriate choice or to wish to re-enter?

Further what obligation do they have in connection with spouse's benefits?

Is there any legal guidance or should they be seeking spouse's consent?

b. **Actuarial basis**

The principal issue is to determine a cash sum to represent the present value of the deferred benefits.

If benefits are well defined, (i.e. they are set out in rules and there is no discretion or unknowns, e.g. inflation adjustment) the benefit is straightforward.

However, if there are unknowns or options they need to decide to what extent they should be taken into account.

If there is any legal or competitive guidance that should be considered

otherwise the company should consider the rationale for introducing transferability as guidance. For example if it is to introduce fairness for all then it would be appropriate to make some allowance for these benefits.

If it was in reaction to unwelcome development it may be that the minimum possible benefit level be taken into account.

In setting the present value an appropriate discount rate needs to be established.

The starting point would be a guaranteed investment such as a government bond, provided this exists, as this is an investment which could be considered to guarantee to provide income necessary to support the benefit.

This is likely to produce a relatively high value for the benefit (in that investment return is effectively guaranteed)

Alternatives which reflect alternative investments, e.g. equities or non-government bonds are likely to assume a higher rate of investment return, and hence a lower present value for benefit.

Depends on the options genuinely available to the member, government and competitive practice and the company's objectives as to whether they should be incorporated.

Other aspects such as statistical information e.g. mortality would probably need to be based on prevailing industry statistics.

If the numbers were large enough and experience was available it might be possible to produce a bespoke set of assumptions, however this is unlikely to be the case.

Proportion married could be taken as a general percentage, or specific to the member.

The latter would require verification of the member's marital status

which depending on the numbers may or may not be practical.

Need to consider whether to make an allowance for expenses, particularly the cost of undertaking a transfer calculation and any liaison with alternative providers.

The above gives a calculated value which potentially could vary on a daily basis. Consideration could be given to some simplification, e.g. market adjustment to a standard calculation formulae or even a simplified scale which applies provided market returns are within certain parameters

It is important also to compare the resultant figure with the assets actually held (if any) and their liquidity. For example if it is book reserved, (i.e. no physical assets held) any transfer value would be paid presumably by the company and the company would therefore need to budget for potential cash flow.

Should also consider impact on balance sheet and accounts

### **Advantages and disadvantages of the two approaches**

The present value of the deferred benefits has the merit of objectivity, i.e. the transfer value is directly related to the deferred benefit entitlement. However, given that complicated calculations are required it is unlikely the member would appreciate the connection, and the volume of calculations is complex and time consuming.

The calculation may not be under the direct control of the employer, e.g. trustees in the UK.

There is the possibility that legislation would require more generous benefits to be valued than the company may wish (e.g. including discretionary benefits)

Once calculated the theoretical value of the transfer value changes from day to day.

The amount will either need to be recalculated daily or the figure once quoted will need to be guaranteed and that guarantee is ultimately underwritten by the employer.

The use of twice contributions has the merit of simplicity and the employee can directly see the value in relation to contributions they have personally made.

However, it is unlikely it will represent the true value (either more or less) of the actual deferred benefits and there will therefore be either gain or loss to the member (vice versa for the employer) on making the transfer election and it is likely that employees would exercise it to their advantage only.

In particular no allowance is made for investment return although if younger members transfer out shortly after leaving the practical effect will be marginal.

*Part (i) was generally answered well although comments from the member's point of view were light.*

*Part (ii) was fairly poorly answered. Candidates often wrote little more than for Part (i), despite the difference in marks available, and confined comments to a comparison between existing and new staff and a brief comment on money purchase alternatives. Better candidates recognised that there were ways in which defined benefits might be provided cost effectively and practically e.g. vesting the benefit only on completion of 10 years service. The best candidates also recognised that the state may provide adequate benefit and therefore generous company provision was not necessary.*

*In Part (iii), those candidates who structured their answer logically, and the question was worded to guide candidates to a possible structure, scored reasonably well. Many answers concentrated on only one topic (in particular best estimate versus valuation basis) and were presented poorly. A surprising number of candidates made no attempt to avoid jargon and technical expressions therefore, receiving none of the marks available for drafting.*