EXAMINATION

April 2006

Subject ST4 — Pensions and other Benefits
Specialist Technical

EXAMINERS' REPORT

Introduction

The attached subject report has been written by the Principal Examiner with the aim of helping candidates. 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.

M Flaherty
Chairman of the Board of Examiners

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General comments

Candidates are reminded that they should follow the instructions and, for example, start their answers to each question on a new sheet.

Many candidates answered all the questions in bullet point form, often with just key words, for example legislation. Points were often not explained to demonstrate understanding.

There was some evidence that candidates have a standard list of points to cover questions on certain parts of the syllabus with little attempt at relating their solution to the specifics of the question.

Finally, the examiners have noticed that handwriting standards are falling. It is difficult to give appropriate credit where handwriting is illegible.

Particular points on each of the questions

Q1 *Generally well answered with most candidates noting that mortality rates were likely to be higher than average. Only the better candidates discussed the funding position and appetite to risk.*

Q2 *Many candidates did not attempt to compare the performance of the shares relative to the index.*

Q3 *A standard question which was generally well answered although a surprising number of candidates stated that the purpose of undertaking an ALM was to prevent the scheme from being less than x% funded on a certain basis rather than using it to consider the risk/rewards of different strategies.*

Q4 *Parts (i) and (ii) were generally well answered although easy marks were lost by candidates not defining all the symbols used.*

Only the better candidates scored well on part (iii).

Q5 *The needs of the sponsor and members were well understood but, for shareholders, most candidates restricted their solutions to a commentary on accounting numbers. Only the better candidates covered the needs of Regulators.*

Q6 *Generally well answered although only the better candidates could outline the characteristics of the alternative ways for eliminating a funding deficit.*

Q7 *Candidates struggled with this question. Few appreciated that the directors would want to control the investment policy. Stronger candidates realised that benefits would need to be largely discretionary.*

Q8 *Generally not well answered. Better candidates worked through the list of assumptions commenting on each in turn. Some candidates penalised themselves (through wasting time) by explaining what a best estimate basis was — some even considered other bases.*

1 The scheme is likely to experience higher than average mortality given the industry the members are employed in.
Hence there is likely to be a greater number of deaths and a bigger impact on the scheme.
The scheme is, however, large and mature so the experience should be relatively stable.
However there may be some key members with large death benefits so it may be possible to insure some or all of the benefits of key individuals to reduce the overall risk profile.
How generous are the death benefits i.e. is the liability large relative to the size of the scheme.
Need to consider the impact of any expectation of improved longevity.
Insurers are likely to charge an occupational rating which might make the premiums expensive.
The cost of the insurance over the long term is likely to be similar to the actual claims experience plus the life office expenses, profit and contingency margin.
Hence in the long run self insurance should prove more cost effective
Insuring the benefit will however result in a more even cashflow as there is a greater predictability in the cost of the death benefits.
Experience rating / profit sharing arrangements may be possible to smooth cashflow and still retain any potential profits.
Self insuring all the benefits carries a catastrophe risk which might impair the security of the members' other benefits.
Alternatively it is possible to buy catastrophe cover e.g. stop loss insurance to reduce the risk profile.
Need to consider any "one event" claim limits.
Consider legislation / rules on level of insurance
The spouses' pension is likely to be a significant total liability.
However the payments would be paid over the lifetime of the spouse so the effect of the scheme's cashflow is less of a problem than the lump sum death benefit.
For the older lives (where the most claims are expected) the reserve held is likely to exceed the amount of the death claim.
Need to consider the free cover limits and evidence of health criteria.
Consider lump sum / SDIS separately.
Insurance arrangements need to be regularly reviewed to ensure they remain competitive.
Consider appetite of company to risk
Consider funding position of the scheme.

2 (i) **Advantages**

Over last five years the company's shares have outperformed the index on average.

By around 2.6% p.a. (or 14.4% over 5 years).

If company does well, so should share price and hence pension scheme assets.

Company may be more willing to support pension scheme, if intertwined with investing in company shares.

Disadvantages

Scheme is mature, are equities an appropriate asset?

Lack of independence between the company's fortunes and those of the pension scheme e.g. if company performs badly, share price falls then detrimental effect on scheme assets.

Concentration of risk with $>^1/_6$ in one company's shares.

Scheme 70% funded so could consider trustees already have significant self investment without considering shares

Should trustees be taking such risks with members' benefit security?

Particularly as the size of the scheme could be large relative to the company.

Lack of diversification in the scheme's assets, large holding in one sector/industry.

Company's share price seems much more volatile than overall market.

Are the company shares readily marketable? False or restricted market? Lack of liquidity possibly.

Are trustees complying with any agreed investment principles / guidelines.

May be overriding restrictions on how much of this "self investment" is permissible for any minimum funding assessment.

(ii) Reduce underfunding by extra contributions into assets other than the company shares, thereby reducing 17% figure, without enforced sale of company shares.

Sell some of the company shares, if a liquid market exists.

Move from company shares to company loan stock or preference shares (if they exist) to improve security / credit rating of the self-investment.

Gradual disinvestment of company shares to benefit from pound cost averaging.

Apply to authorities to relax any self-investment limits.

Arrange credit default insurance.

Use derivatives.

Use a book value of company share holding so as to "write down" value and hence not take credit for outperformance in advance.

3 (i) The liability profile — nature & term.
The funding position — is the scheme in surplus allowing greater investment freedom
Or is the scheme in deficit.
The size of the Fund
and whether it is increasing, static or decreasing.
The expected cashflow & liquidity requirements.
Maximising investment return subject risk constraints.
The employer's views on investment policy.
The strength of the employer covenant and its long term commitment to funding the pension scheme.
And/or attitude to risk.
Requirements of any trust deed & rules.
Any legislative constraints.
Active / passive investment considerations.
Management expenses.

(ii) **Objective**

The aim is to project possible cashflows rather than just the average value of those cashflows to help in assessing the risks & rewards of differing asset classes.

Characteristics

The ALM is usually a stochastic model although a deterministic approach can be used.
Set time horizon.
A precise objective of an ALM is needed.
e.g. the highest possible investment return with 90% probability of meeting the funding target over the next 15 years.

The data used in a regular funding valuation is needed
plus full details of the terms for all the options and guarantees
together with the funding method and assumptions used to determine the funding target.
The ALM requires a large number of simulations to be run e.g. 10,000.
An ALM model attaches probabilities to the course of future inflation and investment returns.

Results

The range of possible investment policies is theoretically infinite hence a subset of "optimal" or sensible policies is determined from the model.
These are then tested for robustness under alternative assumptions (sensitivity analysis).

A small number e.g. 3 or 4 investment policies are identified as being sensible under most reasonable sets of assumptions.
It should be noted that derived investment policies should not be regarded as "optimal" other than in the context of the model
and one of the main benefits of the ALM process is to gain a greater understanding of the employers objectives and the nature of the assets and liabilities.

4 (i) What do competitors offer?
Consider the employer's objective — for example encouraging future early retirement to manage the future size of the workforce.
If the options are offered the starting principle is usually that the scheme should not suffer a loss or make a profit.
Need to set the terms of the option by looking at an equation of value of the benefits being provided and the benefits given up
using a basis related to current financial & demographic conditions
allowing for any possible selection against the scheme.
Allowance for any discretionary benefits as appropriate.
Compliance with any legislative requirements.
Should the terms be fixed or change with market conditions.
Need to set eligibility criteria.
E.g. a maximum cash lump sum commutation leaving a minimum residual pension.
E.g. a minimum age for early retirement.
Scheme documentation / trust deed & rules will need to cover the options.
Additional administration time & costs involved in implementing options.
Administrative simplicity is desired.
E.g. adopting smoothed early retirement factors.
Communication to members.
Should the value of the option be reduced to reflect poor funding position at the time of the option.
Should the option be discretionary e.g. requiring the employers (or trustees) consent.

(ii) **Early retirement**

$$Ea_x = Pv^{NRA-x}\frac{l_{NRA}}{l_x}a_{NRA}$$

where

x = age at the point early retirement
NRA = normal retirement age
E = early retirement pension
P = the pension that would be payable from NRA

(iii) **Early retirement**

In practice the factors at each age may be simplified say
to *y*% simple for each year early.
Different scales for early retirement from deferred or active.
Or with/without employer consent.

Transfer value

May allow for market conditions at time of transfer.
Underpin of member contributions?
Best to avoid unnecessarily complex calculations to ease administration.
Consider minimum standards/prescribed basis.
Allow for funding level of scheme.

Commutation

The annuity value may be fixed for long periods
but usually age dependent.
Or may change regularly with market conditions.
Consider non standard circumstances e.g. ill health commutation.
Unisex or sex specific terms.
Encourage cash option as this reduces longevity risk to company.
Consider any statutory limits on factors.

General (credit only once)

Smoothed table for commutation or early retirement
Allowance for discretionary benefits

5 (a) **Sponsor**

Sponsor needs to control the level of costs
and the timing of the costs.
The sponsor may require a reasonably predictable and stable future cost together with considerations of non finance related matters e.g. employer's objective of attracting & retaining good quality staff and other business needs such as reorganisations, mergers downsizing etc.
Understanding the sensitivity to the valuation assumptions used/experience/analysis.
Determination of the funding level and the financial impact of any funding deficits.
Recovery plan to eliminate any deficit.
Contribution rate required for future benefits — i.e. future cashflow requirements.
Decisions on the level future benefits that can be provided and / or benefit design consideration.
Sponsors aim to meet the needs of its current employees in the most cost effective manner.

To aid Investment strategy decisions.
E.g. understanding the risks involved.

(b) **Members**

The benefit structure is defined
so the main issue is the security of the accrued benefits.
The valuation will allow an assessment of the security of the benefits on different bases e.g. insurance buy-out.
Any funding deficit may influence the future provision of the current benefit structure
and the award of any discretionary benefits eg pension increases.
The future contribution rate will allow members to assess the value of the future benefits that are provided.
Aid future financial planning by looking at prospective benefit at retirement or decision on whether to transfer-out to alternative arrangement.

(c) **Shareholders**

Impact of information in company accounts.
This is usually on a "best estimate" of future experience
and hence the impact on the market valuation of the company.
Assessment of the company by potential shareholders.
The company's ability to raise future capital / borrowings.
The requirement and timing of future financial commitments to the pension scheme.
Decisions regarding other major uses of capital in the business.
Possible deferral of tax liabilities.
Pension implications of any mergers and acquisitions.

(d) **Regulators**

The regulator wants a realistic picture of a benefit provider's finances
to ensure security for members.
And ensure adequate steps taken if scheme underfunded.
Valuations may be prescribed or left to actuarial judgement
Compliance with legislation.
Appropriate forms and adequate levels of benefits that are provided
Adequacy of funds backing liabilities.
Calculation of any levies.
Compliance with requirements for any favourable tax treatment.
Reduce the likelihood of any future potential liabilities entering a central discontinuance fund.

6 (i) **Projected Unit Method (PU)**

The actuarial liability is the present value of all benefits accrued at the valuation date by reference to projected final earnings.
The value of the assets will eventually equal the actuarial liability assuming the standard contribution rate has been paid and all the assumptions are borne out in practice.
As such all the past service benefits for members will be covered by the assets held.
The standard contribution rate is found by dividing the present value of all benefits accruing 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 standard contribution rate will be stable if the age, sex and salary distribution of the membership remains constant.
This generally implies a continuing flow of new entrants — note this scheme is closed.
It is possible to incorporate a control period greater than the standard 1 year.

Attained Age Method (AA)

The actuarial liability is the same as under the projected unit method.
But the actuarial liability is not maintained by the payment of the standard contribution rate.
The standard contribution rate is found by dividing the present value of all benefits which will accrue to members after the valuation date, by reference to service after the valuation date and projected final earnings by the present value of total earnings for all members throughout their expected future membership.
The standard contribution rate is higher than the projected unit method provided the average term to retirement is greater than 1 year.
No account is taken of new entrants.
As a result if the scheme is closed to new entrants the contribution rate paid remains stable if the assumption are borne out in practice.
If the scheme remains open to new entrants the method overstates the contribution rate required
because new entrants tend to enter at a younger age than the average age of the existing membership.
hence surplus should result which can be used to reduce AA rate.

(ii) PUC: SCR = $\left[f.S \frac{(1+e)^{NRA-x}}{(1+i)^{NRA-X}} a_{NRA} \div Sa_{\overline{1}|}^{i-e} \right]$

AA: SCR = $\left[f.(NRA-x).S \frac{(1+e)^{NRA-x}}{(1+i)^{NRA-x}} a_{NRA} \div Sa_{\overline{NRA-x}|}^{i-e} \right]$

Where

f	=	pension accrued per year of service as a % of final salary
S	=	current salary/pensionable salary
e	=	annual salary inflation
i	=	valuation rate of interest or discount rate (pre-retirement)
x	=	age at date of valuation
NRA	=	normal retirement age of scheme (or assumed retirement age)
a	=	annuity at NRA (allowing for pension increases and contingent spouse's benefits)

(iii) Estimate the average term to retirement for the active membership (n years).

Set out formula for PUC (1 year)

SCR = $\left[f.S \frac{(1+e)^{n}}{(1+i)^{n}} a_{NRA} \div Sa_{\overline{1}|}^{i-e} \right]$

& AA (n years) where n is the average term to retirement

SCR = $\left[f.nS \frac{(1+e)^{n}}{(1+i)^{n}} a_{NRA} \right] \div Sa_{\overline{n}|}^{i-e}$

Divide one by the other

AA = PUC $\times$ $n \times \frac{a_{\overline{1}|}^{i-e}}{a_{\overline{n}|}^{i-e}}$

Credit was given to candidates that gave a written explanation of how to derive the AA SCR from the PUC SCR.

(iv) **Characteristics of each approach:**

- Capital injection i.e. lump sum payment.
  - Clears deficit quickly if paid at beginning.
  - Thus increases member security.
  - Less secure if paid at end of period.
  - Cashflow lumpy
  - Could be tax relief implications.

- % of salary over a specified fixed term or the remaining lifetime of the active membership.
  - Payments are stable in "real" terms if membership profile constant.
  - Potential problems if membership reduces unexpectedly.

- Payments of specified monetary amounts over a given term which may increase in line with a specified index (e.g. RPI).
  - More appropriate if membership is declining.
  - Not linked to an unknown salary inflation assumption.

7 Assumptions to be made

- That it is the benefit itself which is guaranteed and not a capital sum calculated to be of equal value to the benefit.
- That an insurance market exists so that the benefits can, if desired, be secured with an alternative provider.
- That it will be difficult, if not impossible, for the directors to take out personal insurance (e.g. on the default of the employer) to cover the risks.
- That the bankruptcy system in the country is sufficiently penal that personal bankruptcy is something that individuals will actively seek to avoid.
- Rules exist on liability position for directors who cease to be in office.

The following applies to a company without a State guarantee:

(a) **Funding implications**

- the directors will seek a funding system which gives a very high level of security to the benefits
- so the scheme may be funded with the expectation of a surplus position emerging
- which may be appropriate use of business assets if the tax breaks extend to roll up of investment returns
- particularly if surpluses can be refunded to the employer if they turn out to be unnecessary to pay benefits
- a possible funding basis would be to fund for buy-out costs
- or even stronger if there are remaining unhedged risks relating in particular to investment and mortality
- maximum funding levels might be reduced

(b) **Investment implications**

- system would not be practical unless directors controlled investment policy
- as long as the benefits are sufficiently well funded
- the regime is likely to encourage a very prudent investment strategy
- with a high level of matching of the cash flows expected to be generated by the scheme
- bonds would be the major investment class
- with a preference for government backed securities to avoid the default risk
- tax breaks might make other classes attractive
- The mortality risk still remains
- so insurance policies may be preferred
- ultimately however the employer will need to consider whether the low returns implied by a secure strategy are fully compensated for by the tax breaks offered to set up the scheme in the first place
- if the scheme becomes poorly funded, and the employer is unable to meet the deficit this could encourage a very speculative investment strategy as the directors attempt to avoid the personal obligation

(c) **Benefit design issues**

- it would be sensible for the directors to favour benefit designs where a corresponding matching asset exists
- so final salary schemes are unlikely to be preferred
- low guarantee component with discretionary benefits
- schemes which offer a fixed cash sum at retirement depending on the contributions paid/length of service/other suitable criteria could be suitable
- or schemes which offer a fixed pension (although this is less suitable than cash since there is mortality risk unless this can be laid off to a third party)

(d) **Security issues**

- because of the personal risks involved, the regime is likely to produce benefits which are very secure
- although if the scheme itself couldn't meet the benefit, it is quite likely that the directors will not have the personal wealth necessary to make up the deficit
- so in this situation, members may not receive their full entitlement

8 Financial assumptions

investment returns pre and post-retirement
- consider current asset allocation
- and possible changes to the allocation as the scheme matures
- particularly to match benefits for retired members where bonds are likely to be the best matching asset
- and use market data to support best estimate assumptions for the various asset classes
- taking a blended rate based on the asset allocation to determine the overall assumption

price inflation
- consider market information based on gilt yields
- in particular the difference in yields between fixed interest and index linked gilts
- of appropriate duration
- and strip out any perceived distortion caused by supply and demand impacts on the two markets
- could use government targets

salary inflation
- consider historical information relating to the differential between salary inflation and price inflation for the country as a whole
- and economists forecasts for future improvements in real wealth
- and apply these to the prospects for the industry sectors that the sponsoring employers operate in
- after consulting with the employer and rating agencies/analysts on the prospects for the company itself

pension increases
- what is guaranteed?
- if linked to price inflation, consider in conjunction with price inflation assumption
- consider impact of any caps or collars
- allowance for discretionary increases

statistical assumptions
- different assumptions for different groups (male/female staff/works)

promotional salary scales
- look at actual published pay scales for the employers if these exist
- and the pay differential for employees of different ages, ideally with similar service histories

retirement ages
- consider the actual normal retirement age for the scheme
- and conduct an experience analysis to establish the ages at which members have retired in the past stripping out one off factors
- consider whether early retirements causes strains/profits

- make allowance for any expected early retirement exercises
- and country/industry trends relating to retirement
- possibly looking at political factors too such as changes to the State Pension Age
- consider changes to early retirement terms which might impact on take up rates
- or changes in qualification conditions for ill health retirement cases

withdrawal rates

- conduct an experience analysis to assess the actual ages at which members have withdrawn for membership prior to retirement
- making appropriate allowance for one off factors such as redundancy exercises which might distort the statistics
- and consider the employment market generally e.g. how easy it is for members to find work in the same industry sector
- could allow for any redundancy exercises being considered

mortality rates

- consider pre and post-retirement separately
- the scheme should be big enough to conduct an investigation in to its own mortality experience
- although trends (e.g. improvements) may be difficult to identify reliably
- and so the results should be compared to standard industry tables
- and variations against the standard should be explicable in terms of industry sector etc.

spouses age difference/proportions "married"

- could investigate actual scheme data
- but unlikely to be available
- so probably use census data
- making allowance for changes as the scheme matures

other

- options and guarantees
- need allowance if causes strain on scheme finances
- could include if profitable to scheme
- e.g. commutation
- check for consistency, salary and inflation, etc.
- consider materiality of assumptions

END OF EXAMINERS' REPORT