

REPORT OF THE BOARD OF EXAMINERS ON THE EXAMINATIONS HELD IN

April 2002

Subject 304 — Pensions and Other Benefits

Introduction

The attached subject report has been written by the Principal Examiner with the aim of helping candidates. The examiners are mindful that a number of interpretations may be drawn from the syllabus and Core Reading. The questions and comments are based around Core Reading as the interpretation of the syllabus to which the examiners are working. They have however given credit for any alternative approach or interpretation which they consider to be reasonable.

The report does not attempt to offer a specimen solution for each question — that is, a solution that a well prepared candidate might have produced in the time allowed. For most questions substantially more detail is given than would normally be necessary to obtain a clear pass. There can also be valid alternatives which would gain equal marks.

K Forman
Chairman of the Board of Examiners

25 June 2002

EXAMINERS' COMMENTS

Question 1

Answered well

Question 2

Answered reasonably well

Question 3

- (i) *Answered reasonably well*
- (ii) *Answered reasonably well although there was some confusion over whether the ill health benefit was based on company or pensionable service.*
- (iii) *If the candidate produced an answer for part (ii) then reasonable comments were deduced from this answer.*

Question 4

- (i) *Few candidates covered the general issues on "how you would determine a rate". The pros/cons were answered well.*
- (ii) *Many candidates didn't state the obvious assumptions relating to payment frequency of contributions, salary increases and the net interest rate. The DB part of the question was answered well. In the DC part, mistakes tended to be made by candidates who adopted an accumulation rather than a present value approach.*
- (iii) *As above in relation to the accumulation approach. Many candidates forgot to comment.*

Question 5

Very poorly answered. Candidates seem to be caught out by being asked to apply basic bookwork principles to a practical example. Many did not relate their answer to the MD as instructed in the question.

Question 6

- (i) *Answered well although few candidates suggested that it may be appropriate to use different assumptions for the MD.*
- (ii) *Poorly answered. Many candidates missed the fact that the question said there had been no changes to the membership and so spent a couple of pages explaining how to carry out a mortality investigation.*
- (iii) *Answered better than (ii) but still less than half marks scored.*
- (iv) *Answered reasonably well although some candidates still struggled despite this being standard core reading.*

- 1 industry practice?
comparison of salary levels, i.e. overall benefit package
cheaper for employer (alternatively higher level of benefit can be provided at same employer cost)
more complicated administration records to be kept
It is common for schemes to give no benefit if member leaves having completed little service. With a contributory scheme a refund of own contribution (possibly with interest) can be given in these circumstances so members feel they have got some benefit
“sharing” of responsibility between employer and members but
might lead to calls for benefit improvements if surpluses are disclosed as members will feel they have contributed to this
contributory scheme might discourage membership, this should be cheaper for employer but not paternalistic
might reduce ability of employees to invest in other pension arrangements (if overall contribution limit for tax relief purposes)
if tax relief available — may be advantageous
- 2 Any 4 of the following:

Reduce the initial level of benefit payable to a fixed amount or a fraction of salary
Full salary may be more than “adequate” for many individuals
If a fraction of salary is used, may need to place a lower limit on the amount payable to ensure adequate provision for all.
If full salary is paid there is no incentive to return to work when recovered.
If a lower level of income is paid then individuals are more likely to return to work without being forced to. Fewer health checks are then likely to be needed.
Allow a reduction in the benefit after fixed periods or after certain ages
If combined with means tested state benefits adequate provision can be ensured
If employers normally pay retirement pensions then the amounts payable after pension age should be no higher than the amounts payable to employees retiring from active service.
Revise the benefit increase requirement
Salary increases are often higher than the increases in consumer price inflation.
Income requirements are likely to increase in line with consumer price inflation.
Income requirements are not likely to be linked to the performance of any particular employer as reflected in the salary increases it awards.
State provides benefits directly
Finance the benefits by taxation
Direct cost to employers will be reduced as long as the taxation is not just on employers
Reduce the benefit payment period with the state picking up the liability for the remainder
If the state normally pays retirement pensions, the payment period for this benefit should not extend beyond the state pension age.
Require employees to finance part or all of the cost of the benefit
This would reduce the benefit cost but will increase the administration cost.
Change the condition for payment
If the definition is “unable to do own job”, make it “unable to do any job”

or “unable to do any job for which suited by training”
 or for a limited period “unable to do own job” and then one of the other definitions.
 Allow the payment to be proportionately reduced if the individual is able to work but
 only part time or in a job which pays less than their own job.
 Set up an independent medical authority to assess ability to work.

- 3** (i) Membership at any time
 + easy for members so easy for the employer
 scheme open to selection, if join when member becomes aware of
 illness would lead to significant strains
 Medical evidence required
 who will provide medical evidence, plan doctor or employees
 might lead to aggrieved employees
 could be conflicts, better to have plan doctor but additional
 costs involved here:
 + once accepted easy for administrators
 Adjusted benefits
 need to decide on robust scale
 do not want different rules for different people
 more complicated administration
- (ii) Age at entry to employment 25
 Age at entry to plan 40
 Consider retirement at age x

Under the alternative approach the ill-health pension at all ages would
 be:

$$\frac{(65 - 40)}{80} = 31.25\%$$

Company proposal

$$\text{Pension} = \frac{1}{80} \times \left[(x - 40) + \frac{(x - 40)}{(x - 25)} \times (65 - x) \right]$$

x	$x - 40$	$x - 25$	$65 - x$	Pension (%)	Comparison (%)
40	0	15	25	0	0
50	10	25	15	20.00	64
60	20	35	5	28.57	91
65	25	40	0	31.25	100

Appropriate credit was given if company service was used.

As the age at which ill-health retirement approaches the normal
 retirement age of 65, the benefit arising from the company's

proposals moves asymptotically towards the benefit that arises if the member was treated as if he had joined employment and the plan at age 40.

Therefore, company proposal protects scheme from selection problems identified in part (i)

But, less beneficial treatment for longer service employees who do not join plan at first opportunity compared with benefits offered to new employee

Benefit will be quite complicated to explain to members and may give rise to complaints

Cheaper for employer than 1st option in (i) as pension lower

4 (i) Establishing appropriate contribution

What are competitors doing?

What is intention of introducing MP scheme?

Control, reduce costs?

Look at cost of current DB structure at specimen ages of entry and leaving.

Consider different types of leaving, retirement, death, ill-health.

Need to decide on assumptions.

Could use valuation assumptions, but likely to contain margin for prudence.

Better to use best estimate assumptions.

Check practicalities, can payroll cope with different rates for different employees?

What other risk benefits are provided,
for example, wage continuance, death benefits.

Check scale meets any legislative requirements.

Pros/cons of each approach

Single rate for all employees

+ simplicity

+ seen as fair by employees

+ predictable cost (as % of payroll), good for budgeting

– probably over-provision for younger employees

– under-provision for older employees

Age-related scale

+ broadly matches increasing cost of pension provision as age increases

+ may be easier to “sell”

– can be complex, usual to have broad bands

– can lead to criticism from employees

– could be outlawed on ageism grounds in future

– predictability of cost depends upon turnover of employees

– may be disincentive to recruit older employees

– more admin.

Service-related scale

- + rough allowance for increasing cost as service continues
- + age does not impact on costs
- + rewards longer serving employees
- can be complex, usual to have broad bands
- predictability of cost depends upon turnover of employees
- inadequate provision for older recruits
- more admin.

(ii) Present value of contributions (including members):

$$\text{Salary} \times [8\% \times \bar{a}_{40|} + v^5 \times 2\% \times \bar{a}_{35|} + v^{15} \times 2\% \times \bar{a}_{25|} + v^{25} \times 3\% \times \bar{a}_{15|}]$$

$$\text{at interest rate } \frac{1.05}{1.0175} - 1 = 3.2\%$$

Use salary £20,000

$$\begin{aligned} &£20,000 \times [0.08 \times 22.742 + 0.02 \times 0.85428 \times 21.205 + 0.02 \times 0.62345 \\ &\quad \times 17.302 + 0.03 \times 0.455 \times 11.954] \end{aligned}$$

$$= 51,211$$

present value of pension of $1/60^{\text{th}}$ for each year of service

$$= \frac{(65 - 25)}{60} \times v^{40} \times 15 \times 20,000 \text{ also at } 3.2\%$$

$$= \frac{40}{60} \times 0.28367 \times 15 \times 20,000$$

$$= 56,734$$

$$\% \text{ of DB benefit} = \frac{51,211}{56,734} = 90\%$$

(iii) Present value of contribution:

$$20,000 \times [0.08 \times \bar{a}_{17|} + 0.02 \times v^5 \times \bar{a}_{12|} + 0.02 \times v^{15} \times \bar{a}_{2|}] @ 3.2\%$$

$$= 20,000 \times [0.08 \times 13.163 + 0.02 \times 0.85428 \times 9.993 + 0.02 \times 0.62345 \times 1.938]$$

$$= 24,959$$

Present value of DB benefit:

$$= \frac{(42 - 25)}{60} \times v_0^{17} \times v_1^{23} \times 15 \times 20,000$$

v_0 @ 3.2%

v_1 @ 5%

$$= \frac{17}{60} \times 0.58539 \times 0.3255 \times 15 \times 20,000$$

$$= 16,200$$

$$\% \text{ of DB benefit} = \frac{24,959}{16,200}$$

$$= 154\%$$

Comment

Generous scale for a leaver with deferred benefits
if assumptions are borne out
Less generous for long stayers

- (iv) Cost of DB arrangement unknown
will be based on actual salary increases, investment returns,
demographic experience
usual to determine funding position using cautious assumptions as
consequences of things going well is not opposite of bad experience
trustees want to be able to sleep at night so want better than 50/50
chance of money being there to provide benefits
actual cost emerges over time, not affected by funding policy
unless funding affects investment policy
more cautious investment policy likely to lead to lower returns
increasing actual cost of providing benefits
Good characteristics of contribution rate
durable, not tendency to increase over time
stable, can withstand changes in experience (usually want constant
percentage of payroll)
flexibility of contributions to DB scheme
Do not know what ongoing cost of DB arrangement is, 15% might
include a deficiency surcharge
Do not know age of employees — no immediate saving if all over 50
Closure of Scheme to new entrants will increase ongoing contribution
cost as membership ages albeit on a declining payroll.
but average age in MP scheme should be lower
might want to look at aggregate cost of both arrangements
(as % of joint salary roll)
cost may increase in the short term

might have employees not in DB scheme so costs will increase
if these all join MP scheme
DB scheme may be subject to funding legislation.

5

Any insurance costs will involve a contribution to the expenses and profits of the insurer.

The scheme loses out to the extent that these exceed the expenses that the scheme would otherwise suffer, e.g. cost of paying pensions.

May also be appropriate to insure MD's benefits only.

(i) Death benefits — Spouses' pension

The value of the MD's accrued retirement benefits (lump sum, pension and widow's pension) is significant

in absolute terms and as a proportion of the total scheme liabilities.

He has a young wife and the value of the pension payable to her on his death is also significant.

If he dies, these values would largely cancel each other out.

The net impact on the fund would have to be calculated.

If the widow's benefit was insured then there would be a large reduction in scheme liability and a large surplus would be likely to arise

or, if the current valuation reveals a deficit, this deficit may be eliminated.

It may be difficult to get insurance of the required shape, i.e. increasing in line with CPI, higher level for the first year,

so some liability might have to remain with the scheme.

Premiums may be cheap if the actual age of the spouse is not taken into account.

Death benefits — Lump sum

The lump sum, when paid in addition to the widow's pension would be likely to exceed the MD's accrued retirement liability.

Payment of the lump sum would most likely exceed the net contribution income at the time

so assets would have to be sold, possibly when market values are depressed.

Insurance would result in smooth monthly or yearly payments which could be properly budgeted for.

(ii) Benefits at Retirement

The lump sum will have to be paid out at retirement, insurance will have no impact on this.

If the pension benefits are not insured the scheme is vulnerable to the MD living for an unexpectedly long time after he retires,

or his wife surviving him for longer than assumed.

If the pensions are insured then the scheme loses out if they die sooner than assumed by the insurer.

The scheme would have to realise assets to purchase the pensions unless the insurer will accept a transfer of investments.
If a cash sum has to be paid the scheme would be vulnerable to market movements reducing asset values relative to insurance costs.
The scheme might have to consider switching investments into assets that match the investments backing the insurer's pension rates.

6 (i)

Investment return / discount rate
Inflation rate
Salary growth
Rates of mortality pre retirement
post retirement
of spouses
Proportion married at death
Rates of early retirement
Rates of late retirement
if not actuarially neutral benefits
Rates of withdrawal
Rates of new entrants
Assumptions for MD may be different

- (ii) No changes in membership so no demographic investigations possible.
Salary experience
investigate the managing director separately
subdivide remaining membership into homogeneous groups
group by age possibly in 5 year age bands
and / or by length of service
and / or by occupation
In a scheme this size too much subdivision is likely to be inappropriate.
Check with the company or by sampling the data to see if last year's bonus was a one-off event.
(If so) Strip out the effect of the bonus to determine the underlying rate of salary increase.
For each group, calculate $\sqrt{(current\ scheme\ salary \div 1.2 \div scheme\ salary\ 2\ years\ ago)}$
For the MD, calculate $\sqrt{(current\ scheme\ salary \div 1.33 \div scheme\ salary\ 2\ years\ ago)}$
(If not)
For each group, calculate $\sqrt{(current\ scheme\ salary \div scheme\ salary\ 2\ years\ ago)}$
For the MD, calculate $\sqrt{(current\ scheme\ salary \div scheme\ salary\ 2\ years\ ago)}$
Compare with $\sqrt{(sx / s\ x-2)}$ used at last valuation (if known)
Compare the underlying rate of salary increase with consumer price inflation over the two years.

Investment return

Calculate i from $A_0 (1 + i)^2 + C_0 (1 + i)^{1.5} + C_1 (1 + i)^{0.5} = A_2$

Where

A_0 is the value of the assets 2 years ago

A_2 is the value of the assets now

C_0 is contribution income less pension payments in the first year

C_1 is contribution income less pension payments in the second year.

Check with the company if there have been any special contributions or if the contribution payments were not made evenly over each year.

Adjust the above formula to take account of uneven or special payments.

Compare the investment return with consumer price inflation over the two years

and with the investment return assumed at the last valuation

and with the investment return expected based on actual market movements.

Pension increases

Check whether there have been any special pension increases paid.

Compare pension increases paid with consumer price inflation over the two years.

Check to see if there have been any special payments made to pensioners.

If so, ask company if they expect them to be repeated.

- (iii) Inappropriate to assume that there will be no demographic movements in future.

New entrants, withdrawals and early or late retirements:

Ask the company for information

Check previous valuation reports for information.

Mortality:

Consider using population mortality tables (if available)

or mortality tables (if any) available for the relevant industry

or any mortality tables that are available.

Population mortality tables may be the most suitable for spouses' benefits.

If any of the benefits is to be insured then the mortality tables expected to be used by the insurance provider should be allowed for.

Proportions married at death:

Any information from previous valuation reports is likely to be sparse and unusable

Could use whatever statistics e.g. population are available or just assume 100%

Salary:

The last two years experience will give an indication of the relative increase rate relative to consumer price inflation that can be taken into account.

Check previous valuation reports for additional information.

Check with the company if the special bonuses are likely to recur if so, how frequently and at what level

Check what is the likely pattern of the MD's salary over the period to retirement,

this will have a significant impact on the scheme's liabilities.

Ask the company what it expects of general salary increases relative to consumer price inflation.

Investment return:

If the experience over the past two years appears abnormal compared with consumer price inflation or general market returns then an explanation should be sought to determine the reason and whether this will have an impact in future.

Consider economic expectations

especially in relation to consumer price inflation

Consumer Price Inflation:

Consider economic expectations

If the investment return assumption and salary growth assumptions are consistent with this assumption, the absolute value will be of limited significance.

Age difference between members and spouses very relevant for MD.

(iv) Asset Based Discount Rate:

Determine an implied market discount rate for each asset class
fixed interest securities

- redemption yield

- gross or net according to tax position

equities — discount rate implied by current market price and expected dividend and / or

sale proceeds

Discount rate = weighted average of the individual discount rates

= $\frac{1}{2}$ (bond yield + weighted average equity rate)

or could use the distribution of a notional portfolio matching the liabilities.

Bond Yields:

Discount liabilities at bond (redemption) yields

either government bonds or corporate bonds

Could use discount rates that vary over time to reflect the shape of the yield curve.

Derive the market rate of inflation from the difference between the yields on fixed interest and index linked bonds (if available)

Bond Yields Plus Risk Premium:

Adjust bond yields by the addition of a risk premium
either constant or variable
usually variable