

EXAMINATION

11 April 2005 (pm)

Subject ST4 — Pensions and other Benefits Specialist Technical

Time allowed: Three hours

INSTRUCTIONS TO THE CANDIDATE

1. *Enter all the candidate and examination details as requested on the front of your answer booklet.*
2. *You have 15 minutes at the start of the examination in which to read the questions. You are strongly encouraged to use this time for reading only, but notes may be made. You then have three hours to complete the paper.*
3. *You must not start writing your answers in the booklet until instructed to do so by the supervisor.*
4. *Mark allocations are shown in brackets.*
5. *Attempt all 6 questions, beginning your answer to each question on a separate sheet.*
6. *Candidates should show calculations where this is appropriate.*

AT THE END OF THE EXAMINATION

Hand in BOTH your answer booklet, with any additional sheets firmly attached, and this question paper.

In addition to this paper you should have available the 2002 edition of the Formulae and Tables and your own electronic calculator.

- 1** The finance director of a very large company operating a defined benefit pension scheme is concerned with the increasing level of premium being paid to insure the death in service benefits provided by the scheme. These benefits are currently:
- A lump sum of five times the member's basic salary.
 - A non-increasing spouse's pension equal to 75% of the member's prospective pension.
- (i) Set out the points you, as actuarial adviser to the company, would include in a letter to the finance director explaining why the premiums may have increased. [3]
- (ii) Suggest possible ways these premiums could be reduced. [4]
- [Total 7]
- 2** You are the actuary to a large defined benefit pension scheme. The trustees are reviewing the scheme's investments and are proposing to switch a large proportion of the assets from equities to bonds.
- (i) Outline the investment characteristics of bonds compared to equities. [5]
- (ii) Outline the possible impact on the members' benefits of the proposed switch to bonds. [2]
- (iii) Set out the factors the trustees should consider when deciding which bonds to invest in. [3]
- (iv) Set out the other issues the trustees should take into account when setting an overall investment objective and making decisions on asset allocation. [3]
- [Total 13]
- 3**
- (i) Outline the features of a market based valuation method that incorporates an equity risk premium and a mark to market method. [4]
- (ii) Describe the main features of valuations for the purposes of a company's formal accounts and outline the main differences between such a valuation and a funding valuation. [4]
- (iii) Discuss the advantages of presenting valuation results using a range of valuation assumptions and producing values for a range of alternative economic scenarios. [6]
- (iv) List the main sections you would expect to find in a funding valuation report. [3]
- [Total 17]

- 4** A member aged 30 left a final salary pension scheme (Scheme A) with an entitlement to a deferred pension. Rather than keeping the deferred pension, he took a transfer value into his new employer's scheme (Scheme B), also a final salary pension scheme. Scheme B provided, in lieu of the transfer value of £20,500, a service credit of 3 years 2 months, incorporating a "value for money" underpin.

The underpin is such that on subsequently leaving Scheme B, the benefits in respect of the service credit will be compared to the original transfer value rolled up with interest at 6% p.a. for the period from date of receipt of the transferred in amount to the date of subsequent exit. The higher of the value of the service credit on the then current transfer value basis and the value of the underpin will be granted.

- (i) When the member left Scheme A he had 5 years' pensionable service. Outline possible reasons why the service credit provided by Scheme B is less than 5 years. [5]
 - (ii) After 8 years' pensionable service as a member under Scheme B, the member then leaves that Scheme and requests another transfer value of his benefits. If the transfer value in respect of the 8 years' pensionable service is £68,000, calculate the total transfer value available, assuming that Scheme B is fully funded on a transfer value basis. [2]
 - (iii) Describe in what circumstances the value for money underpin is likely to apply. [3]
 - (iv) Discuss the principal factors to take into account in setting the investment strategy for Scheme B, including reference to the value for money underpin. [6]
- [Total 16]

5 An employer offering a final salary pension scheme is proposing for the first time to allow scheme members to pay additional voluntary contributions (AVCs) in order to enhance their scheme benefits. As actuary to the scheme, you have been asked to advise on the following possible options:

- Option 1 — Contributions are invested in a series of individual money purchase accounts separate from the main scheme assets.
- Option 2 — A regular contribution, expressed as a percentage of pensionable salary and payable until normal pension age, purchases a fixed number of “added days” of pensionable service.

For each of these options:

- (i) Discuss the advantages and disadvantages from the point of view of the scheme sponsor and the scheme members respectively. [8]
 - (ii) Discuss how the AVC payments might be invested. [3]
 - (iii) Suggest the information which should be disclosed to scheme members each year. [4]
 - (iv) Set out any practical issues which the trustees will need to consider when determining the terms offered to scheme members. [4]
- [Total 19]

6 You are the Scheme Actuary to a defined benefit retirement and death benefit scheme which will close to new members with effect from 1 January 2006. The employer has indicated that they intend to set up a defined contribution (DC) section for all employees who join on or after this date (existing active members will continue to earn benefits in the defined benefit section).

Describe how you could help the employer implement and maintain the DC Scheme, giving examples of the issues faced and decisions to be taken.

Your answer should cover the following aspects:

- (i) the preferences of the interested parties [7]
 - (ii) the risks associated with the DC scheme [3]
 - (iii) design options and process [12]
 - (iv) ongoing monitoring [6]
- [Total 28]

END OF PAPER

EXAMINATION

April 2005

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**

28 June 2005

- 1** (i) Any comment about the recent relationship of premiums to claims.
The number of members insured give a reasonably stable base for claims experience.
Current provider may no longer be competitive.
Salary roll increases
Number of members increased
Ageing of membership
Change in insurance pricing structure
Changed Market conditions have made insuring spouses' pensions a lot more expensive
Improving longevity might have increased the cost of insuring spouse's pension.
- (ii) Reduce benefits
5 times basic salary is top of the range for lump sum benefit. Check your peer group.
Is there scope to reduce this to 3 times basic without causing employee relation problems?
Consider scope to reduce 75% spouse's pension, probably high relative to peer group.
Suggest market review.
Following results of review, can examine self-insuring; in particular spouse's pension.
But cash flow may be an issue if lots of deaths over a short period.
Cash flow strain for spouse's pension is limited as pension paid over a period of time.
No significant extra administrative expense of paying spouse's pensions — as other pensions paid from the Scheme.
but self insurance increases risk to the Company
Consider catastrophe cover.
Have members met part of the cost?
Perhaps on a flexible benefits basis

Reasonably well answered. In (ii) many candidates only covered reducing benefits. Only the better candidates mentioned catastrophe cover.

2 (i) Bonds

Government backed — low default risk
Company issued — default risk varies depending on rating of company
Income fixed in monetary terms
or in real terms (e.g. index linked)
Defined levels of capital redemption on defined dates
High volatility in real terms
Bonds usually have a lower default risk than equities
Lower dealing costs
Lower expected return
Can be liquidity issues for company stock

Equities

Less certainty about the levels of income

Income (dividends) depends on the profitability of the relevant company
Do not provide any capital redemption proceeds
Capital can only be redeemed by sale on the open market
Market values of equities are generally more volatile than bonds

- (ii) The benefits are “defined” therefore benefits payable should be unchanged
Increased security of accrued benefits
Especially for pensions in payment and deferred pensions
Sponsoring employer may have to pay increased contributions in the long run
and /or the employee’s contribution rate may be increased
Therefore possible lower security for future benefit accrual
ultimately loss of future accrual
And possible lower job security for active members
Reduces chance of discretionary benefits
Less chance of discretionary benefits.
- (iii) Investing in bonds without taking account of the details of the liabilities can
leave substantial mismatch risks

For example:
Currency risks
nature of liabilities (fixed or index linked)
Duration risk if the term of the liability exceeds that of the bonds

Scheme specifics include:
Size of the fund and likely to increase or decrease
Size of employer
Is the scheme closed to new entrants
Likely changes to the liability profile in the short, medium or long term
What are the expected cashflows for benefit outgo
The current funding position
decision on company/government bonds

- (iv) Need to consider the views of the scheme sponsor
and the impact on the employer’s future contribution rate
Do the trustees have the necessary skills, information and resources to
make effective decisions — may need training or more advice
In particular the willingness to accept under performance due to market
conditions
The importance of strategic allocation decision depends on the contribution it
can make to the fund’s investment objective
Legislative constraints and guidelines
Liquidity and marketability considerations
Diversification
The expected total return on the assets taking account of their attitude to risk
consider ALM study

Generally the best answered question, with better candidates noting that size of scheme relative to sponsor is relevant. Surprisingly, few candidates noted in part (ii) that benefits are defined so not directly affected by the investment strategy.

3 (i) Market based valuation with equity risk premium

Assets taken at market value

A “market value” of the liabilities is needed to ensure consistency
Liabilities are valued using a discount rate based on bond yields
representing a “risk free rate of return”
plus a constant or variable addition
to take account of the returns expected on other asset classes

The equity risk premium can be derived from market information and /or
actuarial judgement

Taking account of the extra return from equities may be considered unsound
unless account is also taken of the extra risks associated with equities

Mark to Market

The inflation rate, discount rate and related assumptions are derived solely
from market information

Liabilities are discounted at bond yields
The bond yield may be based on government bonds
Or corporate bond yields adjusted for any credit risk
The discount rate may vary over time to reflect the shape of the yield curve
The market rate of inflation is derived from as the difference between the
yields on fixed interest and index linked bonds

(ii) Financial reporting valuations

Provides audited information about a company to the outside world
Enables the financial significance of the pension benefit obligation to be
assessed
Recognises the realistic costs of accruing benefits
Consistency from year to year
Avoids distortions from fluctuations in the flow of contributions
A number of disclosure requirements are usually required
e.g. elements of basis, actuarial method etc.
Basis/method may be prescribed

Funding valuations

The main purpose of funding valuation is to provide advice about the future
level of contributions
There is no single definitive methodology and various methods are used by
actuaries to set the discount rate when valuing assets and liabilities
It is common for valuation assumptions to be relatively cautious
Might include allowance for discretionary benefits
Objectives for funding valuations include
Assessing the degree of security for the benefits

Reviewing the financial progress since the previous valuation using the actuarial control cycle
Part of the purpose of the valuation may be to determine an appropriate investment policy

- (iii) The Actuary can never be certain that a set of assumptions will be “correct” so the valuation may simply be a “best estimate” of future experience
A “best estimate” valuation may not always be appropriate
A more cautious, or possibly more optimistic, view may be more suitable e.g. by building in contingency margins / prudence
Presenting a range of values may be more useful in making decisions about the future of the scheme
If the financial commitment is a long term one a “worst case” scenario should be considered
Looking at alternative scenarios looks at whole sale differences in assumptions e.g. recession scenario with low growth and low inflation or boom (high growth and moderate inflation)
Trustees and sponsors can make their own judgements (i.e. no probability assigned)
Helps value guarantees
Aids understanding of the risks of the scheme
Employer planning looks at different trading conditions (i.e. scenarios)
Shows the sensitivity or otherwise to certain assumptions as altering assumptions (sensitivity analysis) shows the impact of changing a few key assumptions
May impact future benefit design (e.g. improvements)
And may be useful in determining an investment policy
Assessing security levels
Negotiations with employees or representative
Or mergers and acquisitions
- (iv) Basic information, eg liability data, assets, benefits
Inter-valuation period events
Funding objectives
Valuation assumptions and method
Statement of economic and demographic assumptions
Contribution rate recommendation
Funding levels
Reconciliation

Under (i) some candidates tried to describe a method that incorporates both equity risk premiums and mark to market.

Under (ii) only the better candidates commented on the fundamental difference between the two valuations.

Parts (iii) and (iv) were not well answered.

- 4** (i) Salary increased on moving employer.
Transfer-in basis assumes future salary increases at a rate higher than the increases to the deferred pension in Scheme A.
Different actuarial assumptions, tv out to tv in.

Transfer value out may have been reduced to take account of Scheme A underfunding.

Expenses of calculation allowed for in one or both calculations.

Differences in benefit structure Scheme A vs. Scheme B, with B scale more generous.

For example, lower NRA, higher accrual rate, higher pension increases, better FPS definition etc. in B.

Cost of underpin guarantee allowed for in service credit calculation

- (ii) £68,000 for 8 years, so $3^{2/12}$ credit worth $3^{2/12}/8 \times £68,000 = £26,917$

But underpin = $£20,500 \times 1.06^8 = £32,674$

Underpin > basic value of credit, so total transfer value available
= $£68,000 + £32,674 = £100,674$

- (iii) If salary increases were not as high as anticipated then the credit was understated.

Likely if member only completed a short period of pensionable service in scheme B, whilst period to NRA much greater.

Ordinary TV basis for Scheme B being cut back to allow for underfunding

The service credit calculation allowed for a low rate of return, < 6% p.a.

Market movements combined with a market related tv out basis.

For example, equity based tv basis and falls in equity values leads to a fall in tv out values.

High discount rate on transfer out calculation, > 6%.

- (iv) **General**

Nature of liabilities — term, currency, real/fixed etc.

Nature of available assets — term, currency, real / fixed, marketability, diversity etc.

Cash flow considerations

Attitude to risk of trustees / sponsor

Covenant of sponsoring company

Overall fund size

Funding level — surplus or deficit.

Fully funded on tv basis, so may be well enough funded to have fair degree of investment freedom.

Underpin

How many transfers in? Are they significant in total amount?

Cannot match service credit liability and guarantee at same time (except perhaps with derivatives).

Generally well answered, although in (i) very few candidates mentioned that the individual's salary probably increased on switching employers.

Under (ii), the most common error was assuming the 8 years included the service credit.

Most candidates struggled with (iii).

Some candidates only discussed investing for the underpin in (iv). Very few candidates realised that there is not a perfect match to the underpin – most said that the assets should be invested in fixed 6% bonds.

5 (i) Option 1

Advantages

Separate pot, not affected by funding position of main scheme (*member*)
Choice of funds, e.g. low / high risk, possibility of ethical investments (*member*)
Flexibility in form of benefits (*member*)
Member bears risks pre and post retirement (*sponsor*):
 Such as investment
 Mortality
 Expenses

Disadvantages

Possibility of poor investment performance (*member*)
Need to administer investment pots (but could possibly subcontract to insurance company) (*sponsor*)

Option 2

Advantages

Contributions maintained in real terms (*sponsor*)
Easy for member to assess cost of topping up the main scheme benefits (*member / sponsor*)
Likely to be popular with members (*member/ sponsor*)
Aids retirement planning

Disadvantages

Assumptions prove to be too optimistic (*sponsor bears risks*)
Or pessimistic (*member gets poor value for money*)
With additional dimension of salary risk (*member may get poor value if salary increases less than assumed*)
Decisions required on treatment of AVC entitlements if scheme is subsequently altered (e.g. change in pension age) (*sponsor*)
Or, specifically, improved (e.g. are the added years eligible for discretionary increases) (*sponsor*)
Leading to possible complexities in the administration (*sponsor*)
And the need to explain / justify the position to scheme members (*sponsor*)
Investment likely to be pooled, so possibility of benefits being cut back if funding position poor, e.g. on discontinuance (*member*)
Potentially expensive if “added days” granted in all circumstances (e.g. enhanced early retirement / ill- health) (*sponsor*)
Potentially poor benefits on leaving service, unless benefits revalued to pension age (*member*)

(ii) Option 1

Invested in individual pots, with choice of different investment funds
E.g. with a third party such as an insurance company
Or administered by the trustees but segregated from the main scheme assets
Protects AVCs from a poor funding position in the main scheme
But subject to satisfactory monitoring of the solvency / performance of any third party

Option 2

Likely to be invested in with the main fund assets
So that there is a pooling of risks with the main fund

(iii) **Option 1**

Current fund value
How monies invested / name of investment manager
Contributions paid in year
Projected fund at pension age
Projected member's pension
Based on current fund
And allowing for future contributions at current level
Method to adjust amounts to current monetary terms
Current death benefit
Sensitivity tests

Option 2

Current pensionable salary
Current no of "added days" allowing for future contributions at current level
And equivalent benefit in monetary terms based on current pensionable salary
Summary of ancillary benefits
Comment on funding position of scheme if likely to affect entitlement

(iv) **Option 1**

Minimum level of initial contributions / increments
Range of fund options
Terms for switching between funds (e.g. timing / minimum switch amounts)
Availability of investment advice to discuss investment / switching issues
Legislative constraints

Option 2

Setting and monitoring appropriate assumptions
Assumptions need to be best estimates,
I.e. not too optimistic (so disadvantaging the scheme)
Or pessimistic (so disadvantaging the member)
Minimum level of initial contributions / increments
Determining how the "added days" are treated if member given generous early retirement or ill-health benefits

Generally, a straightforward question which, apart from (iv), was reasonably well answered. Only the better candidates mentioned the salary risk under option 2 in (i). Under (iv), only the better candidates noted that assumptions would be needed for option 2 and considered the possible restrictions for option 1.

- 6** (i) Meet the needs of the interested parties:
- the sponsoring employer
 - members and their dependants
 - government and regulatory authorities

Preferences of sponsoring employer are likely to include:

- acceptable level of cost
- predictable/stable cost in future
- attract and retain suitable staff
- provide competitive benefits by the standard of the employer's industry
- avoid future moral obligations to former employees
- simplicity of administration
- tax efficiency

Preferences of members and their dependants:

- providing a target level of income in retirement
-and financial protection to dependants on death before/after retirement
- affordability whilst in employment
- adequate information on which to base decisions on
.....how much (whether?) to contribute
.... planning for retirement etc.
- flexibility of scheme benefits

Preferences of government / regulators etc:

- encourage appropriate levels and forms of provision
- ensure adequate levels of provision
- ensure secure provision

- (ii) Risks:

There is uncertainty for the member over the level of benefits, which may be less valuable than they expected for a number of reasons:

- not enough money was put in the first place
- investment returns were lower than expected
- annuity purchase terms were worse than expected
- ...due to lower interest rates
- ...and increased life expectancy
- impact of inflation on purchasing power was not understood

Whilst most of the risks that are borne by the employer in a DB scheme are transferred to the member for a DC scheme, there may be a knock-on impact on the employer if members can't afford to retire or get much lower benefits than expected.

(iii) **Design options and process**

As actuary I can use various actuarial models to consider alternative design / financing options.

If you are looking to target levels of benefit, use models which illustrate the level of member and employer contributions needed based on appropriate assumptions.

Similarly, if the level of contribution is specified in advance, I can use these models to project the benefits that are likely to emerge.

Actuarial input is necessary in setting the assumptions for use in these models.

For example:

- investment returns
- inflation
- salary growth
- annuity purchase prices

Can test the sensitivity of the required contributions / expected benefits to changes in the assumptions.

Stochastic modelling can also help illustrate the potential variability of the benefits which will emerge.

Specific DC design issues which need to be addressed:

- Eligibility criteria
e.g. age, period of employment, type of work, hours worked
- Retirement age — i.e. for DC, age at employer contributions stop
- Split of member/employer contributions
- Will member contributions be the same for all members?
- Will contributions (member and/or employer) be flat or age/service related?
- Will employer match optional member contributions (to a specified level)?
- How will expenses be met — from funds or by employer?
- Interaction with state benefits (if any)?
- What options will be offered?
- How does target benefits compare with existing scheme?

The actuarial models described can also show the impact on the employer cost over time due to any age/service related scales and contribution matching.

Given that investment return directly affects the level of members' funds/benefits for DC,

....actuarial advice will also be valuable in determining which investment options are to be offered to members.

Investment issues which need to be considered are:

- the risk / return balance
- tax efficiency
- expected level of income / capital
- level of management expenses
- range of options to be offered to members
- what default investment options are offered for members who don't make a decision

Members may be able to choose form of benefits:

- amount taken as cash (tax-free) and pension
- whether dependant's pension is purchased on retirement
- level of pension increases

Advice may be appropriate on any constraints imposed by legislation or the sponsoring employer on these options.

Should members be offered the facility to secure pension within the scheme?

If so, actuarial advice is needed on appropriate terms.

Need to consider what level of non-retirement benefits will be provided.

(iv) **Ongoing Monitoring**

Need to provide members with information about their entitlements

- to ensure they make adequate provision
- to ensure members understand the risks they are taken
- to manage members' expectations

Also enables the employer to check that their objectives are being met.

- In particular, are funds on target to deliver original benefit targets?
- Will members be able to afford to retire at the age at which the employer wishes them to do so?

Also monitor provider to ensure competitive

Items to be disclosed include:

- current funds
- levels of contribution
- projected benefits on one or more sets of assumptions
- the assumptions used, including any benefit options
- impact of inflation on purchasing power of funds
- annuity conversion terms where appropriate

May be required:

- on commencement
- annually
- on leaving service etc.

Legislative requirements / professional guidance may:

- specify frequency and contents of disclosure
- specify (the range of) assumptions to be used
- require formal “valuations” to check project benefits won’t exceed limits

It appeared that candidates had not allowed sufficient time for this long question.

Parts (i) and (ii) were generally well answered. Under (ii), only the better candidates considered the role of the actuary and all areas of the scheme design rather than just contribution levels.

Under (iv), few candidates considered the information to be disclosed to members.

Overall comments

Most candidates did well on the bookwork questions. Where application of knowledge was required, there was a clear difference between the stronger and weaker candidates.

Too many candidates did not structure their answers, particularly for the longer questions, and therefore focused on the same issue far too long. Candidates should note that in any particular question they only get credit for a point once however many ways they find of repeating themselves.

EXAMINATION

12 September 2005 (pm)

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1 For each of the main types of investment classes in which trustees might consider investing pension fund monies, outline the possible disadvantages associated with that investment class from the point of view of the scheme trustees. [6]

2 You are the actuary to a large defined benefit pension scheme. The trustees have requested you to prepare a short paper explaining how the various financial assumptions will be determined for the forthcoming triennial actuarial valuation to determine a recommended contribution rate.

Set out the points you would include in your paper. [7]

3 The government of a developing country is considering setting standards for the disclosure of information regarding pensions liabilities in company accounts.

(i) State why such standards may be desirable. [3]

(ii) List the main items which might be disclosed in respect of a final salary pension scheme. [5]

[Total 8]

4 You are the actuary to a non-contributory final salary pension scheme and the following information is available to you.

<i>Valuation as at</i>	<i>1 January 2002</i>	<i>1 January 2005</i>
	<i>£m</i>	<i>£m</i>
Assets	80	75
Liabilities:		
Actives	40	57
Deferred Pensioners	8	9
Current Pensioners	12	11
Surplus/(Deficit)	20	(2)

As a result of the surplus disclosed by the 2002 valuation, the employer did not pay any contributions to the Scheme during the intervaluation period.

The financial basis used for both valuations is summarised below:

	<i>% p.a.</i>
Interest Rate	= 5.5
Salary Increases	= 4.0
Price Inflation	= 3.0
Pension Increases	= 3.0

The following additional information is available:

- Benefit accrual is 1/60ths of pensionable salary for each year of service.
- Normal Retirement Age (NRA) = 65 years
- Annuity at NRA = 18
- Average age of active members at 1 January 2002 = 45 years
- Total pensionable salaries at 1 January 2002 = £10m p.a.
- Total pensions in payment at 1 January 2002 = £1m p.a.
- There have been no changes to the membership over the intervaluation period, in particular no members have left service, retired or died.

Calculate the total approximate actuarial gain/loss arising over the intervaluation period in relation to:

- Actives
- Current Pensioners
- Contributions
- Investments

[8]

5 You are an actuary advising the senior management of an investment bank in setting up a new defined contribution scheme for new employees instead of the current defined benefit pension scheme. Set out the various design issues you will discuss with your client before preparing the report. [10]

6 You have been instructed by the professional physical sports association (which covers football, rugby, hockey and lacrosse) of a developing country to advise on the establishment of an industry wide healthcare scheme for players, coaches and managers.

(i) List the benefits that such a scheme might offer. [4]

(ii) Set out the particular characteristics of the potential membership, and how these might impact on the design of the scheme. [8]

[Total 12]

- 7** The government of a country is reviewing its State provided retirement benefits scheme, which was first set up 20 years ago. The review has been prompted as the cost of the current scheme is proving an increasing burden on the State's finances.

The Scheme provides a flat rate pension at age 60, which is payable for life and available to all citizens who have paid at least 10 years' State retirement contributions (at a rate of 3% of wages).

The benefit was set at a level equivalent to 40% of national average wages when the system was set up; since then the flat rate has been adjusted annually in line with the State measure of price inflation.

- (i) Suggest possible reasons for the increasing cost burden. [4]
 - (ii) Discuss the measures the State could introduce to alleviate the problem highlighting any difficulties that might be encountered in implementing the proposed new measures. [8]
- [Total 12]

- 8** The human resource (HR) director of a large employer has decided that "all benefits should be offered on a fully flexible basis" so that the employee can choose the design of ancillary benefits offered to supplement his/her basic salary. The employee will be able to spend a fixed percentage of basic salary on such ancillary benefits.

The employer is committed to continue to offer its defined benefit scheme which provides pension and life assurance benefits to existing staff and new entrants. The defined benefit scheme will fall within the scope of the flexible benefit arrangements, and you have been asked to advise the HR director how the scheme's benefits could fit into the flexible benefits package.

Set out the points you would cover when offering your advice, in relation to:

- (a) benefits on retirement
- (b) other benefits [16]

- 9** You are the actuary to a defined benefit pension scheme. The trustees are reviewing the current benefits available on transfer from the scheme.
- (i) Outline the issues that should be considered when setting the terms for transfer values. [4]
- (ii) Discuss the key features of the following possible methods of setting transfer values:
- using a prescribed transfer value basis
 - using an approach based on scheme specifics and allowing actuarial judgement
 - using a method reflecting the likely expectations and requirements of the individual members
- [9]
- (iii) Outline the advantages and disadvantages of using a method of calculating transfer values that produces transfer values within a narrow range for members of different schemes with similar benefit structures, periods of service and salary levels. [3]
- (iv) The trustees have questioned why the transfer value for a member 5 years from his normal retirement date differs from the recently quoted immediate annuity cost of the alternative early retirement benefit. Set out the points you would make in your reply. [5]
- [Total 21]

END OF PAPER

EXAMINATION

September 2005

Subject ST4 — Pensions and other Benefits Specialist Technical

EXAMINERS' REPORT

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M Flaherty
Chairman of the Board of Examiners

29 November 2005

Examiners' comments

Question 1

Generally well answered. Some candidates did not mention the need to link the characteristics of the assets with those of the liabilities.

Question 2

Generally well answered. Few candidates mentioned how to treat different types of pension increases. A surprising number of candidates extended their answers to cover demographic assumptions.

Question 3

Generally well answered, although some candidates restricted their ability to gain marks by only considering the position of only one of the parties.

Question 4

Candidates found this question stretching, although they should have been familiar with the underlying principles, and only a few scored well. Common errors were to ignore the accrual for active members, to adjust values between the two valuations at the wrong rate of interest (or make no allowance at all for interest), or to assume that because there were no contributions during the inter-valuation period, there was no contribution loss.

Question 5

Generally well answered.

Question 6

Poorly answered. Some candidates mentioned death benefits which went beyond the scope of the question. In part (ii), many candidates failed to link the characteristics of the membership with the scheme design. Very few candidates recognised the potential role of the employer in the scheme.

Question 7

Generally well answered

Question 8

Although many of the themes of this question are standard, the unfamiliar context caught most candidates off guard.

Part (i)

Only a small number of candidates developed their answer by mentioning the different accrual rates that might be offered.

Part (ii)

Many candidates mentioned benefits such as holidays which went beyond the scope of the question. Most candidates failed to pick up the marks available for discussing selection issues.

Question 9

Reasonably well answered, although most candidates failed to assume that 'member expectations' should be considered to be realistic

Part (ii)

Few candidates mentioned the difficulties of monitoring compliance.

Part (iv)

Some candidates failed to realise that the scheme actuary would not be responsible for the basis underlying the immediate annuity cost.

1 Fixed interest bonds

Lack of suitable range of stocks to match liabilities
E.g. to match salary increases
Or term of liabilities
May give poor return compared to other investments over the longer term
Possible default risk on corporate bonds
Currency risk if overseas bonds

Index linked bonds

Similar to fixed interest but better if real pension increases etc.

Property

May not readily match liabilities
Not readily marketable
'Lumpy' investments
Need to allow for voids

Equity

Potentially volatile income and capital value
May not appreciate sufficiently to match increase in salary related liabilities
Shares may become valueless if company hits poor trading/goes into liquidation
Overseas investments have potential currency risk
May not be a satisfactory match for pensioner liabilities
Or other liabilities fixed in monetary terms

Cash

A poor match for most scheme liabilities
Likely to give a poor return compared to other investments over the longer term

2 Price inflation

Two key figures available from market conditions at valn. date:

- Yields on FI/IL gilts
- Market expectation of inflation
- Expected inflation can be measured by difference in yields on fixed interest and IL gilts — say 3% p.a.

Salary increases

- Discuss with employer their plans for salary increases — usually be in the range of ½%–3% p.a. real.
- Consider also include an allowance for merit/promotion — perhaps a separate scale.

Pension increases

- Guaranteed pension increases. Apply appropriate rate if fixed
- if RPI use around price inflation as derived earlier
- if LPI could use price inflation less a small margin e.g. 0.25% lower
- In the event there are no guaranteed increases check for history of discretionary increases. Apply appropriate rate depending on history and current market conditions — if say 70% of RPI then use 2.25% p.a.

Investment return/discount rate

- Consider asset strategy
- The least risk approach for pension funds is to invest in fixed interest gilts or index linked gilts.
- The discount rate could therefore be based on FI/IL Gilts — say around 5% p.a.
- If part of the assets are invested in equities then allowance can be made for higher expected returns — around 2%–3% p.a. (the equity risk premium)
- resulting in a discount rate of 7%–8% for pre retirement and 5% for post retirement.
- Review liability profile.... If mature scheme then allowance for equity risk premium likely to be limited.

Overall

- The assumptions have to be reasonable, prudent and consistent with each other.
- Assumptions will have to be discussed with Trustees and most likely employer.
- Consider any statutory constraints.
- Consider last times basis/approach.
- Results will be provided using higher/lower discount rate and salary increases to provide sensitivity analysis.

- 3** (i) Owners and potential owners of capital to be aware of financial significance of benefit obligations
So that readers of accounts/analysts can form a realistic opinion of the company's current financial position
And likely future financial position
To give realistic cost of benefit accrual
Which may not be apparent from the contributions actually paid
Which may be irregular
E.g. due to temporary reduction in contributions or special payments
Consistency in accounting from year to year

- (ii) The actuarial method
The key assumptions
E.g. salary increases, investment return,
Value of liabilities accruing over the year
Change in value of past service liabilities
How assets invested
Investment return on assets
Surplus/deficit over the year
The change in surplus/deficit over the year
The pension cost for directors
The impact of any changes in the basis of benefits
E.g. review of pension in payment
Other augmentations, e.g. for directors
Or augmentations granted on early retirement
The contributions paid (employer/employee)
And whether these were in accordance with an actuarial recommendation

- 4** (i) PUC rate for active members $\frac{1}{60} \times \left(\frac{1.04}{1.055} \right)^{20} \times 18 = 22.5\%$
No membership change so average age and hence PU rate will have increased since last valuation.

Expected Active Liability

$$= 40 \times (1.055)^3 + .0225 \times 10 \times (1.055)^3 \times 3$$

$$= £47.0 + £7.9 = £54.9 \text{ million}$$

Actual Actives Liability = £57 million

Active Loss = £2.1 million

(ii) Expected Pensioners Liability

$$= 12 \times (1.055)^3 - 3 \times 1 \times (1.03)^{1.5} \times (1.055)^{1.5}$$

$$= £14.1 - £3.4 = £10.7 \text{ million}$$

Actual Pensioners Liability = £11 million

Loss = £0.3 million

(iii) Contribution Loss

$$= 22.5\% \times 10 \times (1.04)^{1\frac{1}{2}} \times (1.055)^{1\frac{1}{2}} \times 3$$

$$= £7.8 \text{ million}$$

(iv) Expected Assets

$$= 80 \times (1.055)^3 - 1 \times 3 \times (1.03)^{1.5} \times (1.055)^{1.5}$$

$$= £93.9 - £3.4 = £90.5 \text{ million}$$

Actual Assets = £75 million

Asset Loss = £15.5 million

5 Issues to be discussed:

- Why are you opting for a DC Scheme?
- Past History e.g. design, cost of DB scheme
- Are you considering the proposed scheme as part of your total remuneration package or in isolation?
- Comparison with benefits for current employees
- Comparison with package offered by competitors
- Any Global pension policy?
- Employee Profile, likely no. of new hires, take-up rate etc.
- Targeted population, eg different scales for different elements of the workforce (dealers/clerical, execs/junior).
- Range of Income Replacement Ratio targeted.
- or possibly target DB benefits
- to avoid different remuneration packages for 2 people doing same job.
- Any cost constraints?
- Sophistication of payroll system. Can it handle age and service related contribution rates?
- Range of Investment options required.
- Any higher risk options required? In particular, would investment professionals expect access to higher risk options?
- Frequency of review of investment options for members

- Internet access for members and/or Bank
- Bundled or Unbundled approach to administration/investment/insurance
- Facility of on-line projections for members.
- Death in service benefits
- Incapacity benefits
- Part of Flexible benefits package?
- Initial and ongoing communication
- Union agreements/ contractual issues/employee expectations
- Salary definition on which contributions based (include bonuses?)
- Will members contribute?
- Flat rates or a company “matching” approach to contributions
- annuity purchase at retirement or pension through scheme?
- Options available if through scheme
- Member expectations
- Member understanding of investment and pension issues
- Note not all employees will be investment experts
- Offer default investment option?
- Impact of proposed Scheme benefits on means tested State benefits

6 (i) The benefits to be offered might include:

- medical assistance on injury
- loss of earnings cover to the individual
- possibly payable to the players club — as compensation for loss of services
- lump sum on specified accidents (e.g. broken leg)
- long term medical care, if career is terminated through injury
- rehabilitation treatment
- physiotherapy treatment courses
- continuation option if temporarily out of work
- continuation option if employed abroad

(ii) Sportsmen and sportswomen have the following characteristics:

- a short expected working lifetime
- a huge variation of earnings between successful and average players
- a high level of injury during a playing career
- increasing international mobility
- a high incidence of transfers between playing clubs
- a possibility of continued employment within the sport as a coach or manager
- a low level of job security particularly as a coach or manager
- a “value” to their employer which is often very different to their current level of earnings
- a “glamorous” lifestyle which can have an adverse health impact
- but an occupation where selection will mean that the population is fundamentally “healthy” in the first place

This could impact on the scheme design as follows:

- Choose type of cover — i.e. injuries sustained during playing/training included, exclude general health problems perhaps, exclude self inflicted health problems.
- Industry wide good to ensure minimum level of cover if employed by member club but unlikely to meet full requirements of high earning individuals needing specialist treatment.
- “Loss” to the club in terms of value of services foregone — may be variable at clubs option with player simply getting continued earnings.
- Potentially very high level of protection cover required to meet loss of earnings through career terminating events.
- Self financed continuation options desirable whilst not in employment of member club.

7

(i) Demographic shift

Too few contributors supporting too many pensioners.

In particular increased longevity and lower birth rates or changing working patterns leading to shorter working lives.

Contributions set at an inappropriate level, either at start, or have become inappropriate.

High inflation — if price inflation higher than wage inflation then benefit will be rising quicker than contribution input (Pay as you go).

If Scheme Funded:

High investment return on contributions could outweigh some of high inflation problem, but if poor investment returns i.e. lower than price inflation, then funding will not work.

Fraud, non-payment of contributions, multiple benefit claims etc.

(ii)

- Cap the price inflation link to a fixed percentage maximum.
 - but reduced retirement income could lead to a falling standard of living.
 - benefit might appear mean.
- Adjust the 40% target to something lower. Or rebase to 40% of current national average wages, if the price inflation original target is now too high (>40% of current).

- possible difficulties with citizens close to retirement — phase in the change?
- Increase minimum 10 year eligibility criterion.
 - consider how to transition with potential working life between 10 and new period — phase in?
- Increase contribution rate
 - likely to be unpopular, reduced standard of living etc.
- Raise retirement age
 - again transitional problems.
- Means test the benefit, so only those in need get the full benefit.
 - complex to administer
 - disincentive to save
- Introduce an employer contribution based on workforce numbers.
 - may be seen as an extra tax.
- Fundamental review could lead to switch to money purchase system
 - admin issues
 - citizen understanding
 - investment choices

8 (a) Retirement Benefits

- these will consist of pension, cash and contingent benefits

Pension

- the scheme is defined benefit and so will probably offer a pension expressed for example as $n/60$ ths
- the “fully flexible” criteria means the member could presumably choose any rate of accrual from nil (i.e. full opt-out) to the highest available if the entirety of the flexible benefits “pot” is applied to pension
- this would cause huge administrative challenges, and options such as $n/100$ ths, $n/80$ ths, $n/60$ ths, $n/50$ ths might be set in advance
- legislative restrictions
- a selection risk exists again where healthier members or those with high salary potential might choose to maximise benefits
- or otherwise seek to take advantage of the conversion terms offered
- particularly if these were fixed rather than being “market related”
- maximum tax approval limits might restrict the members ability to increase their accrual rate
- and some guidance might need to be offered to help individuals take an informed decision

Cash

- similar points apply in relation to cash as for pension
- except there may be a financial benefit to the company if tax concessions apply to the cash benefits
- so if members choose to maximise the cash option, it reduces the cost of the scheme

Contingent benefits

- similar points re moral risks for separated members as under protection benefits

(b) **Other Benefits**

- these will include lump sum on death
- and dependants pension on death
- and pension on permanent ill-health
- the individual will have a high level of knowledge in relation to their state of health
- and the possibility of higher mortality as a result
- including their exposure to high risk pursuits
- and could use this information to select an appropriate level of cover accordingly
- as such, the scheme and/or any external insurers will probably want to increase underwriting activity
- or might seek to restrict short term changes to levels of cover
- which could potentially leave the scheme exposed if the scheme benefit/insurance protection were not fully matched
- unmarried members might seek to eliminate dependents cover
- which could cause issues generally e.g. in the case of a married, but separated, member
- the arrangements could accommodate a core component
- although this doesn't necessarily meet the HR directors "fully flexible" criteria

- 9** (i) Should the transfer value should be no less than the expected cost of providing the benefits within the original scheme so the member is no worse off because the same level of benefits can be provided from an alternative scheme

Other issues include:

- allowance for changing market conditions
- allowance for any discretionary benefits
- consistency between different classes of beneficiaries
- reducing transfer value to reflect a funding level below 100%

- value for money for previously transferred in from another scheme
- expenses of calculation and payment
- legislative requirements
- underpin of member contributions

(ii) **Prescribed Basis**

A single definitive basis would be used

The transfer value amount would be the same for all members (with the same benefits etc.) with consistency across all schemes

Therefore it would appear equitable for all members

Trustees do not have the responsibility for the basis used

The actuary does not have the responsibility for the basis used

Hence no professional judgement can be used

Independent monitoring may be needed to ensure compliance

Who determines the definitive basis?

And when will it be updated/revised?

There may not be a single appropriate basis for all schemes

Easy to administer

Selection issues

Scheme specifics and actuarial judgement

Can allow explicitly for scheme specifics

For example:

Any discretionary benefits, funding level, life expectancy, early retirement options etc.

Allows flexibility and application of professional judgement

to ensure the overall objective is met

but there may be pressure from the scheme sponsor to reduce transfer payments to reduce costs

Should be able to allow for changing market conditions

There may be significant difference across different schemes

Hence difficult to monitor compliance

Members expectations and requirements

Expectations and requirements may include:

The member may view the transfer value as a “replacement cost”

i.e. the amount a new scheme may require to provide the same number of years service in their scheme (assuming same benefits etc) or

an amount to secure/guarantee the expected pension benefit at retirement

Likely to lead to higher transfer values

Hence more expensive to provide

Allowance for individual circumstances (e.g. state of health, marital status)
Value for money for previous transfer payments into the scheme
Ensuring comparability for length of service in new scheme
Independent of the scheme funding level
and current market value of the assets
No allowance for expenses

It is very difficult for any one method to satisfy all the expectations and requirements of members all of the time

(iii) **Narrow range**

Advantages

Consistency across schemes
May enhance the reputation of Pension Schemes
Appears equitable to members
The transfer payment can be used for other purposes (e.g. pensions on divorce)

Disadvantages

Will not allow for scheme specifics

For example:

Security of the benefits — strength of the employer covenant,
current funding level of Scheme
Inclusive/exclusive of discretionary benefits
Life expectancy of membership

- (iv) The early retirement terms may be different to the terms for transfer
i.e. different methods and assumptions may have been used to determine the amount of the transfer value and the early retirement pension
In particular, early retirement terms can be generous, particularly if retiring on account of redundancy
The transfer value does not guarantee to provide the expected pension benefit at normal retirement date
The early retirement cost is based on current immediate annuity rates and not the actuary's assumptions regarding interest rates, life expectancy etc.
+ loading for expenses, profit etc in annuity quote
The assumptions underlying the transfer value may differ from the members actual experience
For example, the early retirement pension will allow for the actual age of the spouse and the amount of pension commuted for cash
The transfer value may exclude any allowance for discretionary pension increases
The transfer value may have been reduced to allow for the scheme's funding position or to allow for the expenses of the calculation

END OF EXAMINERS' REPORT

EXAMINATION

31 March 2006 (pm)

Subject ST4 — Pensions and other Benefits Specialist Technical

Time allowed: Three hours

INSTRUCTIONS TO THE CANDIDATE

1. *Enter all the candidate and examination details as requested on the front of your answer booklet.*
2. *You have 15 minutes at the start of the examination in which to read the questions. You are strongly encouraged to use this time for reading only, but notes may be made. You then have three hours to complete the paper.*
3. *You must not start writing your answers in the booklet until instructed to do so by the supervisor.*
4. *Mark allocations are shown in brackets.*
5. *Attempt all 8 questions, beginning your answer to each question on a separate sheet.*
6. *Candidates should show calculations where this is appropriate.*

AT THE END OF THE EXAMINATION

Hand in BOTH your answer booklet, with any additional sheets firmly attached, and this question paper.

In addition to this paper you should have available the 2002 edition of the Formulae and Tables and your own electronic calculator.

- 1** You are the actuary to a large mature defined benefit pension scheme. The active membership is employed by a company in a heavy engineering industry. In addition to retirement benefits the pension scheme provides a lump sum and a spouse's pension if a member dies in service.

Outline the factors that should be considered when deciding whether or not to insure some or all of the death in service benefits. [8]

- 2** A medium sized company in a developed country has for many years sponsored a defined benefit pension scheme for its employees, written under a Trust Deed.

At the recent valuation, completed as at 31 December 2005, the scheme was only 70% funded on a minimum funding assessment, and the results showed that the liability profile is mature.

At present 17% of the total value of the pension scheme's assets are held in the ordinary share capital issued by the sponsoring employer. In the last 5 years there have been no sales or purchases of those shares.

The performance of the company's shares, measured in terms of total performance from capital growth and income, compared to the country's main share market index over the last five calendar years is as follows:

	2005	2004	2003	2002	2001
<i>Company</i>	+9.3%	+8.2%	−12.6%	−2.1%	+17.4%
<i>Index</i>	+4.1%	+1.9%	−7.0%	−1.9%	+7.9%

- (i) Discuss the appropriateness of holding the company shares in the pension scheme's investment portfolio, from the viewpoint of the scheme's trustees. [6]
- (ii) Outline ways in which the investment risks associated with the current holding of the sponsoring company's shares could be reduced. [3]
- [Total 9]

- 3** You are the actuary to a large defined benefit pension scheme. The trustees of the scheme are reviewing the current investment strategy which will include the use of an asset liability model.

- (i) Outline the general issues that should be considered in the investment strategy review. [4]
- (ii) Describe the objectives and the characteristics of, and the outputs from, an asset liability model. [6]
- [Total 10]

- 4** A new defined benefit scheme is being set up. The employer is considering providing the following options for the members:
- Payment of a retirement benefit at a date earlier than normal retirement age.
 - Payment of a transfer value if a member leaves employment before normal retirement age.
 - Allowing conversion of pension to cash at retirement.
- (i) Set out the general issues to be considered before a decision is made to offer any of the above options. [6]
- (ii) State a simple equation of value for the early retirement option. [2]
- (iii) Outline the practical issues that should be considered when determining the terms to offer for each of the three options. [4]
- [Total 12]
- 5** Discuss the reasons for undertaking actuarial valuations of defined benefit pension schemes from the perspective of:
- (a) Scheme sponsors
 - (b) Scheme members
 - (c) Shareholders
 - (d) Regulators
- [12]
- 6** You are the actuary to a long established defined benefit pension scheme that was closed to new entrants after the previous valuation. The next actuarial valuation is due.
- (i) Discuss the characteristics of the Projected Unit and Attained Age funding methods. [5]
- (ii) Set out simple formulae (ignoring any pre-retirement decrements) that could be used to calculate the Standard Contribution Rates for the Projected Unit and Attained Age funding methods respectively. [4]
- (iii) Explain how you could estimate the Standard Contribution Rate for the Attained Age funding method from the calculated Standard Contribution Rate for the Projected Unit funding method. [2]
- (iv) Set out the different ways company contributions could be structured to eliminate a funding deficit and outline the characteristics of each method. [4]
- [Total 15]

- 7** A government has established a new framework for protecting benefits offered by employers to members of approved defined benefit pension schemes. Very generous tax breaks will be awarded to employers who establish such schemes. However, under the new framework, a failure to meet any of the liabilities of the scheme will result in the directors of the company being personally responsible for making good any shortfall in benefits to the members.

Stating any additional assumptions you make about the new framework, describe the:

- (a) funding implications
- (b) investment implications
- (c) benefit design issues; and
- (d) security issues

that might arise under such a regime. [16]

- 8** You are the actuary to a large defined benefit pension scheme which has 100,000 pensioners, 50,000 deferred pensioners and 100,000 active members.

Explain how you would establish a best estimate valuation basis for this scheme. Your reply should cover the components of the basis where you would expect to use standard assumptions and those which would need to be scheme specific in order to meet the best estimate objective. [18]

END OF PAPER

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

June 2006

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 $> \frac{1}{6}$ 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**

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

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.

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

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

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)

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

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

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

Divide one by the other

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

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

EXAMINATION

8 September 2006 (pm)

Subject ST4 — Pensions and other Benefits Specialist Technical

Time allowed: Three hours

INSTRUCTIONS TO THE CANDIDATE

1. *Enter all the candidate and examination details as requested on the front of your answer booklet.*
2. *You have 15 minutes at the start of the examination in which to read the questions. You are strongly encouraged to use this time for reading only, but notes may be made. You then have three hours to complete the paper.*
3. *You must not start writing your answers in the booklet until instructed to do so by the supervisor.*
4. *Mark allocations are shown in brackets.*
5. *Attempt all 7 questions, beginning your answer to each question on a separate sheet.*
6. *Candidates should show calculations where this is appropriate.*

AT THE END OF THE EXAMINATION

Hand in BOTH your answer booklet, with any additional sheets firmly attached, and this question paper.

<p><i>In addition to this paper you should have available the 2002 edition of the Formulae and Tables and your own electronic calculator.</i></p>

- 1** As actuary to a defined benefit pension scheme, you propose to carry out an asset liability modelling exercise on a stochastic basis. One of the trustees has asked you to explain the main features of such an exercise.

Set out the points you would make in your reply. [6]

- 2**
- (i) Describe the main factors that contribute to the expenses of running a defined benefit pension scheme. [5]
 - (ii) Describe the options that the employer could consider to reduce these expenses. [5]
- [Total 10]

- 3** A centralised defined benefit pension scheme is run on behalf of several different employers within the same industry. A common benefit structure related to final salary applies to all scheme members. There is a wide range of benefits and options available on retirement, death or leaving service. Each employer pays the same contribution rate.
- (i) Set out the advantages and disadvantages of a centralised scheme to participating employers. [8]
 - (ii) The scheme rules allow individual participating employers to approve the payment of enhanced benefits to its own employees. Suggest restrictions that could be applied to prevent a deterioration in the funding position. [4]
- [Total 12]

- 4** Currently, the only benefits provided by a defined benefit pension scheme are benefits to scheme members on retirement. The employer is considering extending the scope of the scheme to provide benefits to the dependants of scheme members on the death of a scheme member.
- (i) Discuss the issues which the employer should consider before extending the scope of the scheme. [10]
 - (ii) Suggest how the employer might mitigate the risks associated with providing dependants' benefits. [4]
- [Total 14]

- 5** You provide actuarial services to a small company in a particular country which provides a funded defined benefit scheme for its 100 employees. You have recently completed a valuation of the scheme.

You have been asked to carry out a valuation of the country's unfunded defined benefit state sponsored scheme which currently covers approximately 1 million workers and their dependants representing the bulk of the working population.

- (i) Describe the key differences between the two schemes with regard to the risks of each scheme to the sponsor and explain how these risks might be mitigated. [5]

- (ii) Describe the differences between the data considerations, the actuarial assumptions and the funding objectives of the two valuations. [13]
[Total 18]

- 6** An employer has recently introduced a defined contribution scheme for its staff. The scheme currently operates on an income drawdown basis at retirement, under which the fund remains invested and the member withdraws part of the fund each year as income.

- (i) Describe the advantages and disadvantages to the scheme members of income drawdown. [6]

- (ii) Explain the restrictions which the employer might impose on the operation of income drawdown. [3]

The employer is considering two further options:

Option 1: the accumulated fund would be used to purchase an annuity at retirement from an insurance company.

Option 2: the level of income which the member receives would be determined at retirement using the scheme's conversion factors. The pension payments would be met from the overall scheme assets.

- (iii) Describe the advantages and disadvantages of each of options 1 and 2 from the point of view of the employer. [9]

[Total 18]

- 7** You are the actuary advising the trustees of a defined benefit pension scheme which allows members to commute part of their own pension for tax-free cash at retirement. The scheme also allows members to purchase additional pension by augmentation. The member pays income tax on any pension in payment. Sample rates for the two options are set out below.

<i>Age</i>	<i>Commutation Factor (i.e. cash granted for each unit of pension given up)</i>	<i>Augmentation Factor (i.e. cost of purchasing one unit of pension)</i>
60	12.0	20.0
65	10.0	15.0

A trustee asks you why the published commutation factors are so much lower than the augmentation factors used for purchasing single-life pensions, and suggests it would be fairer to use the same factors for both calculations.

- (i) Outline the key actuarial assumptions required to set commutation and augmentation factors, together with any further information needed regarding the benefits provided by the scheme. [6]
 - (ii) Discuss the arguments for and against using the same factors for commutation and augmentations, including any other issues that should be considered. [16]
- [Total 22]

END OF PAPER

EXAMINATION

September 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 Stocker
Chairman of the Board of Examiners

November 2006

General comments

Overall the standard was disappointing. In the main, this was due to a combination of:

- *not reading questions carefully, even worse assuming a questions is the same as seen on past papers*
- *assuming UK practices apply*
- *failing to write enough separate points; and*
- *an inability to apply knowledge to a (slightly) unfamiliar situation*

Comments on individual questions

- Q1** *Reasonably well answered, but some candidates forgot their audience — most trustees would not appreciate a long description of stochastic models or the Wilkie model.*
- Q2** *Many candidates did not distinguish between costs and expenses and therefore wasted time by going into detail on the costs of providing DB benefits. A surprising number suggested that using a weaker funding basis will lower scheme expenses.*
- Q3** *Most candidates failed to pick up enough points as they did not expand on the main themes.*
- Q4** *Reasonably well answered, but many candidates assumed this was the standard “options” question. The answers to part (ii) lacked detail, with many candidates just considering insurance options.*
- Q5** (i) *Candidates who sent down the route of comparing the main risks for each scheme (e.g. investments, mortality, etc.) did reasonably well.*
(ii) *Only the better candidates considered how the various assumptions might be set for each scheme, rather than just churning out their pre-prepared list of assumptions.*
- Q6** (i) *Most candidates assumed that income drawdown would be a temporary arrangement, with annuities being purchased at age 75. it was not uncommon for candidates to believe that income drawdown means withdrawing **all** the income generated by the assets.*
(ii) *Generally well answered.*
(iii) *The examiners were surprised that some candidates did not seem to realise that option 2 would introduce risks for the employer.*
- Q7** (i) *Poorly answered, with too many candidates just giving a list of key assumptions without thinking if they were relevant. Only the better candidates noted that assumptions relating to spouse's benefits were not required.*
(ii) *Given the marks on offer, candidates failed to write down nearly enough. Indeed, many wrote more for 7(i) than 7(ii). Several candidates suggested that improving the commutation rates would worsen the funding position, but did not go on to explain that this would only arise if the funding basis took advance credit for future commutation profits.*

1

- The purpose is to assess the risks and rewards of adopting different investment strategies to meet the liabilities
- and obtain an appropriate balance between them.
- Consider the funding target to which the risk is to be considered over an appropriate time period
- e.g., x% probability that the funding target will be met at all valuations over the next y years.
- An ALM uses all data for regular funding valuations,
- with details of options and guarantees.
- Uses suitable model for projecting future cashflows
- based on best estimate assumptions
- in combination with a model for the demographic elements (e.g. mortality, pattern of retirement etc.) that is usually deterministic (i.e. tables derived from a combination of industry data and the experience of the scheme itself).
- The methodology considers a large sample of possible cashflows/simulations
- to estimate the probability of future events in the life of a scheme
- e.g. to indicate the probability that funds will be insufficient to meet funding targets
- by assessing the probabilities associated with alternative investment strategies.
- The relative risks (i.e. the probability of holding insufficient funds) can be assessed against the possible rewards (i.e. the probability of holding large funds, or the chance of reduced employer contributions)

2 (i)

- Internal staff responsible for administration eg interfacing with the payroll system, updating the pensions scheme records, making benefit payments, paying death claims, transfer values.
- Internal staff responsible for other, e.g. legal, IT, actuarial, investment
- Communications: booklets, announcements, benefit statements, details of benefits just before retirement, details of options, member counselling, presentations to members / prospective members.
- Trustee meetings, expenses, training.
- Cost of collecting contributions,
- e.g. from members, participating employers.
- External advisers, e.g. benefit consultants, legal, actuarial, auditors, investment managers.
- External fees, e.g. regulator, government, levy.
- IT system to link with payroll system.
- And cost of upgrading for scheme improvement / legislative requirements.
- Maintaining bank accounts.
- Investment expenses.
- Rebroking insurance policies if used.

(ii)

- Simplify the benefits provided by the scheme
- so as to reduce the cost of administration, communication, detailed correspondence with members, maintaining and updating IT systems, etc
- or by reducing the options available
- or reducing the frequency of providing benefit improvements such as discretionary increases in payment.
- Provide members with the necessary factual information at the minimum level required by legislation
- charge members for transfer quotations
- and withdraw any facility for free advice / counselling.
- Reduce the number of trustees to the legal minimum.
- Consider outsourcing significant elements of the scheme administration
- if cost reductions can be made for the (new) scheme basis.
- more computerisation
- Review role and scope of external parties
- such as advisors, auditors
- obtain market quotations for the (new) package of services required.
- Simplify the investment strategy.
- e.g. by investing in tracker funds.
- Close the scheme to new members
- so avoiding the need to provide information to new employees.
- consider email correspondence with members

3

(i) **Advantages**

- Employer can offer a DB arrangement, which may not otherwise be cost effective / viable if restricted to his own potential employees.
- Competitors – scheme sets benchmark – easy transfers between participating employers
- Saving in expenses / costs resulting from economies of scale:
- e.g. for record keeping, advisors / trustees / legal / audit
- The impact of scheme experience for particular members or groups of members would be averaged over a larger group
- so leading to less volatility in the contribution rate.
- The cost of death in service benefits (as % of payroll) should be lower for a larger group of lives
- e.g. by taking out a profit share arrangement with an insurance company
- or by allowing the scheme to self-insure.
- A larger group of lives should enable the scheme to negotiate improved “free cover” terms (i.e. insurance without evidence of health) with an insurance company.
- There will be a bigger pool of assets to invest
- giving more scope for diversification in the investment strategy
- and more scope for the scheme to manage its own assets
- as opposed to a pooled investment arrangement

- with savings in investment costs as % of funds under management
- could facilitate movement of employees between participating Employers.

Disadvantages

- Cross-subsidies arising from the impact of unfavourable scheme experience
- e.g. other companies giving higher salary increases.
- Employer may be unable to influence choice of advisors
- or investment medium / asset distribution etc.
- or changes in the scheme benefits
- e.g. an increase or reduction in the pension age, or the rate of increase of pension benefits in payment.
- Viability / costs of scheme may be affected by factors outside individual employers control.
- e.g. if employers with a below average age profile cease to participate.
- good pay for bad if one employer defaults

(ii)

- All proposed enhancements reported to the scheme actuary
- who will recommend a schedule of payments
- to be made in full before the enhancement vests.
- Scope to cut back the enhancement if payments not made in full.
- Veto the enhancement if the funding position of the scheme is poor
- and cost of augmentation not paid for in full when granted.
- Request medical evidence if there is any possibility of adverse selection against the scheme.
- Financial limits on the cost of any one augmentation, or a group of augmentations for any one individual employer.
- Obtain agreement of all other employers.
- Check if any impact on scheme's investment strategy,
- e.g. due to changing cash flow requirements for enhanced early retirements.

4

(i) **Who should be covered / possible restrictions, e.g:**

- Spouses
- Partners: opposite sex, same sex
- Children
- age limits, e.g. if in further education or financial dependence.
- Other family members
- e.g. need to be financially dependant.

Benefits

- Integration with state
- Level of benefits on death pre-retirement
- or death post-retirement
- or on other events / circumstances.
- Consistency with benefit basis for members
- e.g. if salary / service related etc.
- How payable: cash, pension, or both.
- Members appreciation
- Any reduction for large age disparity between member and dependant.
- Whether benefits cease on remarriage.
- Option to exchange member's pension for dependants' pension
- or vice versa.
- How to deal with any selection issues, eg if member in poor health.

Admin issues

- Nomination / expression of wish forms
- with regular communication with members to ensure these are kept up to date.
- Methodology for determining who to pay benefits to
- and establishing method for dealing with disputes between different beneficiaries.
- Record keeping
- Consider requesting evidence of health for new scheme members.

Costs

- Likely level of costs and future trends in the cost.
- Split of costs : company / member.

Insurance

- Consider availability of insurance to (re)insure benefits
- especially any large risks
- and so as to get a free cover limit.

Other

- What equivalent benefits competitors are providing.
- Offer as part of flexible benefits package?
- Legislative requirements
- e.g. maximum level of dependants' benefits
- or a requirement that benefits can only be provided in certain circumstances,
- such as a requirement for financial dependency.

(ii)

- Medical evidence for all new members and or 'actively at work' clause
- and / or increments in benefits.
- medical evidence unlikely to be appropriate for existing employees
- (Re)insurance of all or part of the benefits with an insurance company on a non-profit basis
- or a experience rated / profit sharing basis.
- Purchase of an annuity with an insurance company
- to protect against changing financial conditions
- or improvements in longevity.
- Record keeping to avoid disputes over eligibility for benefits.
- Regular benefit statements detailing benefits covered.
- Provision of benefits is at trustees or employer's discretion
- e.g. in respect of non spouses

5

(i) **Risks (funded – F))**

- The employer bears all the risks.
- So if experience is unfavourable, he pays more than expected
- though he may be able to recoup some of the additional costs from extra employee contributions
- or by changing the scope of the scheme
- or by discontinuing the scheme
- subject to possible legislative requirements on an employer to make up some or all of a deficit on discontinuance.
- In the extreme case, poor scheme experience could put the employer out of business if scheme can't be afforded
- legislation changes might increase costs.

Risks (Unfunded-U)

- The risks are borne by the country at large.
- If experience is worse than assumed the sponsor can increase general levels of taxation
- or borrow money against the country's future growth / prosperity
- or reduce the benefits
- such as an increased pension age.

Credit was given for the alternative approach of looking at each risk and how they differed between the two arrangements

(ii) **Data considerations F**

- Most relevant employee data available from payroll system/individual data
- or by asking employees
- e.g. regarding marital status
- though need to ensure it is kept up to date.

- Need to keep in contact with retirees / former employees to ensure correct benefit payments.

Data considerations *U*

- If available, use data from current and past contributing members.
- If full individual data not available, use population statistics
- or sample data.
- Take steps to ensure that only individuals who have contributed are eligible for benefits
- and that the benefits granted correlate with historical contributions.

Actuarial assumptions *F*

- Salary increase assumptions should relate to the particular industry
- taking account of any local factors.
- Demographic assumptions based on suitable industry data.
- Investment returns should take account of the investment opportunities in the local market,
- and the opportunity for overseas investment
- and the required investment mix
- which depends on the matching of assets and liabilities
- and the risks that the employer wishes to take
- allow for any legislative restrictions/boundaries.

Actuarial assumptions *U*

- Assumptions relate to the economy as a whole
- e.g. wage inflation.
- The current and likely future rate of employment.
- Demographic trends, such as changes in life expectancy, rate of ill-health retirement, number of marriages, number of children, migration, economic activity rates.
- An investment assumption only needed to the extent that a contingency reserve is built up to maintain cash flows, to smooth the costs to members and their employers to allow for changing demographics.
- Investment assumption to take account of the expected return on monies invested on the local economy and expected growth in the economy.

Funding objectives *F*

- Advance funding with aim of providing
- security of accrued rights on ongoing basis
- and discontinuance basis
- with stable contribution rate, subject to periodical review.

Funding objectives U

- Enough funds to pay benefits as they fall due.
- Stable contribution subject to periodical review
- as a result, there is likely to be a contingency reserve built up
- which can be used to support unexpected additional costs
- and smooth the way towards a long term increase in contribution rates, should this be required.

6 (i) Advantages

- Funds can remain invested
- so member can receive benefit of returns from equities and property, say, from the invested funds
- which are expected over the long term to exceed those from bonds or cash
- with the ability to change the mix of investments
- if a greater or lesser level or security of income is required.
- On the member's death the residual fund can be passed on to dependants
- so avoiding a potential loss of capital if the member dies soon after retirement.
- Flexibility over the level of income that is taken each year
- subject to any legislative constraints.
- Some might have religious objections to annuities

Disadvantages

- If funds invested in equities or property, member bears risk of poor investment performance
- or volatile investment performance.
- Investment may be mismatched against the requirement for a steady stream of regular payments
- so investor risks the possibility that his income may need to reduce.
- Scheme member bears his own longevity risk
- so if he/she takes an regular income consistent with insurance company annuity rates, the invested fund may run out if she / she lives longer than implied by insurance company rates.
- Complex to understand/decide how much to draw each year

(ii) To reduce risk of fund running out

- Set minimum age for retirement.
- Maximum level of income, e.g. no more than that implied by insurance company annuity rates.
- Subject to periodical review of level of income in relation to invested funds.

To increase security of the underlying investments

- Minimum proportion of fund invested in fixed interest securities / cash.
- Restriction of the equity component to readily marketable investments
- such as listed shares rather than unlisted shares or property.
- Employee may be asked to pay part or all of the costs of monitoring out of his individual fund
- which would reduce the level of income which could be provided.

(iii) **Option 1**

Advantages

- Simplifies administration relative to current benefits
- Matches the liability.
- Protects company against improvement in longevity
- and changing financial conditions
- as the risks are borne by the insurance company.
- Insurance company responsible for payments, and deals with annuitants' tax coding.

Disadvantages

- Need to shop around for the best terms.
- If this involves an intermediary, then likely to involve expenses, e.g. commission.
- Contributes to insurance company profits.
- Potentially a poor return on the investment if the member dies soon after retirement
- depending on what guarantees / dependant benefits have been purchased.
- liquidity requirement — might have implications for investment strategy
- possibility of insurer default

Option 2

Advantages

- Funds can be invested to achieve the best expected investment returns.
- Avoids contributing to insurance company profits.
- Ultimate sponsor gains if member dies soon after retirement.

Disadvantages

- Need to regularly review factor
- Company not protected against unexpected improvements in longevity
- since annuity terms set at outset.
- Company bears risks if underlying investments not matched to annuity payments

- or if assets invested in investments which achieve a poor return.
- So funds held in respect of members' annuity may run out before he dies, leaving company to make up any deficit.
- Company responsible for annuity payments
- and suitable tax deductions.

7 (i) Assumptions & benefits

- Whether commuting pension for cash, or purchasing pension with cash, we need to determine the alternative benefits by setting up an equation of value, on a given set of assumptions:
- $\text{Cash} \div \text{Factor} = \text{Pension Purchased} / \text{Commuted}$
- The assumptions needed in each case are those required to calculate a single-life annuity:
 - Post-Retirement Investment Return
 - Post Retirement Mortality (member's only)
 - Need male/female split for unisex terms
- The key item of the benefit structure of the scheme is the level of pension increases in payment, which may be guaranteed, discretionary or a combination of both.
- Where increases are not specified as a fixed percentage amount per annum, further assumptions may be needed, typically:
 - The level of future price inflation, and
 - The impact of any maximum or minimum level of increase in any one year.
- The history of discretionary increases provided is important in determining the appropriate allowance (if any) to include in setting terms for commutation and augmentation.
- Are pension increases (guaranteed or discretionary) paid on pre or post commutation pension?
- If on pre-commutation pension, it is clearly inappropriate to include allowance for those increases in the commutation factor.
- Similarly, if pension secured by augmentation is treated differently from normal scheme pension, this should be taken into account.
- The impact of any guarantee on death (or certain period) may be built into the single-life annuity used in the equation of value.

(ii) **Should factors be the same?**

- As the same assumptions are required for single-life commutation and augmentations, the Trustee is asking a reasonable question.
- Need, however, to consider whether it might be appropriate to pick different assumptions.
- Trustees' have a responsibility to act in the best interest of all beneficiaries:
- Fairness to the member might suggest the same factors should apply.
- Consider the (theoretical) situation where a member purchases an extra £1,000 pension by augmentation at 60 using the factor of 20:1, and
-immediately commutes it at 12:1, getting £12,000 back for original investment of £20,000.
- Security of other beneficiaries entitlements might suggest otherwise.
- For commutation it is prudent to **minimise** the amount of cash given in return for each £1 of pension (or maximise pension given up to provide specified cash amount)
- i.e. use assumptions that produce “low” factors.
- For augmentation it is prudent to maximise the cost of securing each £1 of pension
- i.e. use assumptions that produce “high” factors.
- Unless scheme is extremely well funded (i.e. >>100% on solvency basis) so these are not issues, and it's in the interest of **all** members to make option terms as favourable as possible.
- The issue of selection could theoretically be used to justify different factors, e.g.
 - Members in poor-health would maximise commutation.
 - Members in good-health more likely to purchase pensions.
- In practice, selection is unlikely to be a major issue for commutation or augmentations.

Other issues

Member's Expectations

- If factors have been different historically, probably not an issue for members.
- Members likely to take cash as tax free.
- It can be argued that commutation is an option that members are not obliged to take, so there is no requirement for terms to be “fair”.
- On the other hand there is the potential for dispute at some point.
- This would be avoided if commutation factors were increased

Funding Position of the Scheme/ Strength of Employer

- If commutation is anticipated in the funding valuation, increasing commutation factors will immediately increase disclosed liabilities / contribution requirements.
- If commutation is not allowed for explicitly, increasing the commutation factors is likely to reduce prospects for future favourable experience, increasing sponsor's costs in the long term.
- Therefore, the strength of the employer and its long term commitment to funding the scheme need to be considered.
- The sponsor should not unknowingly be exposed to significantly increased costs when options are taken up.

Trust Deed and Rules

- Possible, but unlikely that different factors are explicitly specified in rules.
- More likely that rules will state how factors are determined, and this might justify differences e.g.
 - Commutation factors determined from time to time by the actuary on a basis consistent with that used for determining employer contribution requirements
 - i.e. suggests “best estimate” assumptions, factors reviewed every 3 years.
 - Terms for augmentations are recommended on a case by case basis on assumptions consistent with market conditions at the time option is exercised

- i.e. suggests factors based on an immediate annuity basis or similar.

Legislation

- Tax restrictions on commutation terms may limit the factors to something below the “fair value” of the pension being commuted, even on a best estimate basis.
- Tax treatment of alternative forms of benefit
 - Commuted pension tax-free vs pension taxed as income — it can be argued that lower commutation factors can be justified on the basis that the equation of value should be carried out net of any tax involved.
 - Alternatives available for funds used for augmentation payment?
- Sex-equality legislation

Miscellaneous other issues in determining option terms

- Frequency of use of each set of factors.
- Non-standard circumstances where standard factors may not be appropriate:
 - trivial commutation
 - Ill-health commutation
- Administrative issues should not be significant, other than that using the same factors will be simpler.

END OF EXAMINERS' REPORT

EXAMINATION

17 April 2007 (pm)

Subject ST4 — Pensions and other Benefits Specialist Technical

Time allowed: Three hours

INSTRUCTIONS TO THE CANDIDATE

1. *Enter all the candidate and examination details as requested on the front of your answer booklet.*
2. *You have 15 minutes at the start of the examination in which to read the questions. You are strongly encouraged to use this time for reading only, but notes may be made. You then have three hours to complete the paper.*
3. *You must not start writing your answers in the booklet until instructed to do so by the supervisor.*
4. *Mark allocations are shown in brackets.*
5. *Attempt all 8 questions, beginning your answer to each question on a separate sheet.*
6. *Candidates should show calculations where this is appropriate.*

AT THE END OF THE EXAMINATION

Hand in BOTH your answer booklet, with any additional sheets firmly attached, and this question paper.

*In addition to this paper you should have available the 2002 edition of the
Formulae and Tables and your own electronic calculator.*

- 1** For a large occupational defined benefit pension scheme the benefits payable on death before retirement include a dependant's pension of $1/3^{\text{rd}}$ of salary at death, plus a lump sum of three times salary at death.

Currently both of these benefits are fully matched by an insurance arrangement.

The sponsor has suggested that instead of directly insuring the expected amount of the dependant's pension an additional lump sum be insured instead.

- (i) Suggest possible reasons for the sponsor's proposal. [4]

- (ii) Describe how the additional insured lump sum amount might be calculated. [5]
[Total 9]

- 2** You are the actuary to a defined benefit pension scheme. The trustees are considering reviewing the terms available for exchanging pension for cash at retirement.

Set out the points to be included in a short paper for the trustees covering the following areas:

- Scheme documentation and legislation.
- Valuation basis and prudence.
- Administration considerations.
- Other general issues. [10]

- 3** You are the actuary advising a small defined benefit pension scheme. Set out the advantages and disadvantages of buying annuities. [10]

- 4** A large investment management company is considering introducing a separate defined contribution (DC) pension scheme, to replace its existing occupational defined benefits scheme for the provision of all future pension benefits in respect of all of its employees. The pensions manager has asked for an initial report from you, as the consulting actuary to the Company, on the issues involved in the closure of the existing scheme and the design of the new DC arrangement.

Set out the principal points you would make in your initial report. [12]

- 5** A long established industrial company operates an occupational final salary pension scheme for its employees. You have just been appointed as the actuary. The scheme has been closed to new members for the last two years. Then existing members continue to accrue final salary benefits, although the future accrual rate was reduced two years ago.

Under the contribution rule, the future service cost is split evenly between the employer and members. Any experience gains or losses are met by the sponsoring employer.

The latest actuarial valuation has revealed an increase in the future service contribution rate from 14.0% of pensionable pay on a Projected Unit Method set three years ago, to 22.0% of pensionable pay on an Attained Age Method currently, on more cautious assumptions.

Summary information from the valuation:

Past service liabilities for employed members: £108m

Pensionable payroll: £40.0m

Average salary weighted term to retirement of the employed members: 10 years

Assumptions — discount rate 6.0% per annum throughout, salary increases 4.75% per annum, inflation 3.0% per annum.

Expenses and insurance premiums: 2.4% of pensionable pay, included in the SCR.

A member elected trustee has suggested that the future service contribution rate should be calculated on a Current Unit Method (CUM) to keep the member's contribution requirement down because he has heard that CUM contribution rates are always lower than any other method.

- (i) Estimate, using the information given, the future service contribution rate on a CUM. [9]
 - (ii) Comment on the member trustee's assertion. [3]
- [Total 12]

- 6**
- (i) Describe four methods of financing social security schemes. [6]
 - (ii) Suggest the possible ways that a government can encourage non State benefit pension provision. [4]
 - (iii) Outline the advantages to a government of introducing compulsory pension provision. [4]
- [Total 14]

- 7** You are the actuary to a non-contributory pension scheme, offering a pension of $1/50^{\text{th}}$ of Final Pensionable Salary for each year of pensionable service at age 65. The results of the most recent valuation are as follows:

	<i>Value (units)</i>
Assets	60
Liabilities:	
Active members (Pensionable Salary roll 8 units p.a.)	30
Left service members	5
Pensions in payment (2 units p.a.)	20
Surplus	5

The financial assumptions used in the valuation are:

	<i>% p.a.</i>
• Discount rate	10
• Salary increases	7
• Increases to pensions in payment	5

In the year following the valuation, the employer has contributed at a rate of 5% of Pensionable Salaries, which is lower than you have recommended.

- (i) Assuming that the average age of the active members is 40, the annuity value at age 65 is 15, and that there are no changes in membership over the year, estimate the expected values of the assets, liabilities, and the surplus or deficit one year after the valuation using the same basis. State any further assumptions you have made. [9]
 - (ii) List the factors which could result in the surplus being different from that calculated in (i) [5]
- [Total 14]

- 8** A large defined benefit pension scheme is about to undertake a valuation to determine the scheme's liabilities and to decide on the employer contributions to be paid for the next 10 years.

- (i) Discuss why it is important for the trustees to understand the future support that the employer will provide and their ability to provide the promised support. [8]
 - (ii) Outline the methods the trustees could use to determine the strength of the employer's covenant and how it should be monitored over time. [7]
 - (iii) One of the trustees has suggested that the prospects for the company are not favourable and has suggested that contingent contributions or other alternatives to cash payments should be considered. Discuss this suggestion. [4]
- [Total 19]

END OF PAPER

EXAMINATION

April 2007

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 A Stocker
Chairman of the Board of Examiners

June 2007

Comments

As for the September 2006 exam, overall the standard was disappointing; the marks were relatively low for a straightforward paper. This continues to be a combination of:

- *not reading questions carefully, or assuming a question is the same as seen on past papers*
- *assuming UK practices apply; and*
- *failing to write enough separate points*

It would appear that the lack of a specific pensions investment question unsettled some candidates so the investment issues were sometimes overdone at the expense of the rest of a question. In particular, asset liability modelling was weaved into answers for Q1, Q2, Q3, Q4 and Q8!

Our comments on the specific questions are set out below:

- Q1** *Poorly answered. Candidates generally only managed to come up with cost savings as a reason in part (i). Very few candidates noted that there would be a reserve held in the scheme which could help to pay for the spouse's pension. In part (ii), most candidates discussed the equation of value but didn't expand on the practicalities of using this to determine the lump sum amounts to insure — what basis to use, assumptions about dependant (age gap was mentioned but few mentioned the need to consider the likelihood of a dependant), rounding to give easily insured multiples of salary etc.*
- Q2** *Marks were fairly average and given that this was a straightforward bookwork question which stated the areas that needed to be covered, this was surprising. A number of candidates thought that, under the heading "Valuation basis and prudence", they should discuss whether to allow for cash in the valuation basis, rather than commenting on the use of the valuation basis to calculate the commutation factors.*
- Q3** *Generally well answered.*
- Q4** *Well answered, although some candidates just set out the standard DB/DC advantages/disadvantages.*
- Q5** *Very badly answered - candidates seemed unprepared for a numerical question requiring them to switch between different valuation methods. Few candidates realised that they needed to calculate the PU rate first rather than jumping straight to the CU rate. In part (ii), most candidates noted that the CU rate can exceed the AA rate but didn't explain why in much detail. In particular, very few candidates specifically mentioned the revaluation element of the CU rate.*
- Q6** *Part (i) was well answered. The answers to part (ii) and particularly part (iii) were generally too brief.*

- Q7** *This was similar to a question at a recent sitting so candidates who had looked at past papers as part of their revision were advantaged. Most candidates had a reasonable attempt at part (i) although there were a surprising number of basic errors e.g. dividing by the interest rate rather than multiplying, forgetting to include the contributions or pensions paid from the asset roll-forward etc. Candidates also struggled or forgot to state the assumptions they were making in their calculation. Part (ii) was well answered.*
- Q8** *Parts (i) and (iii) were very poorly answered. Part (ii) was generally well answered, which meant candidates had learnt ways to assess the employer covenant but did not appear to understand why it is important to assess it. Many candidates demonstrated little knowledge of how contingent contributions operate.*

- 1
- (i)
 - Insurance premium rates may appear less competitive for pension.
 - Particularly when compared to lump sum.
 - Looking to save costs.
 - Therefore may not look to replace the pension with an actuarial, equivalent lump sum
 - perhaps deliberately under insuring & self-insuring part of the risk.
 - After all the retirement reserve would be released on death.
 - Large scheme so can accept greater risk of cashflow mismatching
 - May actually pay out this lower lump sum rather than the pension by changing the benefit structure going forward.
 - Gives beneficiaries more flexibility with large lump sum,
 - as compensation for reduction in actuarial value of total benefits.
 - Consider market practice, competitor trends etc.

 - (ii)
 - Firstly determine the actuarial lump sum equivalent of the dependant's pension.
 - This could be on a basis close to insurer's terms, the basis used for funding the pension scheme, or the company accounting basis.
 - Company may choose cheapest basis which could be funding, as likely to allow for some equity returns long-term, no insurer's margins for expenses/profit etc.
 - Consider the likelihood of there being a dependant, need to allow for proportions married, chance of dependant children etc.
 - Based on general population statistics as scheme too small to provide credible experience.
 - Then establish annuity cost of the pension based on assumed age of dependents in relation to age of member at death.
 - $\frac{1}{3}\text{rd salary (inflated to date of assumed death i.e. } \frac{1}{2} \text{ year)} \times \text{annuity} = \text{lump sum equivalent.}$
 - Sponsor then needs to decide whether it insures different lump sum for different members.
 - This would still involve some rounding of lump sum and age banding to reduce the number of different multiples.
 - Alternatively insure same extra multiple for everyone — recognising there may be profit/losses in relation to each death.
 - But sponsor may deliberately round down (under insure) to reduce cost, allow for self-insurance and release of retirement pension reserve on death in service.

2 Scheme documentation & legislation

- The scheme rules may specify who has the power to set the factors e.g. trustees, employer, actuary
- and on what basis they should be set e.g. equivalent value to pension given up
- Legislation (or rules) may specify how much of the pension can be exchanged for cash
- and any maximum or minimum factors that have to be used

Valuation basis and prudence

- Only the post retirement assumptions are relevant
- The factors could be calculated using the valuation basis
- but this will incorporate “cautious” assumption hence may not be considered appropriate
- A general aim is usually cost neutrality
- hence a more realistic valuation basis may be used
- trustees may want to set terms to encourage take up of option and thus reduce longevity risk
- It is unlikely the factors will vary with market conditions
- Need to consider what allowance if any would be made for discretionary pension increases

Administration considerations

- Theoretically calculated factors may be “smoothed” for practical purposes
- Should sex dependent factors or unisex factors be used
- Full commutation may be permissible for small amounts of pension
- Factors are usually changed infrequently
- Expenses of exercising and administering the option need to be allowed for
- Implementation issues eg honour existing quotes (if beneficial to member)

Other general issues

- Is the tax treatment different for pension and cash and if so, should this be allowed for?
- Consideration of any possible selection against the Scheme, e.g. members in ill-health
- This is likely only to be significant if the majority of the pension can be commuted for cash
- Should the funding position be allowed for e.g. amount reduced if the scheme is not fully funded
- Should different factors be used if the member is retiring in exceptional circumstances of serious ill health
- and hence the member's life expectancy is very short
- Should any spouses pension be allowed to be commuted for cash?
- Consider member expectations

3 Advantages

- Removes the liability in respect of current pensioners
- and hence removes the longevity risk,
- the investment risk,
- and the expense / administration risk
- May be purchased on favourable terms if the annuity market is competitive or special tax considerations
- May reduce administration costs
- A “bundled” package of administration and actuarial service may also be offered on competitive terms
- Likely to improve the security for pensioners
- Purchasing annuities may be needed on possible wind up
- May free up investment policy for the remaining assets

Disadvantages

- The rates will include an allowance for the insurers expected profit and insurance company margins
- Terms may be uncompetitive
- The purchase of the annuity is effectively an irrevocable decision to invest in bonds at current market prices
- There may be difficulties in purchasing an annuity that precisely matches the benefit promise
- Granting discretionary pension increases will be complex
- Any potential profits from mortality, investment and expenses are passed to the insurer
- In particular members in poor health may be insured on “standard” terms
- Future increases in the cost of annuities is outside the control of the pension scheme
- and may cause a strain compared to the funding basis
- Reduces the security for remaining active and deferred members
- Possible Insurer default risk
- Reduces the total funds under investment and hence reduces investment options
- Large amounts of liquid funds will be needed at the members' retirement dates
- and disinvestment of assets at these retirement dates may be at an inappropriate time
- hence a constrained investment strategy may need to be followed
- there may be communication issues with retired members as the pension is paid by a third party

4 DB scheme closure

- What are competitors doing?
- Run as a closed scheme or wind-up?
- Keep salary link on accrued benefits?
- Investment strategy may need review to take account of
 - ageing liability profile
 - cashflow considerations
- Need to consider what to do with any surplus/deficit
- Might want to offer TV to DC perhaps on enhanced scale

DC scheme design

- Occupational arrangement with trustees or contract based?
- Former offers more flexibility/ownership but perhaps at a slightly greater cost.
- Contribution scale:
 - Salary base (include bonuses?)
 - overall cost constraint
 - age-related scale to “mirror” old DB possibly, but consider how many bands, is the scale fair between differing age bands
 - service related perhaps, rewards loyalty
 - core contributions plus matching, encourages extra provision by employees, matching level 1×, 2× etc
 - is there a minimum employee contribution (compulsory?, perhaps to fit in with State requirements)
 - separate rates for executives?
- Investment fund range required.
- Is there to be default fund.
- Life styling option available?
- Given the type of members, perhaps there needs to be an extensive range of funds offered (restrictions on how many free switches in a year etc?)
- Consider risk benefits e.g. ill-health and death-in-service.
- Such benefits do not fit with DC concept nicely particularly paying pensions on death/ill-health, so may need to offer separate lump sums, to be insured probably.
- Decide whether to buy annuities at retirement or provide pension within scheme

General

- What are overall aims of change?
- What about other options? Have these been considered?
 - e.g. Revalued career average
 - reduced accrual rate
- Consider overall cost considerations:
 - perhaps less aggressive investment strategy also impacting on underlying cost of DB.
- Possible HR issues with any change
- Cost of change: communication, professional fees etc.
- Are there any legal restrictions?
 - in scheme documentation
 - or terms of employment
- Integration with State benefits — impact, costs etc.

- 5 (i) SCR = 22% but this includes expenses / insurance premiums of 2.4%.
So net = 19.6%

Adjust a 19.6% cost of accrual on AAM to a CUM rate with 1 year control period.

Convert to PUM first

$$\begin{aligned}
 & 19.6\% \times a_{10}/10 \times 1/a_1 \text{ where } a_n \text{ @ interest rate} \\
 & i = (1.06/1.0475 - 1) \text{ payable continuously} \\
 & = 19.6\% \times 0.1 \times (1 - v^{10}) / (1 - v^1) \\
 & = 1.96\% \times 0.1118595 / 0.0117924 = 18.6\%
 \end{aligned}$$

If deferred benefits assumed to increase in line with price inflation the calculation would be as follows:

Next convert to CUM (accrual element)

$$\begin{aligned}
 & 18.6\% \times [(1.03)/(1.0475)]^9 \\
 & = \underline{16.0\%} \text{ CUM - Accrual rate}
 \end{aligned}$$

CUM also has a “revaluation component”

Standard fund (Accrual Liabilities) on AAM = £108m based on accrued service to valuation date but salaries projected to retirement

Estimate equivalent liabilities allowing for deferred revaluation only

$$= 108 \times (1.03/1.0475)^{10} = \text{£}91.25\text{m}$$

Add back salary increases for control period

$$91.25 \times [(1.0475/1.03)^1 - 1] = \text{£}1.55\text{m}$$

Express as percentage of pay

$$1.55 / [1\% \times 40 \times a_1^{6\% / 4.75\%}]$$

$$= 1.55 / 0.4 \times 0.9882 = 3.9\%$$

Total CUM rate (Accrual & Revaluation)

$$= 16.0 + 3.9 = 19.9\%$$

Add back expenses / insurance premium of 2.4%

$$\text{Total SCR} = 22.3\%$$

Credit was given for calculations that assumed a different (or nil) level of deferred revaluation if this was consistent with the assumptions stated.

- (ii)
- Total SCR has come out higher on CUM than AAM
 - Need to consider past service position in conjunction with future
 - Expenses and insurance premiums unchanged on either method.
 - CUM SCR has 2 parts: accrual and revaluation. First part is lower than PUM or AAM, but revaluation part can be considerable.
 - Particularly where past service very long when compared to future service could give CUM SCR > PU or AA.
 - Note future service benefits reduced 2 years ago which helps to explain this
 - Mature scheme also narrows gap on future accrual element if average age high.
 - Overall recommended cont. rate would be higher as Standard Fund lower and hence more catching up to be done via past service adjustment, i.e. pay less at start and more later.

Credit was given for any sensible comments that were consistent with the calculations.

6 (i)

Pay as you go

- The contribution income in each year equals the benefit expenditure so no fund is established
- The contribution is likely to vary each year
- And will generally rise as the system matures or the population ages
- A control period could be adopted — using an equalised annual contribution rate covering the expected income over a fixed number of years

General average premium

- The level contribution rate is payable throughout the lifetime of the scheme
- A relatively high initial rate is set compared to the pay as you go method
- The contribution is calculated as the present value of all future benefit expenditure / present value of total salaries of the contributing population in all future years
- The contribution rate is stable and substantial reserves are set up under this method

Terminal Funding

- The contribution income in any period is the amount required to finance the capital of the benefits awarded in the period i.e. benefits are prefunded at the time they are awarded
- Widely used for pension benefits paid from occupational injuries funds

Scaled Premium

- The contribution rate is between the extremes of pay as you go and general average premium
- It is similar to using an equalised pay as you go rate but the fund cannot fall to zero
- A fund will be built up but the scheme will not be fully funded
- It may be complicated to operate

(ii)

- Tax (or other) incentives for the employer e.g. employer contributions deducted from profits before deduction of any corporate tax
- Tax (or other) incentives for the employee e.g. contributions deducted from taxable income
- Tax incentives on investment income (e.g. dividends, rents) and investment growth (realised and unrealised gains)
- Tax incentives on benefit payments (e.g. regular income, lump sums)
- State recommendation / accreditation of certain pension providers
- or certain forms of management of funds (e.g. with maximum charges)
- Providing guarantees to top up investment returns or act as a guarantor if the private scheme fails
- Provision of central administration resources
- or simplifying regulations and advertising private pension provision

- Reduce state pension benefits
- Regulation to enhance the security of pension schemes e.g. funding checks, regular disclosure etc.
- Education as to the benefits of pension provision

(iii)

- Avoids the need to offer other incentives e.g. tax incentives
- Likely to significantly increase the coverage of retirement saving
- So reduces pressure on State provision
- And without it is difficult to ensure some people will make any or an adequate provision for retirement
- Is likely to involve an education campaign that will result in improved understanding of retirement saving
- Should be easily portable from one employer to another
- Investment funds will be delivered at a low cost as a result of economies of scale
- Administration services will be delivered at a low cost as a result of economies of scale
- and should provide members with a greater degree of security as their own funds will be less affected by political change
- Will set a minimum target level of benefits

7

(i)

- PUC rate for active members $[1/50 * (1.07/1.10)^{25} * 15] / .01$
= 15% Pens Sal
- Expected active liability
 $30 * (1.10) + PUC * 8 * 1.07^{1/2} \times 1.10^{1/2}$
= 33.00 + 1.30
= 34.30
- Expected pensioners liability
 $20 * (1.10) - 2 \times (1.05^{0.5}) * (1.10^{0.5})$
= 22.00 - 2.15
= 19.85
- Expected left service liability
 $5 * 1.10$
= 5.50
- Expected contributions
 $0.05 * 8 * (1.07^{0.5}) * (1.10^{0.5})$
= 0.43

- Expected assets
 $60 \times (1.10) + 0.43 - 2 \times (1.05^{0.5}) \times (1.10^{0.5})$
 $= 66.0 + 0.43 - 2.15$
 $= 64.28$
- Expected surplus
 Expected assets – Expected liabilities
 $= 64.28 - 34.30 - 19.85 - 5.50$
 $= 4.64$

Assumptions used:

- Pension increases on average $\frac{1}{2}$ way through the year
- Pension payments on average $\frac{1}{2}$ way through the year
- Contributions on average $\frac{1}{2}$ way through the year
- Salary increases on average $\frac{1}{2}$ way through the year

(ii)

- Salary increases different from that assumed
- Investment return different from that assumed
- Pension increases different from that assumed
- There may have been membership changes, e.g.
 - ..early retirements
 - ..new entrants
 - ..members leaving service
 - ..with or without an entitlement to a deferred benefit
 - ..deaths
 - ..members electing a transfer value
- The average age weighted by salary may be different from that assumed
- There may have been augmentations to benefits, without a corresponding payment into the scheme
- The incidence of payments or increases may have been different from that assumed
- There may have been expenses debited from the scheme which were not anticipated

8

(i)

- Trustees have a duty to ensure sufficient contributions are paid so that scheme benefits can be paid as they fall due and a viable ongoing employer is needed to achieve this
- For an ongoing pension scheme any deficit could be viewed as an unsecured debt on the sponsor
- This deficit will rank alongside other creditors of the sponsor
- If a pension scheme winds up there may be a deficit that will not be paid
- The trustees will need to assess the security of accrued benefits
- and the differing priorities of various categories of members
- To aid setting the general investment strategy

- and in particular how “safe” the backing assets need to be e.g. Government Securities
- To aid setting a prudent valuation basis
- and in particular any adjustment needed to the discount rate to allow for the underlying risks
- To understand how much the employer can actually afford to pay
- and over what reasonable period the contribution schedule should extend
- Relating the employer's ability to pay to their willingness to pay
- Any trust deed & rules requirements
- Assessing the impact of any statutory minimum contributions
- Allows consideration of alternatives to cash payments e.g. charge on company assets
- Assessing trustee demands for earlier payments of contributions to make good any deficits
- Trustee decisions to trigger wind up
- or forcing cessation of future benefit accruals

(ii) **Methods**

- Trustees can adapt a number of conventional credit quality assessment techniques to assess the strength of the employer's covenant — these include;
- Assessment of the sponsor's general business outlook
- and those specific to the sponsor's sector
- Use of financial statistics and accounting ratios from published accounts e.g. interest cover
- and comparisons with similar companies
- and comparisons with previous years figures to determine any trends
- Ask for access to management accounts
- Assessment of the market view if the sponsor has issued equities or corporate bonds
- e.g. excess yield over government bonds or Merton model
- but only a small number of pension schemes will have access to this information
- Independent credit ratings from specialist credit rating agencies giving an assessment of the sponsor defaulting on its financial obligation and its subsequent insolvency
- but again only larger companies tend to have full credit ratings
- Commission an independent business review from an accounting firm or insolvency practitioner

Monitoring the covenant

- Reviewing publicly available financial information on a regular basis e.g. published accounts
- and undertake regular reviews of the sponsor's covenant using qualified professionals

- Discussing the sponsors financial position regularly with the finance director
- Ensuring the sponsor notifies the trustees of any changes in circumstances that could affect business prospects and hence member's security
- Take account of any risk based measures imposed on the sponsor e.g. levies

(iii)

- It may mean that any deficit is financially unmanageable
- The trustees may request the sponsor to make up the deficit more quickly if the scheme's financial position deteriorates
- However difficulties can arise if the employer cannot afford the contributions
- It could be argued a weaker sponsor should be permitted to defer contributions to ensure the company stays in business
- but trustees should request increase to contributions as prospects for employer improve
- Alternatively the pension scheme could arrange to have a charge on certain assets if a specified event occurs
- For example an employer insolvency or failure to achieve a specified funding level
- The charge could be on a property or other assets and be provided by the sponsoring employer or by a third party such as a bank
- Legal and actuarial advice should be considered
- It may enable the trustees to pursue a riskier return seeking investment strategy
- or enable the schedule of contributions to be structured in a way that would otherwise not have been acceptable to the trustees
- The guarantee should only be considered over a short period and reviewed at each valuation

END OF EXAMINERS' REPORT

EXAMINATION

28 September 2007 (pm)

Subject ST4 — Pensions and other Benefits Specialist Technical

Time allowed: Three hours

INSTRUCTIONS TO THE CANDIDATE

1. *Enter all the candidate and examination details as requested on the front of your answer booklet.*
2. *You have 15 minutes at the start of the examination in which to read the questions. You are strongly encouraged to use this time for reading only, but notes may be made. You then have three hours to complete the paper.*
3. *You must not start writing your answers in the booklet until instructed to do so by the supervisor.*
4. *Mark allocations are shown in brackets.*
5. *Attempt all 7 questions, beginning your answer to each question on a separate sheet.*
6. *Candidates should show calculations where this is appropriate.*

AT THE END OF THE EXAMINATION

Hand in BOTH your answer booklet, with any additional sheets firmly attached, and this question paper.

<p><i>In addition to this paper you should have available the 2002 edition of the Formulae and Tables and your own electronic calculator.</i></p>

- 1** A company wound up its defined benefit scheme three years ago and replaced it with a defined contribution arrangement which aimed to target a similar level of benefits for each current employee.

You are the actuarial adviser to the company. With reference to the actuarial control cycle, discuss how you would carry out a review on a regular basis to determine whether the original objectives are being met. [8]

- 2** You are the actuary advising a defined benefit pension scheme which provides a range of benefits on death and retirement. The ownership of the sponsoring employer has recently changed and the pension fund trustees wish to establish the strength of covenant of the new employer. Describe the investigations which you recommend be carried out and state any limitations in respect of the information which might be collected. [8]

- 3** An employer currently provides its workforce with a defined contribution pension scheme under which the only benefit currently available is a level pension for the member from a specified retirement age. The employer is reviewing the benefit provision and wishes to offer a wider range of benefits, but without altering the cost of the scheme.

(i) Outline the different benefit options that could be offered to members. [6]

(ii) Discuss the practical issues that might arise, and how these might be addressed. [6]

[Total 12]

- 4** As actuary to a final salary pension scheme you have been asked to review the commutation basis, i.e. the rates at which members can exchange their own pension for cash at retirement. The basis has been unchanged for a number of years.

As part of your review, the scheme's trustees have asked you to comment on the following three possible methods for assessing a commutation basis:

Method 1:

- the discount rate is related to the current yield on government index-linked stocks
- other relevant assumptions are determined by the actuary

Method 2:

- the discount rate is that used for valuing liabilities in the last scheme valuation (this is a long-term assumption and has been unchanged for over 10 years)
- other relevant assumptions are determined by the actuary

Method 3:

- a basis related to insurance company annuity rates
 - (i) Apart from setting a discount rate, outline which other assumptions an actuary would need to take into account under Methods 1 and 2. [2]
 - (ii) Discuss the three possible methods. [8]
 - (iii) Describe the practical problems associated with setting a commutation basis and suggest how such problems could be addressed. [3]
- [Total 13]

5 A defined contribution pension scheme was set up 12 months ago. As the advising actuary you have been asked to comment on the annual benefit statements that are to be issued to members.

- (i) Outline the reasons for issuing benefit statements to members. [3]
 - (ii) State the key information that should be included in the annual benefit statements. [4]
 - (iii) Discuss the considerations involved in the calculation of any benefit projections that may be provided. [5]
 - (iv) Outline any other information that could be added to aid members' understanding of the key information in the annual benefit statement. [6]
- [Total 18]

6 A developed country has a range of private pension provision covering around 50% of the workforce. The government of the country is planning to introduce State pension provision which is aimed mainly at those workers who currently have no private pension provision.

- (i) As the government actuary, you have been asked to advise on the general features of State pension provision and to compare the following systems:
 - flat rate contributions and benefits; or
 - earnings related contributions and benefits

Set out the points you would make in your reply. [12]
 - (ii) You have been asked to carry out a population projection using the component method. List the main factors you would take into account on carrying out such a projection. [5]
 - (iii) List the main features that apply to a projection of benefits and contributions for a State pension scheme but which do not apply to occupational schemes. [3]
- [Total 20]

- 7** You are the actuary to a large defined benefit pension scheme which is closed to new entrants. You have just completed the triennial valuation and have been asked to provide deterministic cashflow projections to the scheme's investment adviser who is planning to construct a cashflow matched bond portfolio with the scheme's assets.
- (i) Explain the advantages and disadvantages of investing the scheme's assets in this way. [7]
 - (ii) Explain why the assumptions that you have used to perform the valuation might not necessarily be appropriate for the projected cashflows that you will supply, giving examples to illustrate the points you make. [9]
 - (iii) Set out the additional assumptions that would be needed if you were to produce stochastic cash flow projections. [3]
 - (iv) Explain what additional value could be obtained by producing stochastic projections rather than deterministic projections. [2]
- [Total 21]

END OF PAPER

EXAMINATION

September 2007

Subject ST4 — Pensions and other Benefits Specialist Applications

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 A Stocker
Chairman of the Board of Examiners

December 2007

Comments

Overall the standard was in line with recent sittings, but it continues to be disappointing that questions are not read carefully enough.

Comments on each individual question are given below:

Q1 *Although the question stated the objectives, many candidates wrote about the process for establishing a DC scheme. Those who knew all the steps of the actuarial control cycle and set it out logically got higher marks.*

Q2 *A straightforward bookwork question which was generally well answered.*

Q3 *Many candidates suggested options that would change (typically increase) the cost of the DC scheme despite the wording of the question. Many candidates struggled with the practical issues arising from offering options.*

Q4(i) *Well answered.*

(ii) *Candidates did not write enough distinct points given the marks available.*

(iii) *Too many candidates simply wrote down the advantages and disadvantages of offering a commutation option.*

Q5 *Apart from part (iv), reasonably well answered but again the number of distinct points made by candidates did not bear any relation to the marks available.*

Q6 *This question was poorly answered, in particular, the reasons for offering a State benefit, with most candidates simply repeating their knowledge of State schemes. without applying this knowledge to the question.*

Q7 *It was apparent that many candidates had not met the idea of matching cashflows before. Many simply wrote about the advantages and disadvantages of investing in bonds.*

A common mistake under part (ii) was to write about discount rates and investment returns which wasted time as these were not applicable. Very few of those who answered this part correctly gave examples to illustrate the points made.

It was not clear whether the short answers given under parts (iii) and (iv) were due to time constraints or lack of knowledge.

1

Inputs

- Original target benefit at retirement
- Original levels of contribution, e.g. member / company / flat / salary related etc.
- Original assumptions and methodology
- Current commercial and economic environment

Specifying the problem

- To check whether the original objectives are being met
- To assess the risks involved in setting appropriate contribution rates and how these risks can be handled
- ..e.g. to take account of changes in the commercial and economic environment and changes in regulation and legislation
- To decide how to communicate and explain the results of the current review
- ..so to justify to the company and the scheme members any changes in the required contribution levels

Developing the solution

- Pick model
- Set appropriate assumptions for the future
- ..e.g. economic, such as salary increases, pension increases, investment return (pre and post retirement)
- ..and demographic, e.g. mortality (possibly none pre-retirement, ..post retirement based on standard tables and / or past scheme experience, ..with suitable allowance for future improvement) Test the sensitivity of these assumptions to understand risks involved
- ..e.g. by calculating a range of different contribution rates on different assumptions for the required target benefits

Monitoring experience

- Compare current suggested contribution rates with those set 3 years ago
- Assess reasons for the change
- ..by analysing experience, e.g. investment return, salary increases
- ..and the impact of any revised assumptions

Professionalism

- Actuary needs to have regard to the needs of the sponsoring employer and the beneficiaries in explaining / justifying any changes in contribution rates
- ..hence providing further explanation, as necessary, of the impact of changing from DB to DC
- ..so to ensure an understanding of assumptions and risks
- refer to legislation/professional guidance

2

- An assessment of the sponsor's business outlook in general and specific to the sponsor's sector
- ..the results are subjective and difficult to quantify
- consider financial statistics and accounting ratios
- ..e.g. interest cover and gearing/leverage compared with similar companies and previous years
- ..e.g. to spot any trends, particularly deterioration
- ..does not give an indication of absolute level of risk
- and may be out of date
- consider the market prices of issued equities and bond
- e.g. might use Merton model
- ..compare bond yields with risk free investments such as government stocks
- ..for equities, model the company's equity and debt to derive a cost and probability of default
- ..these are of limited use, as access to the necessary information may be limited
- Review of the company's credit rating
- ..usage is low as only larger companies tend to have a full rating
- might use as proxy failure score if any risk based levy payable
- Quantitatively derived credit risk from standard corporate accounting data
- ..plus confidential credit information from credit bureaux / banks
- ..based on accounting data updated annually in arrears
- ..so up to date information not easily available
- Obtain an independent business review e.g. from an accounting firm
- ..more expensive, and requires sponsor cooperation
- ..but can help assess how much the sponsor can afford
- Discussions with FD/Company board

3 (i) Benefits / options

- An option for a lower initial pension, but with subsequent increases in payment
- ..e.g. at fixed rate
- ..or in accordance with an index of prices
- Ability for part of the accumulated investment to be taken in the form of a cash sum, rather than a pension
- An option to elect to take benefits earlier than the specified date
- ..e.g. on ceasing employment
- or ill-health retirement
- ..or later than the specified date
- an option to take a transfer value to an alternative pension scheme
- ..e.g. after leaving service
- Using the accumulated fund to provide dependants' benefits before or after retirement
- ..e.g. as a lump sum or an annuity
- ..to spouses, legal or common law
- ..or dependant children

- ..e.g. up to a specified age, e.g. 25
- allow some form of income drawdown, perhaps depending on fund size at retirement
- Consider provision of a lump sum or annuity related to salary / service on death-in-service, usually insured with an insurance company
- or specified benefit if retirement on ill-health grounds
- ..with the cost of the insurance met out of the contribution rate

(ii) **Practical issues**

- Need to satisfy any legislative constraints
- or scheme rules
- ..e.g. maximum rates of increase in payment, maximum lump sum benefits, retirement ages, level of spouses pensions
- How often the options chosen can be changed
- ..e.g. the balance between benefits payable before and after retirement
- ..and / or to reflect changing personal circumstances
- ..such as marital status, names of dependants, number and age of children
- ..but to prevent selection
- ..e.g. members wishing to increase death benefits if in poor health
- Determining what evidence of health is required initially in respect of death benefits payable before retirement which are in excess of the accumulated fund
- Deciding the ages between which retirement benefits can be taken
- ..e.g. can this be before the employee leaves employment, so that retirement benefits concurrent with employment
- Setting a minimum level for the annuity in payment
- ..to avoid the payment of trivial pensions
- Determining what medical evidence is required to permit an ill-health early retirement pension
- Determining a methodology for assessing the yearly cost of the insured benefits
- ..e.g. a variable cost to reflect each year's risk, or alternatively an average cost over the period to retirement
- Need to be able to explain options to members
- aim to simplify administration
- probably wish not to over engineer any conversion terms

4 (i)

- a suitable mortality table
- based on standard tables
- ..or scheme experience, if credible
- ..with allowance for any expected improvements in mortality
- if not allowed for in the interest rate, an assumption in respect of any increase in payment which are in accordance with an index
- ..e.g. in respect of prices
- ..possibly with an allowance for any discretionary increases given in the past
- ..particularly if they have been granted on a regular basis
- if unisex terms, proportion of males/females

- expense allowance (but not if covered in part (iii))

(ii) **Method 1**

- the index needs to be a suitable match for the scheme liabilities
- ..e.g. in relation to increases in payment
- ..guaranteed / discretionary
- ..and the basis needs to relate to a stock with a term matching the expected length of annuity payments
- ..in which case the basis would be broadly cost neutral in relation to current financial conditions
- the prices and yields of such stocks likely to be volatile
- ..implying a volatile basis
- ..which may be difficult to administer
- unless it was decided that the theoretical basis was smoothed and only reviewed periodically

Method 2

- need to use the post retirement discount rate
- this is a stable basis
- ..so on the valuation basis, the option selected is neutral
- ..but the basis is not realistic, and is unlikely to be cost neutral in relation to market conditions
- there may be a large change in commutation rates if the valuation basis were to be changed
- ..which may be difficult to explain and justify to members

Method 3

- would need to choose an annuity which matched the benefit profile of the scheme
- need to decide which annuity rates to track
- ..e.g. would this be the best rates available in the market?
- ..and would need a process to monitor annuity rates with changing market conditions
- the underlying rate does reflect the value of £1 p.a. pension
- ..so is broadly cost neutral on a realistic basis
- ..but will contain margins, e.g. for insurance company profit
- need to decide how to often to change the commutation basis, given that annuity rates can change daily
- probably more expensive than funding reserve

(iii)

- the theoretical rates should be smoothed to give a stable basis
- ..which should be reviewed from time to time
- ..to take account of changing financial and demographic conditions
- the rates could be sex dependant or unisex (no credit if given in (i))
- if the tax treatment is different for pension and cash this could be allowed for
- if the scheme is not fully funded, the rates could be reduced
- allowance could be made for expenses? (no credit if given in (i))
- the basis needs to allow for any legislative requirements
- ..or may be constrained by the scheme rules (which may specify minimum or maximum rates of commutation)
- communication with members

5

(i)

- To provide information about a member's benefit entitlement and contributions
- May be required to comply with legislation
- or because competitors/other schemes provide them
- To aid member understanding of the benefits provided
- To promote the pension scheme as part of the member's total remuneration package
- and to ensure the benefits are valued by the member
- To encourage further pension provision from members as required
- Aid to assist members with financial planning for retirement
- To check basic data correct

(ii)

- Basic member details e.g. name, d.o.b. etc.
- Investment Fund choices
- return over year (either % or amount)
- Value of accumulated Fund
- Transfer value if different
- Projected fund value at normal retirement age
- Projected Pension at normal retirement age in nominal
- and in real terms allowing for inflation
- Death Benefits
- Employer contributions
- Member contributions
- Valuation assumptions used e.g. return on invested assets, annuity terms at retirement, inflation etc.
- Expense allowance
- Projections are illustrations and are not guaranteed

(iii)

- Need to state any assumptions clearly
- Need to allow for inflation to prevent giving misleading information
- Benefits could be presented in current values allowing for inflation
- and as a percentage of projected final salary
- Projections need to be presented on more than one basis
- to illustrate the sensitivity to the assumptions used
- In particular, the investment return assumed
- Best estimate or more prudent assumptions could be considered
- Allow for any expenses charged
- Allow for future pension increases if appropriate
- Normally assume that the member continues to contribute up to normal retirement age
- and the investment fund choice is unchanged to normal retirement age
- Will need to comply with any relevant legislation and any actuarial guidance

(iv)

- Include some explanatory literature on the pension scheme
- and the range of investment funds available
- Comment on the outlook for investment returns
- and on possible increases in life expectancy
- Provides a guide to benefits not a quote / guarantee
- Comments that investments may not perform in line with assumptions
- Offer of further information / helpline for members
- Make an online benefit statement / interactive modeller available to members
- Provide figures on a range of investment return assumptions
- Provide figures using a range of annuity options e.g. differing pension increases in payment
- And different forms of benefits e.g. dependents benefits, tax free cash etc
- Further advice could be sought from a financial advisor
- Show state benefits
- Show total benefits on statement
- Provide figures at an early retirement date

6 (i) General

- Needs to be affordable for all
- ..and costs acceptable in relation to the benefits for all different age groups
- If the country has a wide range of incomes, the terms of the scheme need to be affordable for the lower paid
- ..and so only suitable as a basic level of provision
- ..so likely for most of those with a private scheme already in place to be able to opt out
- ..providing the benefits offered by the private scheme are least as good as those of the state scheme

- Need population projections to decide the likely long term cost of the scheme
- could consider some form of means testing
- whether arrangement will be funded
- or pay as you go

Flat rate

- Likely to need to adjust benefits and contributions from time to time to allow for inflation
- ..but benefits earned to date unlikely to change in value
- ..so the benefits from the scheme likely to get eroded with time
- Need to maintain history of entitlement to benefit
- ..but this does not require salary history
- Need population projections so as to minimise the likelihood that contributions will need to increase over time without any change in benefits
- Need to decide how many years contributions are required to achieve the benefit for the scheme
- ..if this is set too low, then costs could be expensive in the early years
- ..with significant cross-subsidy between generations

Earnings related

- A decision will need to be made as to whether benefits are based on final salary or average salary
- Most likely average salary
- ..to avoid employers selecting against the state by increasing salaries close to retirement
- ..and with an inflation link to ensure that benefits are maintained in real terms
- The state will need to keep records of salary history in order to pay the correct benefits
- ..and there will be a significant administrative burden on employers in calculating, collecting and remitting the correct salary related contributions
- Possibility that benefits will be small for those with short employment histories
- ..which will be relatively expensive to administer
- ..so might need to consider allowing commutation of such benefits for a cash sum at retirement
- could have upper and lower earnings thresholds

(ii)

- Population subdivided by age
- ..or age groups
- by identifying factors that cause a population to change in size
- ..such as mortality, fertility, migration
- Future population size by age obtained by using deterministic recursive formulae (or if formula given)
- ..to relate the future population size to past population size
- Projections usually for each sex separately
- Need to make suitable estimates of the sex ratio at birth
- ..e.g. based on past births
- Future migration based on available data, e.g. government statistics
- ..with allowance where applicable for expected future changes, e.g. as a result of joining an economic union)

(iii) Features specific to State pension scheme

- More likely to be based on population effects and data rather than scheme membership
- ..e.g. allowing for fertility and migration
- Unlikely that individual data will be available
- ..or that projections will be made at an individual level
- Funding position, or assets may not be relevant
- ..e.g. if operated on a PAYG basis
- projections usually on open membership basis, allowing for future new members
- no fixed idea of “current” or “deferred” members; contributing membership will vary with employment activity, unemployment etc.

7

(i) Advantages and disadvantages of investing the scheme's assets in this way.

Advantages

- Cashflow generated each year will match expenditure required
- No need to make unexpected asset sales
- Bonds are liquid
- Bonds are less volatile than equities
- Bonds can deliver known streams of income which may or may not be linked to inflation
- Manages risk for sponsor
- Reduces volatility of accounting figures

Disadvantages

- Potential for out-performance of assets to subsidise future costs is virtually non-existent
- Outlook for discretionary benefit awards out of surplus therefore also non-existent
- Portfolio will need to be monitored regularly
- Expenses of monitoring portfolio
- Difficult to match benefits with caps or collars
- Difficult to match discretionary benefit awards
- Does not protect the scheme against mortality risk
- Non-Government bonds do not deliver guaranteed returns — there is a risk of default
- May not be sufficient bonds
- Bonds are not available for sufficiently long durations to meet scheme cashflows so there will be some reinvestment risk
- Model risk

(ii) Why the assumptions might not be appropriate .

- For an ongoing valuation it is the present value of benefits which is important, not necessarily the timing of those benefit payments.
- Often approximations or simplifications are made which will not greatly impact value of benefits but which will influence cash flow projections. Examples are: (candidates should explain why)
 - Commutation
 - Surrender of member's pension for dependants
 - Early retirement
 - Death in service or deferment
 - Shape of mortality table used
 - 5 year guarantees
 - Transfers out
 - Insurance of death benefits
- Cash flows might be different if using long term valuation assumptions for price inflation, salaries, etc
- In other cases deliberately prudent assumptions are made for an ongoing valuation which would not be appropriate for realistic cash flow projections. Examples are:
 - Inflation assumption
 - Salary growth assumption
 - Pension increase assumption
 - Allowance for withdrawals
 - Commutation
 - Mortality assumption
 - Proportions married

- For an ongoing valuation no attempt is usually made to project levels of future contribution income. This would need to be netted off the projected cashflows to determine the amount of income required from the matched bond portfolio.
- (iii) Additional assumptions needed to produce stochastic cash flow projections.
- Take up of options/guarantees
 - Assumptions about variance and co-variance of parameters
 - such as inflation, salary growth, mortality over period of model etc
 - Economic model to be used, e.g. Wilkie, random walk, other.
 - Time period of model
 - Number of simulations to be run
- (iv) Additional value obtained by producing stochastic projections.
- Will help to understand impact of options and guarantees
 - Will help to understand potential variability in future cashflows
 - and associated probability of those
 - Will help to understand the risk of mortality improvements being greater than projected.
 - Will help to establish a contingency reserve
 - could use to implement a hedging policy

END OF EXAMINERS' REPORT

EXAMINATION

11 April 2008 (pm)

Subject ST4 — Pensions and other Benefits Specialist Technical

Time allowed: Three hours

INSTRUCTIONS TO THE CANDIDATE

1. *Enter all the candidate and examination details as requested on the front of your answer booklet.*
2. *You have 15 minutes at the start of the examination in which to read the questions. You are strongly encouraged to use this time for reading only, but notes may be made. You then have three hours to complete the paper.*
3. *You must not start writing your answers in the booklet until instructed to do so by the supervisor.*
4. *Mark allocations are shown in brackets.*
5. *Attempt all 7 questions, beginning your answer to each question on a separate sheet.*
6. *Candidates should show calculations where this is appropriate.*

AT THE END OF THE EXAMINATION

Hand in BOTH your answer booklet, with any additional sheets firmly attached, and this question paper.

In addition to this paper you should have available the 2002 edition of the Formulae and Tables and your own electronic calculator from the approved list.

- 1** A company is proposing to cease accrual to its defined benefit pension scheme. As a consequence, all the active members will leave pensionable service and become deferred pensioners.

Discuss the options available to the trustees to meet the provisions of outstanding benefit payments, stating the risks of each option from the trustees' perspective. [8]

- 2** You have been appointed as actuary to Company X, a young and dynamic advertising agency. Employees are highly incentivised, with a relatively low basic salary but very high levels of potential performance related pay. They are all on fixed term contracts of 10 years. Voluntary turnover of staff is high, with the average duration of employment being two years. The ethos of Company X is to "recognise and reward success but not tolerate failure". The managing director has approached you with an instruction to design a defined benefit pension arrangement for the employees which is in keeping with the company ethos and the current pay structure.

Discuss the points that you would make in your advice taking into account the main features of a typical pension scheme. [10]

- 3**
- (i) List the roles the State is likely to play in relation to retirement benefit provision. [2]
 - (ii) Outline arguments for and against advance funding of social security systems. [4]
 - (iii) Describe how the State may use the taxation system to encourage provision for retirement by or on behalf of individuals. [4]

[Total 10]

- 4 You are the actuary to a final salary pension scheme whose members contribute at the rate of 5% of pensionable salaries. An actuarial valuation of the scheme has recently been completed and the following information is available:

<i>Present value of:</i>	<i>Units (million)</i>
Benefits for pensioners and deferred pensioners	170
Past service benefits for active members allowing for future salary increases	380
Future service benefits for current active members allowing for future salary increases	480
Future contributions by all current members	180
Contributions by current active members in the year after the valuation date	20

<i>Valuation assumptions:</i>	<i>% per annum</i>
Discount rate	6
Salary increases	4
Price inflation	3
Revaluation on deferred benefits	3

The average term to retirement of the active members weighted by salaries is 10 years.

- (i) Define and calculate the standard contribution rate and actuarial liability using the Attained Age Funding Method. [3]
 - (ii) Estimate the standard contribution rate using the Projected Unit Funding Method. [3]
 - (iii) Estimate the standard contribution rate using the Current Unit Funding Method. [4]
- [Total 10]

5 You are the adviser to a large self administered defined contribution pension scheme. You have been asked to analyse the potential risks for the sponsor, trustees and the scheme members under the following headings:

- Administration
- Investment
- Charges
- Member Understanding

Discuss the potential risks and how they might be mitigated.

[14]

[Total 14]

6 You are the actuary to a defined benefit pension scheme. As part of the valuation, the trustees are reviewing the scheme's investment strategy and you have recommended an asset liability modelling (ALM) exercise be carried out.

- (i) Explain why the scheme's investment policy should be reviewed as part of the valuation. [3]
- (ii) Outline the general issues that should be considered in the investment strategy review. [4]
- (iii) State the objective of an ALM exercise. [1]
- (iv) List four distinct measures of risk that could be used when setting the objectives of the ALM exercise. [2]
- (v) Describe the information you will need to perform the ALM exercise. [4]
- (vi) Describe the results from the ALM exercise, how these can be used and any limitations. [6]

[Total 20]

- 7**
- (i) List four scenarios where a defined benefit pension scheme sponsor's covenant would not require detailed investigation by the trustees. [2]
 - (ii) Describe the terms "viable ongoing" and "in distress" in relation to the status of a scheme sponsor. [2]
 - (iii) A Scheme valuation has revealed a deficit of £50m on a specified ongoing funding basis. Suggest, with reasons, what information you would need to determine whether the Scheme Sponsor is "viable ongoing" or "in distress". [11]

Given the past service deficit, the Sponsor is looking at reducing its costs and mitigating the risks of the Scheme.

- (iv) Discuss how the use of early retirement options may help. [4]
- (v) Discuss briefly the issues the Sponsor should consider if they want to propose that members exchange their pension with inflation linked annual increases in retirement for a higher starting pension without pension increases. [2]
- (vi) Outline the advantages and disadvantages for the Sponsor of offering transfer values that are 10% greater than the standard transfer values that are available to members for a limited period only. [7]

[Total 28]

END OF PAPER

**Subject ST4 — Pensions and other Benefits
Specialist Technical**

EXAMINERS' REPORT

April 2008

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 A Stocker
Chairman of the Board of Examiners

June 2008

Comments

Overall the standard was in line with recent sittings but the usual issues arose; namely:

- *not making enough distinct points given the marks available*
- *not answering the question asked*
- *not knowing/writing down enough of the “bookwork” points*

Comments on the individual questions are given below.

- Q1 Generally well attempted, although some candidates limited their answers by not considering all the options.*
- Q2 This was poorly answered, perhaps not surprising given the unusual circumstances. In spite of the clear instruction to design a DB scheme, many candidates wrote about DC schemes. Candidates did not seem to appreciate how important the company's ethos was and it was this that led to its high turnover of staff.*
- Q3 Reasonably well answered but many candidates did not write enough for part (iii).*
- Q4 Those who knew what they were doing scored well here. Others struggled, particularly on part (iii).*
- Q5 It was disappointing that some candidates considered investment risk from a DB perspective.*
- Q6 It was surprising how badly many candidates did on this question as it is a topic that has been examined many times previously. A common mistake was failing to write down enough points therefore losing “easy” marks.*
- Q7 Parts (i) and (ii) were well answered. In parts (iii) candidates concentrated on ways of assessing credit risk and did not cover other issues about the scheme or sponsor. Candidates did not make enough points in part (iv) and (vi) and it was surprising how in part (iv) many concentrated on the savings in death in service premiums rather than the more significant issues. Many candidates did not appreciate that the standard transfer value basis is usually a more optimistic basis than the funding basis and not identical to it.*

Finally the examiners have noticed a deterioration in the standard of handwriting which makes marking difficult particularly where candidates use shorthand or text speak. It would be appreciated if those candidates where this is a particular issue (you know who you are) made an effort to make their work clearer as we cannot give credit if a solution is illegible.

1

- *Continuation of the scheme without further accrual of benefits*
- Avoids cost of disinvesting / transferring assets
- No guarantee that discontinuance benefits will be met
- ..as available benefits affected by future investment and mortality experience
- Sponsor may not make good any shortfall
- Good experience may only benefit those alive at some future time
- Retains mortality and investment risk
- Still need to meet expenses

- *Transfer of the liabilities of the scheme to another scheme of the same sponsor*
- Similar points to *Continuation*
- Need availability of another scheme
- Cross-subsidy as any future surplus / deficit may be spread over larger group of lives

- *Transfer of funds to the beneficiary to extinguish the liability*
- Legislation may not permit
- Need controls to ensure that funds used for primary purpose of providing pension / cash benefits at retirement
- ..e.g. requirement to invest funds / transfer to another scheme (e.g. same or new employer) / purchase annuities at retirement
- Ultimate benefits depend on individual experience
- ..and assumptions used to capitalise benefits

- *Transfer of the funds to an insurance company to invest and provide a benefit*
- Ultimate benefits depend on individual experience
- No guarantee that discontinuance benefits will be met
- Transfer value may reflect scheme underfunding

- *Transfer of the funds to an insurance company to guarantee the benefit*
- May be expensive and require lump sum input by sponsor
- Insurance market may be limited
- Need insurance companies to be regularly monitored to ensure guarantees met

- *Transfer of the liability to a central discontinuance fund operated on a national or industry wide basis*
- Central fund needs a way to raise money to ensure guarantees can be met
- ..e.g. by means of levies on other schemes
- May expect a lower benefit level

2

- Defined benefit (or at least final salary) gives greater reward for success
- Since the formula gives credit for final earnings which would be higher in a successful career
- As long as all earnings (including variable pay) were recognised in the definition of pensionable pay
- Where employees do not perform, their variable pay is likely to be low at exit which is another reason for including it in the definition of pensionable pay for this company which rewards success but doesn't tolerate failure
- At the extreme, it might be possible to exclude basic pay from the definition entirely!
- Although this would be a very unusual design feature
- There should be no averaging in the definition of pensionable pay to incentivise the employee to perform right through his/her career
- In terms of the accrual rate, this should be better than the sector average in order to help attract talent in to the business. It is usually the thing that potential employees look at first
- It might be possible to link the accrual rate with amount of performance related pay awarded
- So that 'bonus accrual' is offered for very high performance
- But it should be noted that this might then be locked in even if the levels of high performance are temporary
- In relation to voluntary withdrawal, the company will want to encourage this for underperformers and discourage it for high performers
- It might be possible to orient the deferred pension formula around this, so that the design is more generous to those with low performance related pay
- For example, if local legislation permitted, a cap could be applied to the performance related pay element in calculating the deferred pension for a voluntary early leaver
- Considering non-voluntary leavers (and specifically those reaching the end of their fixed term contracts). The design should be structured to reward those who are still performing well at that time
- For example, by offering immediate unreduced retirement benefits (or a transfer payment of equivalent value for those who want to carry on working)
- Death (and other protection) benefits are not generally offered for incentivisation reasons
- And could therefore be excluded from the design entirely
- Although again that would be a relatively unusual design feature
- Considering now member contributions
- There is a risk under the proposed design that these will be paid on very high earnings in some years
- With the prospect of not necessarily receiving any reward for these payments if performance falls towards the end of a career
- This possibility might be demotivating even for high performers

- So it would probably be appropriate to make the scheme non-contributory (or payable on basic pay only)

Credit was given for well argued/revalued career average designs

3 (i) *Roles state plays*

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

(ii) *Arguments for and against funding*

In favour

- Increases level of savings
- Develops capital markets
- Creates extra investment that stimulates growth
- Eases the pressure of an ageing population
- Investment returns reduce the long-term cost of benefits

Against

- Overall saving may not rise, just be redirected
- Even if overall saving rises, it may not create real investment
- Does not solve the problem of an ageing population
- Transition to funding may be problematic
- Fund may prove a political temptation
- Doesn't add to security, as government can always raise revenue via taxation or borrowing

(iii) *Using Taxation to Encourage Provision*

- Provide financial incentive via beneficial tax terms
- Either full or partial relief
- Provided to provider of benefit, recipient, or both
- On contributions
 - Employer contributions deducted from profits before corporation tax
 - Employer contributions not classed as taxable income for employee
 - Employee contributions deducted from taxable income
 - Contributions subject to lower level of tax than profits / income
- On investments
 - Investment income not subject to tax
 - Investment growth not subject to tax
 - Income or growth subject to lower levels of tax
- Benefits
 - Regular income not subject to tax
 - Lump sum benefits not subject to tax
 - Benefits subject to lower level of tax than earned income
- “Exempt, Exempt, Taxed” is common (for conts, investments and benefits)
- May be upper limits on contributions and / or benefits

- 4** (i) The standard contribution is found by dividing the present value of all benefits which will accrue to active 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 active members throughout their expected future membership.
 - The actuarial liability is the present value of all benefits accrued at the valuation date based on projected final earnings
 - Standard contribution rate = $480 / (180 \div 5\%) = 13.3\%$
 - Actuarial liability = $170 + 380 = 550$ million units
- (ii) $PUC = AA \times (a \ 10 / 10) \times (1 / a \ 1)$ where $i = (1.06 / 1.04 - 1)$
- $$13.3 \times (9.0188 / 10) \times (1 / 0.9811) = 12.2\%$$

- (iii) Accrual element – allow for revaluation of deferred benefits at 3% p.a. rather than salary increases at 4% p.a. (Methods using 0% revaluation were also accepted)

$$12.2\% \times (1.03 / 1.04)^9 = 11.2\%$$

The actives liability fund allowing for revaluation of deferred benefits at 3% p.a. rather than salary increases at 4% p.a.

$$= 380 (1.03 / 1.040)^{10}$$

$$= \text{£}345 \text{ m}$$

Allowing for salary increases in the 1 year control period

$$= 345 \times ((1.04 / 1.03) - 1) = \text{£}3.35\text{m}$$

Expressed as a percentage of pay

$$3.35 / (1\% \times (20 \div 5\%))$$

$$= 0.8\%$$

Total CUM rate

$$11.2\% + 0.8\%$$

$$= 12.0\%$$

5 Administration

Risks

- Record keeping and administration may not be robust
- Leading to incorrect or late payment of benefits
- Late or incorrect payments of contributions may breach local legislation
- Resulting in lost investment return
- And hence overall poor reputational risk for the sponsor
- Fraud

Mitigation

- Establish service level agreements with providers
- Establish robust internal controls e.g. risk management / monitoring processes
- And clear line of communication amongst all parties to ensure accurate and timely
- record keeping
- Setting a clear timetable for receipt and investment of contributions

Investment

Risks

- Poor selection and review of investment managers
- Poor performance of assets
- Inappropriate availability of investment funds
- For existing and anticipated scheme membership
- Members are poorly equipped to make appropriate fund selection
- Market conditions giving higher than expected annuity prices at retirement
- Pressure on sponsor to make good shortfalls

Mitigation

- Take professional advice
- Establish rigorous process to select investment managers
- Review managers on a regular basis
- Similarly select funds for existing / anticipated membership
- Review appropriateness regularly
- Educate / offer guidance to members on fund selection
- Offer “lifestyling” or default option

Charges

Risks

- Unduly high charges
- That reduce members benefits
- Or increase employer costs
- Fixed costs may be high relative to the fund size

Mitigation

- Consider charges at setup and at regular period to ensure value for money
- Issue clear / simple information about costs
- Demonstrating how they affect the scheme and members' returns
- Limit number of switches of fund

Member understanding

Risks

- Members make poor decisions on investment or retirement choices
- Complaints from members about benefits in retirement
- Members don't understand and therefore do not value the pension provision provided

Mitigation

- Ensure members are aware of the design and types of annuities available at retirement
- And understand the alternative retirement options available to them
- Ensure members appreciate the differences between any investment options available to them.
- Including open market options etc.
- Provide members with clear and timely information to ensure they have sufficient understanding to make informed decisions (make member benefit statements available)

6

(i)

- The liability structure may have changed significantly. For example:
 - following a takeover or sale where the membership profile has changed significantly
 - or recent benefit changes such as removing the final salary link and giving all active members leaving service benefits
 - or benefit improvements
 - or legislative changes such as providing guaranteed pension increases for all service, equalisation etc.
- The funding position may have changed significantly.
- For example, surplus may have disappeared or deficit increased following a fall in the stock market, higher than expected salary increases etc.
- The investment manager may have significantly underperformed relative to its performance objective.

- For example, the manager has changed its style, staff movements, adopting too much risk.
- Also need to consider whether any Scheme events have impacted on the manager's performance e.g. a large disinvestment at short notice which adversely impacted the manager's performance relative to its performance target.
- Employer covenant may have strengthened (allowing more risk to be taken) or weakened (allowing less risk to be taken).

(ii)

- The liability profile:
 - nature (proportion of fixed or real liabilities) and term (short/long related to maturity of the scheme)
- The funding position:
 - is the scheme in surplus allowing greater investment freedom or is the scheme in deficit.
- The size of the fund:
 - whether it is increasing, static or decreasing related to maturity of the scheme, whether it is open/closed to new entrants and future accrual.
- The expected cash flow & liquidity requirements.
- Current strategy and expected costs of revising.
- Trustee and sponsors attitude to risk
- The strength of the employer covenant and its long term commitment to funding the pension scheme.
- Requirements of any trust deed & rules.
- Any legislative or taxation constraints.

(iii)

- The purpose of the ALM is to project future asset and liability cash flows using stochastic and deterministic methods to obtain a range of likely outcomes in order.
- to help in assessing the risk (i.e. probability of shortfalls) and rewards (i.e. probability of surpluses) of holding different investment strategies.

(iv) Four different measures of risk must be given to get full marks. For example:

- The probability that the Employer contribution rate rises above $x\%$ over the next 10 years is less than 5%.
- The probability that the ongoing funding level falls below 75% over the next 10 years is less than 5%.

- The investment strategy required to achieve an ongoing funding level of 100% over the next 10 years with 90% probability.
- The probability of exceeding 120% funding level on an accounting basis over the next 10 years is less than 5%

(v)

- Trustees' objectives.
- Time period for the projections.
- Funding method, funding assumptions and results (funding level and future contributions) from the actuarial valuation
- Full membership data, asset information required for the actuarial valuation
- Details of terms of any options (e.g. cash commutation, early retirement, transfer values) and guarantees as the timing of the cash flows is important in an ALM.
- Number of simulations to be run – in order to obtain reliable statistical estimates c10,000 simulations will usually be necessary.
- Economic model needed to project cash flows e.g. random walk, wilkie model
- Parameters for the model – expected returns and standard deviations of return on each asset class, the degree of correlation between different parameters e.g. equity returns and price inflation,
- Initial best estimate assumption for the model – both financial and demographic e.g. withdrawal, mortality, early retirements and proportions assumed to exercise options.
- These may differ from the funding assumptions which contain margins for prudence.

(vi) **Results**

- Statistics on the distribution (typically expressed as mean, standard deviation, lower and upper quartiles) of possible future valuation results at the end of the projection period for different investment strategies.
- The valuation results can be expressed in different ways e.g. funding level or contribution rate on different bases – ongoing, solvency, accounting.
- A range of sensible investment strategies for a particular set of investment return and risk assumptions often called an “efficient frontier”.
- Statistics on the distribution of the future net (benefit outgo less contributions and investment income) cash flows for each year over the projection period to assess the likelihood of having to realise assets possibly on unfavourable terms.

- The results above on alternative sets of assumptions to model the sensitivity of the results to different assumptions and economic conditions e.g. boom market, deflationary conditions etc.
- The ALM can identify the extreme results that fall within the tails of the statistic distribution e.g. the top and bottom 5% of an event happening. The trustees need to consider the implications if such an event happened and whether any insurance (e.g. derivatives) needs to be put in place to protect the Scheme if this happened.

Use of Results

- The range of possible investment policies is theoretically infinite hence a subset of optimal or sensible policies is determined from the model.
- These results need to be tested for robustness under alternative assumptions (sensitivity analysis).
- Following the sensitivity analysis, it is usually possible to identify a small number e.g. 3 investment strategies that appear sensible under most reasonable sets of assumptions.

Limitations

- The ALM is only a tool and is highly dependant on the model, data and assumptions used.
- Therefore the investment strategies derived from the ALM policies should not be regarded as optimal other than in the context of the model.
- The ALM does not allow for external influences such as legislative changes, medical advances which further improve life expectancy.
- May produce impractical answers such as 100% property which is not appropriate given the availability in the market, fund size etc.

7 (i) *Sponsor covenant not important if:*

- Scheme very well funded
- Sponsor covenant strong enough to be deemed as certain
- Sponsor covenant so weak as to be deemed as nil
- Sponsor has no further liability

(ii) *Viable ongoing / In distress*

Viable ongoing

- Deficit is financially manageable
- Reasonable likelihood of it being paid off
- Over an appropriate period

In distress

- Deficit financially unmanageable given sponsor's resources
- No realistic likelihood of removing deficit over appropriate period

(iii) *Determining status of sponsor*

- No specific measures to distinguish between the two.
- Trustees need to decide...
- ...seeking advice from actuaries on nature of liabilities and
- ...credit risk specialists on the sponsor's finances

About the scheme

- Size of liabilities (is the scheme 50% or 90% funded?)
- Ongoing cost of accrual or current contributions (is £50m one year's accrual or 10 years?)
- Reason for deficit arising
- Prudence of assumptions
- Liability on other measures
- Nature and term of liabilities...
- ... in particular, how long is appropriate period to restore funding
- Investment strategy....
- ... in particular, degree to which assets match liabilities

About the sponsor

- Need to assess its ability and willingness to pay sufficient contributions
- To meet benefit payments as they fall due
- £50m could be regarded as loan to sponsor
- Consider size of deficit relative to size of employer
- ... its assets (which could be realised to repay the "loan" if required)
- ... its earnings (which can be used to meet regular "repayments" to the scheme)
- Extent to which it is legally obliged to fund the deficit (if any)
- Particularly if scheme were discontinued
- Consider other company debt (how much / ranking of scheme)
- Consider if parent company who would make good any shortfall
- Various ways to assess credit risk (i.e. ability to pay), e.g.
 - Business outlook
 - Financial metrics
 - Implied market default risk

- Credit ratings
- Other risk-based measures e.g. levies
- Probability of default using Merton-type model
- Independent business review
- Assess willingness to pay by considering
 - Past practice if deficits have arisen before
 - FD's attitude / plans

(iv)

- Need to consider the terms offered on early retirement
- They may not be actuarially neutral and result in actuarial profits for the Scheme on early retirement in which case sponsor would look to encourage early retirement
- They may exclude discretionary benefits
- As the form of the benefit alters on early retirement (i.e. lower pension paid for a longer period) there is a reduction in the investment and longevity risk
- The Scheme may be able to 'buy out' the pension with an insurance company on competitive terms
- hence reducing future risk (and possibly cost)
- Part of the early retirement pension may be commuted for cash
- The commutation terms may be less generous than the cost of the pension again resulting in an actuarial profit
- This commuted pension then has no longevity or investment risk for the scheme
- Reduction in future accrual
- Is it allowed under the TD&R/legislation?

(v)

- A full communication exercise is essential to ensure informed member consent
- e.g. members appreciating that in a high inflation environment this might not be the best option for them
- If this is done on a cost neutral basis there is no financial impact
- but the longevity risk is reduced
- and arguably there is a lower investment risk
- Effectively the option is a transfer of the inflation risk (above an assumed level) from the scheme to the member

- Selection issues as option likely to be more attractive to those in ill health

(vi) *Advantages*

- The risks attributable to the transferring members are removed
- These include investment and longevity risk
- The transfer value offered may be lower than the amounts reserved for funding
- Or on the accounting basis
- hence the Scheme funding level will improve
- It is very likely that the enhanced transfer value will be lower than the cost of “buying out” the benefits with an insurance company
- There may be administrative savings over the long term

Disadvantages

- There would be cashflow implications as significant amounts of cash may be needed immediately to pay the transfer values
- There may be future complaints / compensation claims if eventually the member loses out from investment & mortality experience
- The complaints may impact on the reputation of the Company
- May be perceived as “Mis- selling” with increased sales pressure from the limited time period for the member to make a decision
- Selection issues – 10% enhancement may be attractive to certain subgroups of membership
- Informed member consent may be needed – the cost of this will borne by the Company
- and the actual take up rate may be low
- Costs of exercise may outweigh any savings
- Potential for conflict between Trustees and the employer
- The 10% enhancement will reduce / eliminate the actuarial profits for the Company
- Possible involvement from any Pensions Regulators

END OF EXAMINERS' REPORT

EXAMINATION

19 September 2008 (pm)

Subject ST4 — Pensions and other Benefits Specialist Technical

Time allowed: Three hours

INSTRUCTIONS TO THE CANDIDATE

1. *Enter all the candidate and examination details as requested on the front of your answer booklet.*
2. *You have 15 minutes at the start of the examination in which to read the questions. You are strongly encouraged to use this time for reading only, but notes may be made. You then have three hours to complete the paper.*
3. *You must not start writing your answers in the booklet until instructed to do so by the supervisor.*
4. *Mark allocations are shown in brackets.*
5. *Attempt all 7 questions, beginning your answer to each question on a separate sheet.*
6. *Candidates should show calculations where this is appropriate.*

AT THE END OF THE EXAMINATION

Hand in BOTH your answer booklet, with any additional sheets firmly attached, and this question paper.

In addition to this paper you should have available the 2002 edition of the Formulae and Tables and your own electronic calculator from the approved list.

- 1** You are the actuary to a large defined benefit pension scheme which is scheduled to undertake a funding valuation in the near future.
- (i) With reference to the Actuarial Control Cycle, set out the key stages of the valuation process that should be undertaken. [4]
 - (ii) Describe why the actual experience should be monitored. [2]
 - (iii) Suggest why you might not assume past experience will be repeated. [2]
- [Total 8]
- 2** A friend of yours has a retirement savings policy which matures shortly on her 65th birthday at which time she has to choose one of the following options:
- (a) a lump sum of £150,000
 - (b) an annual fixed single life income of £10,000
 - (c) an annual single life income of £7,000 (increasing annually in line with prices)
- Discuss the issues she should consider in making her decision. [8]
- 3** The Government of a developing country has decided to monitor the management of the country's largest defined benefit pension schemes by looking at the role of trustee boards, their documented policies and their supervision and monitoring procedures.
- (i) Suggest the key features of best practice in these areas. [7]
 - (ii) List the possible forms of controls the Government may impose to improve the security for members in each of the three areas mentioned above. [3]
- [Total 10]
- 4** You have been asked to advise the government of a developing country which is reviewing its state pension provision.
- Currently a flat rate pension is available at age 55 to all citizens, whether employed or self-employed, who have paid flat rate contributions for 10 years or more. On death, the pension continues at half rate to spouses or other dependants. The pension and contribution rates are reviewed from time to time in line with average earnings.
- (i) Over recent years, the contributions have been insufficient to meet benefit outgo, with the balance met out of general taxation. Discuss how this position may have arisen. [5]
 - (ii) Discuss possible steps which the country can take to bring contributions more into line with expected benefit outgo. [8]
- [Total 13]

- 5** A company operates a pension scheme to which both the company and the active members contribute 5% of basic salary in respect of retirement benefits. To cover expenses, the company deducts 0.5% of salary from the joint contribution before it is invested into an individual account for each member.

At retirement, the accumulated cash sum is converted into an annuity using rates which are reviewed by the scheme's actuary every three years. Annuities are paid out of the fund for the lifetime of the member, and subsequently at 50% for the lifetime of a nominated dependant.

On death in service, the scheme provides a lump sum of twice basic salary, and an annuity of 25% of basic salary payable for the lifetime of a nominated dependant.

- (i) Set out the key financial and demographic risks faced by the company. [5]
 - (ii) Discuss how these risks might be managed. [10]
- [Total 15]

- 6** As actuary to a defined benefit pension scheme, you have recently carried out an actuarial valuation which has disclosed a large and unexpected surplus on the ongoing funding basis. Legislation in the relevant country requires that any valuation surplus needs to be eliminated over the next three years.

- (i) The trustees have asked you to set out the options available to eliminate the surplus. Discuss the factors you would take into account and give examples of the different ways that the surplus could be used. [10]

Pensions in payment from the scheme are currently paid out of the fund and there are no guaranteed increases to benefits in payment. They are reviewed from time to time, and an appropriate allowance for the cost of any discretionary pension increases is made in the ongoing funding basis.

The trustees are considering buying out the liability for existing pensioners and their dependants with an insurance company.

- (ii) Discuss the issues that the trustees should consider before making a decision. [10]
- [Total 20]

7 You are the actuary advising a company which is setting up a pension scheme for the first time. It is proposed that the pension benefit for a member who is in service at the specified retirement age is calculated as the greater of:

- 1/100th of basic salary at retirement for each year of completed company service; and
- the benefit purchased from a defined contribution account funded by a contribution of 5% of salary from the member and 5% of salary from the company.

You have been asked to advise the company on the options for members who leave service before the specified retirement date.

- (i) Discuss the factors which the company might take into account when designing benefits and explain these factors in relation to possible benefit designs. [10]
- (ii) Explain the purposes and key features of the following types of actuarial valuations for this pension scheme:
 - Funding
 - Accounting
 - Cost of providing guaranteed benefits from an insurance company
 - Bulk transfer value to another pension scheme

[16]

[Total 26]

END OF PAPER

**Subject ST4 — Pensions and other Benefits
Specialist Technical**

EXAMINERS' REPORT

September 2008

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.

R D Muckart
Chairman of the Board of Examiners

December 2008

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Comments

Overall the standard was a little below recent sittings with evidence that although candidates could recite lists relating to the bookwork they struggled to apply that knowledge to the question asked.

Yet again too many candidates were not guided by the marks available for a question or part thereof and so either wrote too much or too little. It was disappointing that candidates did not structure their answers in any sensible way and illegible handwriting continues to be an issue.

Comments on the individual questions are given below.

- Q1 Generally well answered with the better candidates providing examples for part (iii).*
- Q2 Those candidates who tackled this question in a systematic way tended to score highly and avoided duplication.*
- Q3 Surprisingly given the wording of the question too few candidates looked at each of the three areas separately. Indeed it wasn't uncommon for solutions to exclude any reference to documented policies. Only the better candidates demonstrated that they understood which features are key and which are more minor.*
- Q4 For part (i) a significant minority of candidates appeared to be answering the question "how can state pension benefits be funded?". Typically too few points were covered in part (ii).*
- Q5 Again there was evidence that candidates did not understand which were the key risks faced by the company. Too many candidates trotted out a standard list of risks without relating these to the specifics of this scheme.*
- Q6 Candidates made a reasonable attempt at part (i) although there was some repetition and insufficient points made given the marks available. For part (ii) it was disappointing that many candidates failed to state the obvious that buy out removes investment and longevity risk.*
- Q7 Most candidates correctly interpreted part (i) as a question on the design of leaving service benefits (given your remit) but candidates could also score reasonably if they discussed wider benefit issues.*

For part (ii), consideration of the "key" features caused some difficulty. It was surprising how few candidates could make any sensible points on the last two type of valuation and very few related their answer to the scheme in the question – despite the clear instruction to do so!

1 (i)

- Set and validate the objective of the valuation process (Specify problem)
 - e.g. ensure reserves held are adequate to meet benefit promises
 - Future contributions are set at appropriate levels
- Planning and execution (Develop Solution)
 - Consider data requirements
 - Consider available actuarial models
 - Set assumptions
 - and consider their sensitivity
- Delivery
 - Consider professional/legislative requirements
 - e.g. Guidance notes, peer review
 - interaction with trustees/sponsor
 - Presentation material, Valuation report
 - Timescales
- Evaluation (Monitor experience)

(ii)

- To check whether the valuation model and assumptions continue to be appropriate
- Consider if any changes should be made
- e.g. to achieve a desired level of prudence
- Consider what other uses the overall results may be used for
- Use monitoring process to refine problem definition
- and development of solution
- Assess reasons for departure from assumptions

(iii)

- Credibility of the data, e.g. errors or sufficiency
- One offs e.g. redundancy exercise, re-alignment of salaries
- Changes to practices e.g. salary increase policy, tightening ill health criteria
- General trends e.g. mortality improvements
- General economic factors, e.g. recession
- Changes to legislation

2 Effectively two issues:

- choosing between a single cash payment and a regular income for life
- if income, level versus increasing

Cash versus pension:

- can she secure higher pension by taking the cash and reinvesting it?
 - by purchasing a pension elsewhere (“open market option”)
 - by reinvesting in some other vehicle
- taxation – are options taxed at same rate?
- does she have any immediate need for the cash – e.g. to pay off a mortgage
- if she takes the cash she is effectively accepting investment and longevity risks
- is she interested in / capable of actively managing investments if she takes cash
- her health – if good, and expects to live for a long time, may prefer pension
- need/desire to provide for dependants (pension is single life – unclear what would happen if she died shortly after the pension started)
- other wealth / sources of income (how important are these savings?)

Level vs increasing pension:

- outlook for future inflation
- if inflation is 3% per annum, it will take 13 years for index-linked pension to exceed the level pension
- and even longer for total pension received to exceed that under the level option
- also need to consider possibility of short-period of high inflation
- index-linked pension can be seen as insurance against erosion of standard of living due to longevity / high inflation
- so the decision depends on her attitude to these risks
- level pension means she is accepting the inflation risk
- again, this attitude may be affected by other wealth / sources of income
- and her health
- any short-term financial commitments – minimum level of income required

3 (i) *Trustee Board*

- Diverse and complementary skills
- Both technical
- And behavioural
- The Chair providing leadership skills
- Committees in place where appropriate e.g. investment committee
- Board sets clear objectives and has a business plan
- Trustee Board meets regularly with minutes taken
- Include some member representation
- Uses a risk based approach to Scheme management, regularly assessing its risks and controls

Documented policies

- Written policies covering
- Funding policy
- Investment strategy
- Risk assessment
- Protocol on conflicts of interest
- Informed decisions are made based on the above documentation
- And are reviewed and updated regularly
- Having taken professional advice

Supervision and monitoring

- Relationship with all key stakeholders (e.g. members, sponsor, regulator etc) are developed and managed actively
- Service level agreements in place
- And performance management of advisers and providers

(ii) *Trustee Board*

- Compulsory levels of trustee knowledge and understanding
- Mandatory training courses for trustees
- Power to appoint or remove trustees
- Fines/sanctions for non compliance
- Impose certain make up, eg at least one professional trustee

Documented policies

- Statement of Funding principles
- Statement of Investment principles
- Annual Reports on compliance on the relevant areas
- And production of Statutory Report and Accounts
- Trustee Business Plan

Supervision and monitoring

- Standardised risk analysis / assessment

4

(i) Lower contributions due to:

- Falling birth rates reducing number of younger contributors
- Higher average age at which individuals starts work
- ..e.g. due to greater proportion of population staying in higher education
- Failure to collect contributions from all eligible sections of the population
- ..e.g. self-employed failing to be identified, greater number of illegal workers

Higher payments due to:

- Improved mortality whilst in receipt of benefit
- Changing employment patterns result in greater proportion of the population working at least 10 years
- .. and becoming eligible for full benefits
- Prior baby booms leading to increased retirement population
- Greater proportion of those in receipt of benefits with beneficiaries
- ..e.g. due to changing marriage patterns, greater number of children, greater flexibility of interpreting what constitutes a dependant
- Poor control over when benefit payments should cease
- Inappropriate model, e.g. incorrect assumptions

[8 out of 5]

(ii) *Reduce benefits*

- General level – possible but transitional issues
- Increase age at which benefits can be drawn

- e.g. to 60 or higher
- ..perhaps in one year steps over a number of years
- Reduces ratio of retired to working population
- Benefits paid for less time overall

- Reduce the level at which benefits increase
- ..e.g. to price inflation rather than wage inflation
- Reduces total payments out over time

- Toughen eligibility requirements for full benefits
- e.g. increase number of years required to qualify for a full pension
- ..perhaps introduced over a period of years
- So fewer people get the full benefit

- Means testing
- Only pay to those who need it / income below a threshold
- Reduces number of people receiving some or all of benefit
- Greater control over definition of dependant
- ..e.g. restrict to spouses and children below a specified age

Increase contributions

- General level / rate
- make % of full salary
- Encourage private sector funding
- ..with contracting out option
- ..possibly with incentives / compulsion
- Carry out audit to identify areas where administration arrangements may be abused
- ..e.g. failure to collect all due contributions, failure to stop payments, workers ceasing payments after 10 years when eligible for full benefits
- Recognise that almost impossible to have benefit outgo exactly matching contribution income
- So build up fund/cushion against adverse experience

5 (i) Key Risks

In service only

- If lump sum not prefunded or insured, need to pay out of company resources
- Potential cashflow issues
- ..similarly for death in service dependants' benefits
- ..offsetting any release of reserves for retirement benefits
- risk that employees joining the scheme are in poor health
- ..and may result in a larger claim sooner than expected

In service and after retirement

- In respect of reserves held: Future investment rates may not be in accordance with assumptions, *similarly for*
- ..future bond rates (to match annuitant liabilities)
- ..future mortality rates for active members pre retirement, for annuitants post retirement, for dependants (½ each)
- If dependant very young, could imply a very long payment period

After retirement

- Annuity basis only reviewed every 3 years, so may get out of line with market conditions

Expenses

- Expenses greater than assumed

Other

- Poor scheme design leading to reputational risk
- Poor administration systems
- Fraudulent use of assets
- Potential cashflow issue if lots of employees or very senior employees die

(ii) **Management of key risks**

Calculation of reserves

- Hold reserve in fund based on prudent or best estimate of expected liability
- ..offsetting (in the case of death in service benefits) the release of fund held for retirement benefits
- Subject to regular review in the light of best estimate of future financial conditions
- ..e.g. investment rates and bond rates
- ..and best estimate of future mortality for actives and dependants
- ..allowing for possible future changes in mortality experience

Insurance

- Insure all or part of the risk with an insurance company
- ..e.g. a broad matching of the liability as multiple of salary
- ..taking account of the accumulated fund for retirement benefits
- ..perhaps on a profit sharing basis if the scheme is large enough
- to gain insurance cover for those who might be in poor health

Annuity basis

- Annuity basis to be market related
- ..so that it is sensitive to changes in financial conditions, particularly bond rates
- ..and ask actuary to alert the trustees to any expectation that the mortality rates used may have become inappropriate
- ..so that the annuity rates can be reviewed earlier than end of 3 year period if necessary

Open market option

- Allow employees to take an open market option
- ..so as to remove future uncertainties over longevity, investment etc

Dependant issues

- Tighten definition of dependant

- ..e.g. perhaps restrict to spouse, common law spouse, children to specified maximum age (perhaps different if in full time education), same sex partner, any other dependant with financial dependency, (½ each max 2)
- ..with specified dates for changing nominations
- .. to ensure that reserve / insurance held for all potential beneficiaries
- cease benefit on remarriage, or if reach working age
- reduce benefit if age difference very large

Expenses

- Review allowance made for expenses

Other

- Regular review of scheme benefits to ensure in line with competitors / the market
- Service agreements with administrators
- Use of custodian for assets
- Offer cash option at retirement to reduce amount used to secure annuity

6

(i) ***Factors***

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

Examples

- Benefit increases / improvements
- ..to be prioritised by category
- ..or age, length of service

- *..for active members:* enhance accrual for past service, for future service, give credit for any non-pensionable past service such as waiting periods, or periods before the scheme began, or service prior to a take over (½ each max 2)
- *..for pensions in course of payment:* review benefits to take account of inflation
- *..for left service members:* review benefits to take account of inflation
- Secure assets by switching into bonds
- Consider impact of buying out/securing some liabilities

- Introduction of new benefits / options
- ..extension of dependant benefits
- ..new options which have a financial value
- ..such as retirement at an earlier age with a lower (or no) reduction for early payment

- Reduction in member contributions over a period
- ..but bear in mind that if this is only for a 3 year period, this needs to be communicated clearly
- ..so as to avoid creating expectations for the future

- Reduction in employer contributions over a period
- Or return of surplus to sponsoring employer
- ..perhaps subject to tax
- Each subject to an appropriate communication to members to justify surplus going to the company
- ..e.g. to explain that the employer bears risks in sponsoring the scheme and meeting benefit promises

(ii)

- Consider any regulations/restrictions in their Trust Deed and Rules
- Consider attitude of Company
- A comparison of the cost of insuring current liabilities, with the best estimate of retaining liability under the scheme
- ..allowing for market testing
- Would be reinsuring future mortality risks
- particularly those associated with future improvements in mortality

- Would effectively be reinsuring future investment strategy for pensioner liability
- ..likely to be bonds with liability matched as far as possible
- Insurance would lose the opportunity to gain from future surpluses that might arise e.g. from
- ..mortality experience more favourable than expected
- ..investment terms more favourable than expected
- ..opportunity to invest in more risky (less matched) investments such as equities
- But insurance company bears risk that experience worse than expected
- A decision would be required on the division of record keeping between the trustees and the insurance company
- ..and the corresponding responsibility for communicating with pensioners
- The cost of making pension payments could be transferred to the insurance company
- ..together with associated admin functions such as tax deductions, passing tax to the central authorities, answering pensioner queries (½ each, max 1)
- although some of these functions could be retained by the scheme's administrators
- Decision required on any elements of scheme basis that are uninsurable
- ..e.g. benefits payable to non standard beneficiaries, options, steps in benefits (up or down) at particular ages, or on particular events
- Need to consider likelihood of insurance company being unable at some future point to meet its liabilities in full
- Payments to insurance company include loading for insurance company profits and expenses
- Would need to fund the cost of future increases by means of a lump sum payment in full and in advance to the insurance company
- ..so possible cash flow implications
- Cost of future increases depend on insurance company terms at the time
- ..which may not be economic if increases are small
- ..and would not wish to shop around if intention is, for admin convenience, to retain all payments with one company
- ..and insurance company may not be able to cope with any unusual features of scheme design
- Initial transfer of liabilities would require lump sum payment to insurance company

- ..so need to arrange disinvestment of current assets
- ..or alternative arrangements, such as stock transfer
- Consider whether security for remaining members is acceptable

7 (i) ***Factors***

- Company needs to set a basis that is fair and seen to be fair
- ..particularly if joining the scheme is a condition of employment
- ..and particularly for older or long service members who have accumulated a significant fund from both member and company
- ..need to consider implications if members wish to retire early
- ..e.g. as part of a redundancy exercise
- ..or on ill-health
- ..so need to consider a basis that blends at older ages to the full retirement benefit, without any significant discontinuities
- Possibly subject to a minimum age, a minimum service period, a minimum accumulated fund, or other factors, (½ each max 1)
- Benefits need to satisfy any legislative or regulatory requirements
- ..which could be maximum benefits or minimum benefits
- ..lump sum payments to member may be subject to tax
- Would want a simple design to ease administration
- Alternative costs would be considered
- If known, practice of competitors might be reflected

Possible leaving service benefits

- No benefit in any circumstances
 - Seems harsh and very unfair
 - e.g. if a significant fund has accumulated / has long service
 - Doesn't blend in to retirement benefit
- A benefit based on the members' contributions only
 - ..e.g. a repayment to the member of contributions with or without interest or investment return
 - ..or a deferred benefit payable at retirement based on the member's accumulated fund, plus future investment return

- Harsh to give repayments without interest, except possibly for very short service members
- Retaining the value of the employer's contributions seems harsh for longer service members, e.g. more than 5 years, who even though leaving service, are likely to have made a real contribution to the company
- Harsh to give no benefit for the defined benefit (DB) element, especially for older members /those close to retirement
- A benefit based on the members' and company's DC only
 - ..e.g. a repayment to the member of all member and company DC contributions with or without interest or investment return
 - ..or a deferred benefit payable at retirement
 - Much fairer for the longer serving members who get the full value of the DC account
 - ..but still no benefits from the DB element
 - Could encourage older members to remain in service, as they potentially lose a valuable benefit (even when in employment terms it might be better from both sides for member to move on)
- A benefit based on the scheme design, ie based on salary at the date of leaving, and service and contributions to the date of leaving.
 - Seems fairest approach
 - Need to consider how benefit is reviewed in period of deferment
 - ..e.g. what index is used, e.g. wage inflation, price inflation

(ii) ***Minimum Pension (Underpin)***

Even if the underpin does not appear to bite and have value at the valuation date further investigation using a stochastic model may be needed to determine if it may have some value at a point in the future.

Underpin needs to be considered on an individual basis.

Funding

- Legislative requirement
- Assumes the Scheme will be on-going
- Main purpose is to make an assessment of the future level of contributions needed
- and to compare assets & liabilities to assess the degree of security for the benefits
- Assumptions set by either trustees, sponsor or together
- Assets and liabilities will be valued on consistent bases
- The “under pin” of providing the minimum pension will be valued separately
- and any extra liabilities over and above the basic benefits will be added to the liability total
- It is likely prudent valuation assumptions will be used
- and in particular to value the “underpin”

- The valuation may also be used to develop an appropriate investment policy
- The employer may use the valuation to assess their ability to continue to provide the current benefit basis and hence review future pension provision

- The valuation will review the financial progress since the previous valuation

Accounting

- The valuation is used for the Company's financial reporting requirements
- Allows the owners of the capital of the company to make an assessment of the financial significance of the benefit obligation that exists
- and also the future financial position
- Usually completed on an annual basis
- Certain disclosures e.g. basis used, surplus deficit at year end, pension cost over the year etc are often mandatory
- Attempts to recognise the realistic cost of accruing benefits
- Best estimate valuation assumptions are used
- Assets at market value

- The valuation assumptions are usually determined by the directors of the company after taking actuarial advice
- The pension underpin is valued separately also using best estimate assumptions
- There is a more consistent approach across Companies than for funding valuations
- And consistency in the accounting treatment from year to year

Cost of providing guaranteed benefits from an Insurance Company

- Main purpose is to assess the security of members accrued benefits if the scheme had terminated / wound up at the calculation date
- All active members will be treated as early leavers
- With benefits calculated with reference to salary at the calculation date
- Benefits would be secured by purchase of immediate and deferred annuities from the Insurance Company
- The valuation assumptions are determined by the Insurance Company and are likely to be very prudent often allowing for significant margins
- especially estimates of life expectancy
- The cost will also allow for Insurance Company profit, set up and ongoing administration etc.
- The actual cost will be determined by the Insurance Company i.e. the market price at the time of purchase
- This will vary over time depending on financial conditions and competition in the market place
- The “underpin” will depend on the Insurance Companies assessment
- and may be on different financial terms to the basic benefit
- An estimate of the Insurance Company cost may be made by Scheme's actuarial advisors
- to avoid the time / effort / cost of obtaining actual quotations

Bulk transfer value

- Main purpose is when it becomes necessary to transfer liabilities and assets from one scheme to another

- It is likely that the actuarial advisors to each scheme will be asked to agree the method and assumptions to be used including allowance for the DC underpin
- It is important that the transferring and receiving parties view the terms as being fair
- There is no definitive basis
- but the purchaser will aim to maximise the bulk transfer value and the seller to minimise it with the final valuation basis usually determined following negotiation
- The “transfer values” may be calculated with reference to a number of different methodologies
- e.g. cash equivalent transfer values
- past service reserve
- accounting liabilities
- or a “share of fund” basis reflecting any surplus / deficit
- Always calculated using full data (not roll-forward as for other methods)

END OF EXAMINERS' REPORT

EXAMINATION

24 April 2009 (pm)

Subject ST4 — Pensions and other Benefits Specialist Technical

Time allowed: Three hours

INSTRUCTIONS TO THE CANDIDATE

1. *Enter all the candidate and examination details as requested on the front of your answer booklet.*
2. *You have 15 minutes before the start of the examination in which to read the questions. You are strongly encouraged to use this time for reading only, but notes may be made. You then have three hours to complete the paper.*
3. *You must not start writing your answers in the booklet until instructed to do so by the supervisor.*
4. *Mark allocations are shown in brackets.*
5. *Attempt all eight questions, beginning your answer to each question on a separate sheet.*
6. *Candidates should show calculations where this is appropriate.*

AT THE END OF THE EXAMINATION

Hand in BOTH your answer booklet, with any additional sheets firmly attached, and this question paper.

In addition to this paper you should have available the 2002 edition of the Formulae and Tables and your own electronic calculator from the approved list.

- 1** In the context of a defined benefit pension scheme written under Trust
- (i) State the main responsibilities of the Trustees. [2]
 - (ii) List the principal duties of a Trustee. [2]
 - (iii) Outline the more important Trustee powers usually contained in the Trust Deed. [2]
- [Total 6]
- 2**
- (i) Discuss why it may be appropriate for a company's accounts to include information about its pension arrangements. [4]
 - (ii) List the main items which it may be appropriate for a company to disclose in respect of its defined benefit pension scheme. [4]
- [Total 8]
- 3** The Trustees have asked their actuary to explain the key stages of the funding valuation process and produce a project management action plan.
- (i) List the key stages of the valuation process. [4]
 - (ii) Set out how the valuation process is assessed and monitored using the actuarial control cycle. [3]
 - (iii) Outline the key features of a project management action plan. [3]
- [Total 10]
- 4** As part of the latest formal valuation, the Trustees of a defined benefit pension scheme assessed the covenant of the sponsoring employer and concluded that it was strong at that time.
- (i) Outline the implications for the Scheme of a strong covenant in terms of investment strategy, valuation assumptions and payment of any deficit. [5]
- Following a period of difficult trading conditions, a re-assessment of the covenant has concluded that it is now less strong than previously thought.
- (ii) Outline how the Trustees should react to this new information. [3]
 - (iii) Outline the possible impact of this new information on the future investment strategy, valuation assumptions and any deficit payment schedule. [4]
- [Total 12]

- 5 A final salary pension plan provides only for pensions on retirement and to the spouse on subsequent death after retirement. Members pay contributions to this plan at the rate of 5% of their pensionable salary. The plan allows members to exchange up to 50% of their pension at retirement for a lump sum, on terms specified from time to time by the actuary (currently \$12 lump sum for every \$1 of annual pension). The spouse's pension payable on the death of the member after retirement is not affected by this option.

The latest actuarial valuation produced the following results:

	<i>Accrued Liabilities</i>	<i>Employer's standard contribution rate</i>
Active members	\$24.0m	13% of pensionable salary
Deferred members	\$12.0m	
Current pensioners	<u>\$10.0m</u>	
Total	\$46.0m	

The valuation assumes that active and deferred members will exchange 25% of their pension for a lump sum at retirement.

On the funding assumptions, the value of the single-life annuity at retirement is 16.

The spouses' death after retirement liabilities are approximately one-sixth of the total liabilities. Estimate stating any further assumptions you use, the impact on the total liabilities and employer's standard contribution rate of:

- (i) assuming instead that members exchange the maximum amount of pension for a lump sum. [5]
- (ii) assuming instead that the exchange terms are improved to be 90% of the value of the member's pension, on the actuarial valuation assumptions. [2]
- (iii) the combined effect of both (i) and (ii) together. [2]

One of the male members of the plan who is retiring shortly has just learned that he is not expected to survive more than one year. One of the Trustees has expressed concern that this may result in a significant additional liability to the plan should the member exercise his right to take the maximum lump sum.

- (iv) Demonstrate whether the Trustees concerns are valid. [3]
- [Total 12]

- 6** A company has recently set up a new defined benefit pension scheme which is open to all permanent employees.

Under the three headings of:

- member options
- eligibility and
- augmentations

- (a) Describe the areas over where there may be discretion in the way the benefits from the scheme are determined.
- (b) Explain for each discretion whether the sponsoring employer would wish to retain the exercise of this discretion, or be prepared to pass on the exercise of this discretion to a Trustee body.

[15]

- 7** The next funding valuation of a large defined benefit pension scheme is about to take place. The actuary is considering the mortality assumption to be used for the valuation.

- (i) State the different types of information on mortality that may be available. [3]
- (ii) Outline the investigations and other considerations that may be taken into account in setting the initial mortality rate assumptions before allowance for future improvements. [7]
- (iii) Discuss the impact of future improvements in mortality and how they may be incorporated into the valuation assumptions. [5]
- (iv) Outline how the assumption for mortality may differ for valuations for the following purposes:
- disclosures in Company accounts
 - cost of providing guaranteed benefits from an Insurance Company
 - a bulk transfer to another pension provider

[3]

[Total 18]

- 8** The corporate sponsor of a large defined benefit pension scheme has appointed an actuarial adviser to advise on the funding valuation and risk management issues.
- (i) Outline the key areas of funding and risk management activities that the sponsor's actuarial adviser may be involved with. [8]
 - (ii) Discuss the key differences of the role of the adviser to the corporate sponsor and that of the actuary appointed by the Trustees. [4]
 - (iii) The local actuarial body provides professional guidance. Outline what this may contain. [3]
 - (iv) Discuss the potential conflicts of interest if one individual advises both the Trustees and the corporate sponsor and suggests ways of managing such conflicts. [4]
- [Total 19]

END OF PAPER

**Subject ST4 — Pensions and other Benefits
Specialist Technical**

EXAMINERS' REPORT

April 2009

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.

R D Muckart
Chairman of the Board of Examiners

July 2009

General comments

Poor examine technique continues to be a concern of the examiners. Too frequently candidates do not write enough distinct points that reflect the marks available or appear not to plan their time so that all questions can be attempted. Unless a specific question requests a list, the examiners expect more than the buzzwords and reward highly those candidates who demonstrate that they can apply their knowledge to the scenario outlined in the question.

Specific comments on individual questions

- Q1** *It was clear that candidates could not distinguish between duties, responsibilities and powers and resorted to repetition. There was also evidence that candidates were not aware of what items are key and which are more minor.*
- Q2** *Generally answered reasonably but again there was little awareness of the main items to disclose for part (ii).*
- Q3** *Candidates knew the bookwork so found parts (i) and (ii) relatively straightforward but the examiners were surprised at how poor the answers to part (iii) were.*
- Q4** *Surprisingly badly answered. Those that had the right idea generally didn't make enough points.*
- Q5** *Too many candidates did not understand how to allow for commutation in a valuation basis. A review of our suggested solution should show how straightforward parts (i) to (iii) were. Part (iv) was trickier and it was disappointing that very few demonstrated with numbers. Quite a few suggested that this member should not be offered the commutation option.*
- Q6** *The majority of candidates misinterpreted eligibility and wrote at length about minimum age or service criteria so making no attempt to relate their answers to a scheme open to all permanent employees. This was disappointing. Only the better candidates recognised that the employer would wish to be involved in decisions which might increase the costs of operating the scheme.*
- Q7** *It was disappointing that candidates did not score highly on the bookwork parts of this question, mainly because too few distinct points were made. It was also disturbing that some candidates failed to state the obvious e.g. mortality is a key risk, no consensus on future improvements.*

Part (iv) caused some difficulties.

Q8 *There was some evidence that candidates are unable to distinguish between advising trustees and advising employers so perhaps not surprising that this question was not well answered.*

Parts (iii) and (iv) were particularly poorly answered with too many simply listing the technical guidance notes and what they contain for part (iii).

In part (iv) candidates fell into two camps:

- *Those who refused to acknowledge that one individual could advise both parties; and*
- *Those who did not seem to be aware of situations where different individuals (or even different firms) advice each party.*

Finally, the examiners would appreciate candidates taking a little time to ensure that their script is legible. As we have noted previously appropriate credit cannot be given if we cannot read your handwriting.

- 1**
- (i)
- Primary duty is to protect the rights and benefits of the beneficiaries of the scheme
 - With the utmost good faith
 - Maintain equity among beneficiaries
- (ii)
- Understand details of Trust Deed and Rules
 - And ensure provisions are observed
 - Ensure compliance with regulations
 - Act impartially
 - And not confer an advantage on one or more beneficiaries at the expense of others
 - Ensure proper accounts are kept
 - And relevant information is provided to interested parties as required
 - Monitor sponsor covenant
- (iii)
- Power to set employer contribution levels
 - Power to augment benefits
 - Power to wind up the scheme
 - Power to set investment strategy
 - Distribution of death benefits to dependants
 - Power to delegate duties
- 2**
- (i)
- Required by legislation/regulations
 - Important that owners of capital are aware of financial significance of benefits obligations that exist
 - .. similarly for potential owners
 - .. so as to recognise realistic costs of accruing benefits
 - .. which avoids distortions resulting from fluctuations in flow of employer contributions
 - .. and so provides consistency in accounts from year to year
 - Enables readers of accounts to form realistic opinion of company's current financial position
 - .. and potential future financial position
 - .. by making assessment of risks in light of information provided
 - ..and assumptions that are used / disclosed
- (ii)
- Elements of actuarial basis, e.g. assumptions used
 - .. and actuarial method
 - .. highlighting any changes from previous year's accounts
 - Value of liabilities accruing over year
 - Increase in past service liabilities at start of year
 - Investment return on assets over year

- Surplus / deficit over year
- ..change in surplus / deficit over year
- Pension cost over year for directors
- Contributions actually paid over year
- Expected future cash contributions

3 (i)

- Analyse / understand Scheme benefits
- Specify and obtain:
 - Membership data
 - Asset data
 - Accounting data
- Check benefits / membership data
- Undertake reconciliation of data
- Assess Employer Covenant
- Set Funding Objective
- Choose valuation assumptions and method
- Complete calculations
- Valuation results / report
- Undertake sensitivity analysis
- Undertake analysis of surplus
- Agree actual contributions to be paid

(ii) *Specify the problem (i.e. set and validate the funding objective):*

- to produce valuation results that suggest reserves will be sufficient to meet benefit promises and future contributions are set at appropriate levels

Develop possible solutions (Planning and execution):

- Consider data requirements
- Set assumptions
- Use different actuarial models /funding methods
- And assessment of different assumptions to understand sensitivities

Delivery and Evaluation:

- Presentation material
- Agree timescales
- Monitor experience and use valuation results
- to feedback into the “problem” specification
- And the solution stage of the control cycle
- Identify the causes of any departure from targeted outcome of the model from previous valuations

Apply professionalism

- Consider Legislation and
- Guidance

(iii)

- Allocates responsibilities for the component parts of the valuation process
- Good governance / audit trail
- Allows ongoing monitoring of the progress against the plan
- Producing a well managed process
- Reduce errors
- Allow sufficient time for discussion of valuation results
- Allowing the right outcome for all parties involved
- Agreed end point of valuation process
- And subsequent steps along the process
- The action plan set out who will do what
- And by when
- Setting budgets
- Aids understanding of process

4

(i) *Investment:*

- Covenant strength allows employer to underwrite any asset underperformance
- Allows investment in “risky” assets
- Maximum flexibility

Assumptions:

- Consider assumptions relative to chosen funding target
- Maximum flexibility
- Consider degree of prudence appropriate
- Taking account of strong covenant and chosen investment strategy
- Not unreasonable to allow for anticipated asset “out performance” over Gilts

Deficit:

- Payments can be afforded with relatively strong cashflows
- Deficit could be payable over a relatively short period as ‘affordable’
- Conversely strong covenant means longer recovery period should be acceptable

(ii)

- Consider reasons for reduction in covenant
- Might not be a concern if scheme is well funded
- Look at what less strong means in terms of capital strength and cashflow
- Which of these has changed and by how much?
- Need to consider the significance to the overall assessment of the covenant e.g. cashflow may be reduced as a result of difficult trading conditions but overall balance sheet strength may still be strong
- For example will the covenant still partially mitigate any default risk
- Or are there more serious concerns to meet scheme obligations over the short term
- Consider bringing the date of the next valuation forward or conduct an immediate valuation
- Instigate a regular review of covenant e.g. more than annually
- Consider if covenant will deteriorate further

(iii) *Investment*

- A more cautious investment strategy likely to be appropriate
- For example a general move of equities to bonds
- Although if current funding level is strong, a less cautious investment strategy may continue to be appropriate
- Consider contingent security to mitigate risk of any aggressive investment strategy

Assumptions

- Less flexibility
- Need to align with any changes in investment strategy
- Degree of prudence should be re-assessed
- With more prudence given greater risk

Deficit

- Consider employer affordability
- Consider alternative to cash payment e.g. charge on fixed assets
- Consider ratchets in contributions if position improves
- Consider setting up contingent contributions if position deteriorates

5 (i) *Maximum exchange for a lump sum*

Liability for Actives and Deferreds is \$36m.

Assuming 1/6 of non pensioners are in relation to dependants

Assumed valued lump sum at 12 for 1

Excluding SDAR gives \$30m.

\$30m is present value of projected pension at retirement

$\times (75\% \times 16 + 25\% \times 12)$

i.e. p.v. of pen@ret $\times 15$

Revised liability is p.v. of pen@ret $\times (50\% \times 16 + 50\% \times 12)$

i.e. p.v. of pen@ret $\times 14$

So revised liability of member's pensions = $14/15 \times \$30m = \$28m$

Revised total accrued liability is \$34m, i.e. fall of \$2m

Total normal cost is $13\% + 5\% = 18\%$ of salary

Net cost for member's pensions is $18\% \times 5/6 = 15\%$

Allowing for maximum commutation = $14/15 \times 15\% = 14\%$

Add back SDAR = $14\% + 1/6 \times 18\% = 17\%$

Deduct member contributions = $17\% - 5\% = 12\%$

Impact is a fall of 1% in employer's regular contributions

Credit was given to candidates who noted that the fall in accrued liabilities might further reduce sponsor contribution requirements.

(ii) *Improvement to 90% of value of pension*

Revised value of benefits at retirement is

$(75\% \times 16 + 25\% \times .9 \times 16) = 15.6$

Revised liability is $15.6/15 \times 30 + 6 = \$37.2m$, i.e. increase of \$1.2m

Revised NC is $15.6/15 \times 15\% + 3\% - 5\% = 13.6\%$ of salary, i.e. increase of 0.6% of salary roll

(iii) *Both (i) and (ii)*

Revised value of benefits at retirement is

$(50\% \times 16 + 50\% \times .9 \times 16) = 15.2$

Revised liability is $15.2/15 \times 30 + 6 = \$36.4m$, i.e. increase of 0.4m

Revised NC is $15.2/15 \times 15\% + 3\% - 5\% = 13.2\%$ of salary, i.e. increase of 0.2% of salary roll

- (iv) In this scenario the liability is higher if the member exchanges maximum amount for cash

Assume he:

- lives one year
- is married
- 50% spouse's pension payable
- value of 19 (3 years younger) for spouse's pension

⁽¹⁾ ignores discounting on grounds of simplicity

Just prior to retirement value of £100 p.a. of member's pension in plan is
 $100 \times (16 \times 6/5) = \$1,920$

Allowing for reduced longevity and maximum exchange for cash, value changes to $100 \times [0.5 \times 12 + 0.5 \times 1^{(1)}] + 100 \times \frac{1}{2} \times 19 = \$1,600$

So value lower than reserve held so concern misplaced

But mortality "profits" will be lower than if no exchange permitted

6 Member options

- Commutation (exchange) of income for lump sum at retirement
 - Providing such a basis is neutral to the fund, or does not cause a strain on the fund
 - ... the sponsor will be able to delegate the methodology of its calculation, and the frequency of its review to the trustee body
 - .. e.g. to reflect changing market conditions
- Transfers out / in
 - The basis will need to take account of any legislative or professional constraints, e.g. that transfers in and out should be calculated on a similar basis
 - .. which means that a TV out basis which results in low TVs could cost the company money if applied to TVs in
 - The aim of such a basis will generally be to be neutral to the fund, or at least to avoid a strain on the fund
 - .. the sponsor will be able to delegate the methodology of its calculation, and the frequency of its review to the trustee body
 - .. e.g. so as to reflect changing market conditions

- Early / late retirement basis (not ill-health)
 - Similar to transfer out
 - If the basis is generous to the employee (i.e. not neutral to the fund), the sponsor will wish to retain control to ensure that there are not excessive drains on the fund
 - .. e.g. following a downsizing
 - Employer might wish to control incidence and impact on workforce
- Ill-health early retirement basis, e.g. whether / when to grant / possibility of commuting the whole payment
 - If the basis is generous to the employee (i.e. not neutral to the fund), the sponsor will wish to retain control to ensure that there are not excessive drains on the fund
 - If the scheme is large, and it is possible to set a contribution rate and reserve in advance, it may be possible for the sponsor to set out guidelines for the trustee body to operate
 - .. which are reviewed from time to time
- Surrender for additional dependants pension
 - Similar to commutation
 - Watch for health/selection issues

Eligibility for benefit

- Distribution of death benefits, e.g. on death in service
 - There should be a reserve (or insurance payout) available for distribution
 - .. so generally not a cost implication for the sponsor
 - ..and it will generally be satisfactory for the trustee body to collect suitable evidence and make a decision on which of the (possibly competing) parties should receive the payout (as lump sum or annuity)
- Benefits to partners / dependants (e.g. non spouses / dependant children)
 - If such benefits not specified in rules, then trustee body will wish to agree the rules underlying the provision of such benefits from time to time with sponsor
 - .. and both parties will wish to ensure that the cost of providing such benefits is established in advance,
 - ..e.g. by an addition to the contribution rate, or lump sum payments by the employer from time to time
 - .. subject to review from time to time

Augmentations

- Augmentations above the benefits in scheme rules, e.g. granting extra service
 - Possibly significant cost implications to sponsoring employer
 - ..e.g. if augmentations being granted to senior employees or directors (as part of a Golden hello)
 - .. so sponsoring employer will therefore wish to retain control in general
 - .. unless additional costs per employee are small (e.g. waiving a short service qualification)

- Increases in payment above those guaranteed in rules
 - cost implications to sponsoring employer who will therefore wish to retain control in general
 - .. unless a policy already in force which has been allowed for in funding
 - .. such as to top fixed increases in payment up to a prices index, with advance funding
 - .. with costs subject to review from time to time

7

(i)

- Assumption used last time / Scheme experience
- Historic levels of mortality for the country as a whole
- Historical population data for similar countries
- Industry / Sector data
- Insurance Company data
- Projections of mortality improvements for country
- Medical papers about future longevity
- Mortality Studies (academic research / actuarial profession studies)

(ii)

- Actual scheme experience
- e.g. exposed to risk of each member at each age, number of deaths at each age or amount of pension ceasing on death at each age
- But is data sample large enough
- Past data may not provide an estimate of the future experience
- Need to allow for changes in mortality over time (projections for mortality improvements)
- Need to also consider changes in social & economic conditions,
- Random fluctuations / potential errors in data,
- Changes in balance of homogenous groups,
- Heterogeneity
 - Executives/non executives
 - Geographical location
- Consider use of standard tables
- With an appropriate adjustment for the membership
- Mortality is a key risk and has a significant impact on the liabilities
- Allow for prudence as appropriate in the funding valuation
- Mortality assumption pre / post retirement
- Interaction with Funding Method
- Any Professional / Statutory requirement or recommendations

(iii)

- Health improvements mean longevity is expected to improve over time
- So pensions paid for longer leading to increased cost
- A large part of longevity risk is this unknown future improvement
- No consensus on how rates will improve over time
- Trends in mortality are increasingly important

- Any base mortality table (with appropriate scheme specific adjustment) will need to be projected to allow for mortality improvements

Methods of projection include:

- Process based projections — modelling trends in the cause of death
- Extrapolative methods with historical trends projected into the future
- Allowance for cohort effects can be built in — mortality improvements by year of birth or “cohort”
- Possibly with a floor to improvement levels
- Simplistic approach of allowing for improvements by reducing the probability of death ($q(x)$) by say 2% p.a. overtime.
- Or reducing the discount rate by say ½% p.a.
- Stochastic modelling approaches can be used

(iv) *Disclosures in company accounts:*

- May simply follow the funding assumption
- Or may strip out the degree of prudence
- And use a “best estimate” assumption

Insurance company “buy out”:

- Likely to be more prudent with a significant margin
- A more sophisticated approach to rating may be adopted
- e.g. individual rating by post code analysis
- Influenced by “market pressure” on total buy out price

Bulk TV:

- Assumption needs to be “agreed” by both actuarial advisers
- Likely to be on a best estimate basis
- But will depend on the methodology used
- E.g. could be individual TV basis, accounting basis or “share of fund”

8 (i) *Funding:*

- Input on implication of Covenant assessment on valuation process
- Advice on funding strategies and implications for contribution levels
- Advice on alternatives to cash funding
- Review and input into valuation assumption
- Including management of mortality risk
- Deficit / surplus management
- Including efficient management of company's capital structure
- Valuation updates — deficit position / sensitivity analysis
- Review proposed scheme factors where there are cost implications

- Help Company understand the trustees perspective to any proposed benefit changes
- Advice on optimum / suitability of investment strategy

Risk management:

- Analysis of pension risk on Company financials (balance sheet / cashflows)
- Including Stochastic modelling, VaR analysis
- Managing closed DB Schemes if appropriate
- Advice on Insurance Company buy outs
- M&A / Pension Scheme mergers
- Pension Scheme Governance
- Enhanced Transfer Value exercises
- Investment risk management / investment products
- Accounting — calculation, analysis, assumptions, interpretation
- Future benefit design considerations
- Remuneration strategy
- Advice on regulatory/legislative requirements

(ii)

- Trustee Actuary is appointed by Trustees who have a duty of care to members
- And operate within Trust Deed and Rules
- Corporate Actuary is appointed by Company only
- This avoids potential conflicts

Funding:

- Trustee perspective is based on prudence
- Company may be more focused on best estimate assumptions
- And may have a specific corporate agenda e.g. minimise cashflow etc.
- The covenant assessment is key for Trustee adviser and the interaction of investment strategy, covenant and funding assumptions underpins any decisions

Risk management:

- Many solutions e.g. buy out are driven by the employer not trustees
- However investment strategy is generally determined by Trustees with consultation with Employer
- The Trustee adviser will only be concerned by the defined benefit scheme and the current benefit structure in the scheme rules
- The corporate advisor has a wider remit and will consider the bigger corporate picture and possible changes to the scheme

(iii)

- A document covering professional conduct and standards for advice could be issued to all actuaries
- By issuing Standards and Guidance
- Setting out general principles and ethical standards
- The aim may be to achieve a minimum level of competence or consistency in approach
- The guidance may relate to the application of professional conduct to specific aspects of the work of an actuary
- Including the interpretation of relevant legislation
- The professional guidance may provide a useful checklist of required actions
- Or it may replace detailed regulation

(iv)

- The actuary has two separate clients — the Trustees and Employer
- Advice to each client should be unaffected by interests other than those of the client
- there is potential conflict between the advice that could be given to the Trustees and the Employer
- e.g. setting contribution rates, impact of benefit changes
- Hence the advice might not be independent
- Or might not be perceived to be independent

Mitigated by:

- Strict terms of engagement / appointment letters for both parties
- Agreement from both parties that the advice can be given
- Ensure the advice is clearly addressed to Employer or Trustees
- With relevant consent copy advice to both parties
- Seek an alternative actuary for one of the appointments

END OF EXAMINERS' REPORT

EXAMINATION

5 October 2009 (pm)

Subject ST4 — Pensions and other Benefits Specialist Technical

Time allowed: Three hours

INSTRUCTIONS TO THE CANDIDATE

1. *Enter all the candidate and examination details as requested on the front of your answer booklet.*
2. *You have 15 minutes before the start of the examination in which to read the questions. You are strongly encouraged to use this time for reading only, but notes may be made. You then have three hours to complete the paper.*
3. *You must not start writing your answers in the booklet until instructed to do so by the supervisor.*
4. *Mark allocations are shown in brackets.*
5. *Attempt all seven questions, beginning your answer to each question on a separate sheet.*
6. *Candidates should show calculations where this is appropriate.*

AT THE END OF THE EXAMINATION

Hand in BOTH your answer booklet, with any additional sheets firmly attached, and this question paper.

<p><i>In addition to this paper you should have available the 2002 edition of the Formulae and Tables and your own electronic calculator from the approved list.</i></p>
--

- 1** The valuation of a defined benefit scheme which has 50,000 pensioners is now due.
- (i) Describe the factors the actuary would take into account in setting a suitable mortality assumption for the forthcoming valuation. [5]
 - (ii) Indicate how the approach might differ if the scheme had only 50 pensioners. [2]
- [Total 7]

- 2** A defined benefit pension scheme provides a pension benefit at age 65 based on salary at age 65 and service with the company. All scheme members are in service and there are no pensioners or deferred pensioners.

The Trustees have written to all members to tell them that the scheme is to be wound up with members' benefits under the scheme bought out with an insurance company. Members have been told that the scheme assets are sufficient to purchase benefits which are 50% of those which they would have received if they had left service just before the wind up commenced.

- (i) Discuss how a member might have assessed their expected benefits from the scheme had the wind up not taken place. [4]

A member has complained that his benefits following the wind up are well below his expectations.

- (ii) Outline the points to be made to the member in reply. [6]
- [Total 10]

- 3** The government of a developing country wishes to encourage employers to sponsor arrangements that provide for employees' income in retirement.

- (i) Describe how the government could encourage such arrangements. [5]

- (ii) List the ways that the government could improve the security of such arrangements. [7]
- [Total 12]

- 4** You are the actuarial adviser to the Trustees of a defined contribution pension scheme. Currently the Trustees of the scheme use the accumulated fund at retirement to purchase an annuity with an insurance company in the name of the member.

The Finance Director, on behalf of the sponsoring employer, has suggested that, for future retirements, the scheme should retain control of the investments after retirement and pension benefits paid directly from the scheme.

Explain the factors which the Trustees should take into account when considering this suggestion. Your answer should cover:

- the level of the annuity
- details of any regular monitoring required
- how any funds could be invested, and
- any possible statutory issues

[12]

- 5** A country with established occupational pension schemes is expected to experience a sustained period of high inflation combined with very low investment returns.

(i) Discuss the possible impact on both members and sponsors of the country's funded defined benefit pension schemes. [9]

(ii) Outline the possible impact on members of defined contribution plans. [4]

[Total 13]

- 6** An international company operates a single defined benefit pension scheme for all its permanent employees above a certain grade who work in the country in which the head office is located. The Finance Director has sought advice on extending the scheme's eligibility to cover all employees worldwide without any change in the level of benefits provided.

Set out the points to be made in reply covering:

- the issues associated with the design of the scheme
- funding
- investment strategy
- any other issues associated with running a scheme internationally

[16]

7 The Trustees have asked their actuary to review some of the scheme's actuarial factors.

The factors have been unchanged since the inception of the scheme 20 years ago. Since that time the commutation factors used to calculate the amount of pension a member gives up in exchange for cash at retirement have been fixed for males and females at £9 of cash for each £1 per annum of pension.

There have been no payments of transfer values or any early retirements during the last five years and the Trustees believe the terms should be improved to provide a greater incentive for members to transfer or retire early.

- (i) Set out the general and actuarial issues that need to be considered in a review of transfer values, commutation factors and normal health early retirement terms. [9]
- (ii) Discuss how the actuary might make allowance for commutation in funding the pension scheme. [4]
- (iii) Outline how the actuary would assess the impact of commutation as part of the analysis of surplus and explain how they might use the results of this analysis. [4]
- (iv) Outline the possible impact on the cost of the scheme if the actuarial factors for the three options are made more generous for the member. [3]

The Trustees are considering whether different early retirement terms should apply to members retiring early on the grounds of ill-health.

- (v) Discuss the considerations which should be taken into account when determining appropriate terms for members retiring early on ill-health grounds. [10]
- [Total 30]

END OF PAPER

Subject ST4 — Pensions and other Benefits

Specialist Technical

September 2009 examinations

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.

R D Muckart
Chairman of the Board of Examiners

December 2009

Comments for individual questions are given with the solutions that follow.

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The standard of solutions for this exam was somewhat lower than the examiners were expecting. Often this was because candidates ignored the instruction in the question and simply listed their standard points on any topic even where discuss or describe had been asked. Such an approach is unlikely to be successful.

Possibly in an attempt to avoid repetition, which has been commented on in earlier reports, the examiners have noticed a move towards writing at length on minor or even irrelevant issues. The examiners are looking for candidates to demonstrate an understanding of the key issues.

Handwriting is not always as clear as it could be and the problems caused by poor handwriting are compounded when combined with poor/cramped layout to solutions.

Turning to our comments on each question:

1

(i)

- Consider degree of prudence required.
- Determine base table
- If sufficient historical data to be statistically credible, use this to produce scheme specific decrement tables, *or*
- use rates from standard tables
- .. adjusted to fit experience of scheme.

When considering underlying data from past experience:

- Consider how changes in social and economic conditions will affect view of future
 - possible impact from abnormal fluctuations
 - changes with time
 - random fluctuations
 - changes in way data recorded
 - potential errors
 - changes in balance of homogeneous groups
 - use judgement and analyse fluctuations and trends
- Consider whether different assumptions could be used for different membership types e.g. Executives, office vs factory workers etc.
- Or group by location/pension amount (if credible)
- Derived rates need to be projected to allow for improvements up to current date and into future

Decide on method of projections:

- .. e.g. process based — model trends in cause of death
- .. or extrapolate by projecting historical trends
- .. allow for possible cohort effect
- .. simplistic approach is to assume x% p.a. improvement

- .. stochastic approaches
 - .. or reduced discount rate
 - ..consider heterogeneity with group to which assumptions are to relate
- (ii)
- Scheme data unlikely to be credible
 - ..therefore use standard tables
 - ..or rates underlying insurance company premium rates if annuities insured
 - ..if available or can be deduced
 - Project expected mortality into the future
 - ..likely to use simplistic approach

Generally answered well.

2

- (i)
- Member is likely to have information provided by the scheme trustees, e.g.:
 - announcements
 - booklets
 - past benefit statements
 - annual reports
- So as an in service member, he/she could expect benefits
- based on service to date
 - and with further accrual based on future service
 - allowing for inflationary growth, so based on salary when reaches age 65
 - without any reduction to reflect the funding position of the scheme
 - and with any practice of granting discretionary increases to pensioners (if applicable) to continue when he / she reaches retirement
 - and benefits at least equal in value to own historical contributions
 - and with any options, e.g. commutation, early retirement, transfer values, continuing to be available.
- (ii)
- Winding up process is in accordance with scheme documentation.
 - and any applicable legislation
 - It has been decided to pass risks to insurance company.

Benefits

- Starting point is leaving service benefit, so salary is at date of wind up not salary at age 65 (so salary link is broken).
- but winding up benefit may incorporate some level of revaluation in the period up to retirement (state what), in lieu of future salary increases
e.g. as though had left service.

Funding

- Unfortunately, assets are sufficient to purchase only 50% of leaving service benefits from insurance company on this basis.
- Cross reference to latest published funding position, e.g. on funding basis / discontinuance basis which shows figures and caveats.
- Comment on any changes in financial conditions which might have changed / worsened the position.
- .. e.g. fall in equity markets, reduction in interest rates, changes in insurance market
- State obligation, if any, of company to make up some or all of any shortfall.

Security

- State that benefits now guaranteed by insurance company, and not subject to market, and employer's covenant
- ..what protection available if insurance company runs into difficulty.
- State any options available following wind up, e.g. TV, early retirement, commutation.

This was quite poorly answered with most candidates concentrating their solution to part (ii) on the insurance company's pricing basis. Answers to part (ii) should have concentrated on points suitable for passing on to a member.

3

(i)

- Contributions: Full / partial tax relief for employer and / or employee.
- Investments: Dividends and growth exempt from tax, or lower tax rate.
- Benefits: Income / lump sum exempt from tax, or lower tax rate.
- Perhaps subject to maximum limits.
- Compulsory minimum contributions: employees, employers (on behalf of employees).
- Compulsory minimum benefits or values sponsored by employer, or by individuals through insurance.
- Maximum charges by managers of benefit provision.
- Educate employers and citizens on need for good pension provision.

- Reduce or remove any state pensions.

(ii) Funding

- require advance funding
- impose minimum funding requirements
- require assumptions to be prudent eg little or no allowance for asset out-performance in financial assumptions
- requiring schemes to hold additional capital to absorb market shocks
- regular checks on adequacy of funds

Security of assets

- segregation from sponsor's other assets
- trustee control of funds
- authorisation for management or investment of funds
- restriction on types of investments

Additional security

- financial guarantees from sponsoring employer
- insurance against inadequacy of funds due to malpractice
- letters of credit from bank
- minimum credit rating from organisations managing scheme finances
- compensation fund, funded by levies
- supervision of finances / marketing practices of commercial benefit providers
- outstanding benefit obligations as high priority in case of company insolvency

Other

- establish regulatory body
- benefits available if employees leave service
- regular disclosure of information to members
- reporting bad practice to state regulator

A bookwork question which was well answered by most candidates.

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- Currently the level of annuity for each member will depend on insurance company terms at the date of each retirement.
- The scheme will now need to set its own annuity terms
- Might want to restrict choice e.g. pension increases, dependant's pension

Need assumptions for:

- Future mortality
- Allowing for possible future improvements in mortality.
- Future returns available to match annuity payments.
- Typically based on the returns expected from suitable government securities or corporate bonds.
- Decision on whether to offer unisex or sex specific terms.
- Possible allowance for administration expenses

Monitoring

- In relation to pensioners, scheme becomes defined benefit
- Regular monitoring of the balance of assets and liabilities and of future cashflows will be required
- to ensure that there will be sufficient assets to meet annuity payments when due.
- There needs to be a process to remedy any deficits
- .. e.g. a schedule of payment by the company to the scheme
- .. and hence consideration of any covenant issues.
- Or deal with any surpluses
- .. e.g. distributed to the company, if permitted by legislation
- .. and / or to the members (e.g. as an increase to the annuity in payment)
- .. or as a lump sum, if permitted by legislation.

Investment

A decision will be required on the investment of the assets held in order to:

- match the term and nature of the pension liabilities
- balance risk with return
- typically government securities or corporate bonds
- ..with appropriate coupon, term, and rating
- Could construct suitable swaps portfolio to match expected cashflows but likely to be expensive
- ..but possibly other types of assets, e.g. equities
- as proxy hedge against uncertain mortality improvements
- ..or in respect of any surplus in the fund

- Consider longevity bonds.

Regulatory / legislative

- The approach to be adopted will need to satisfy regulatory and legislative requirements. e.g. with regard to disclosure in relation to:
 - to the investments held
 - the returns achieved
 - the risks taken
 - the level of solvency
 - including any funding plan
 - the treatment of any surpluses
 - consider professional guidance.

Other

- The size of the scheme and hence the volatility of the mortality experience
- which would be increased by self-insurance.
- member could have option to insure pension, if desired
- trustees should explain risks to member (not “guaranteed” like insurance)
- consider why FD has suggested this
- Trustees main concern is member security

It appeared that only a minority of candidates realised that the main point to address was that the scheme would effectively become defined benefit post retirement with the corresponding monitoring and investment requirements. Many candidates repeated the points they had made in Q2 on how an insurance company would set their annuity terms.

5

(i) Impact on DB schemes

Members

Benefits affected

- revaluation in service
- revaluation between leaving and retirement
- escalation in payment
- **Higher absolute levels of benefits if amounts are linked to inflation**
- directly, if increases linked to appropriate indices

- indirectly, if salary increases are relative to inflation
- **Lower real levels of benefit if benefits are non-increasing**
 - or fixed below level of inflation
 - or if cap applies to level of inflation
 - or salary increases not tied to higher inflation
 - Unless sponsors can be persuaded to top up benefits on a discretionary basis
- **Possible reduced security due to**
 - reduction in employer covenant if recession occurs
 - reduced funding levels ...
 - ... due to higher benefits / low (negative?) investment returns
 - ultimately possibility of losing job if higher contributions to DB scheme tip company into insolvency
- **Possible benefit reductions due to financial pressures on sponsors**
 - future accrual reduced
 - increased member contributions
 - scheme terminated, only vested benefits
 - non payment of discretionary benefits
 - less than 100% cash equivalent transfer values

Sponsors

Effect on funding

- reduced surplus / increased deficit possibly meaning higher contribution requirements
- or higher risk based levels to any cdf
- higher cost of future accrual,
- as benefit increases are either higher than assumed or unaffected,
- likely to be lower investment returns than assumed.
- May take some time to emerge depending on next formal valuation
- .. when financial assumptions may be strengthened.
- May be sooner if there are trustees actively monitoring funding levels ...
 - ...or covenant of employer deteriorates
 - ...or statutory triggers.

Investment strategy

- May encourage investment in riskier asset classes in pursuit of higher returns.
- Which in turn increases volatility of funding levels and contribution requirements
- Or Company may seek less risky assets to reduce future volatility.
- Increased cost of benefits in company accounts

(ii) *Impact on members of DC plans*

- Past projections of retirement income unlikely to be achieved.
- Reduced purchasing power / higher annuity costs leads to a “double whammy”.

Due to:

- Lower actual investment returns will reduce funds available to secure pension at retirement.
- If yields on bonds fall, increases cost of securing benefits at retirement.
- If expected longer-term inflation is higher, may also increase cost of securing pension at retirement (if pension increases linked to inflation).
- So, lower benefits for those approaching retirement, unless invested in assets which closely match annuity costs.
- Increased expenses as providers seek to recover increased costs.

Other possible effects

- Company may seek to reduce costs by reducing pension contributions.
- Perhaps reduced member contributions (where members have the choice) due to:
 - need to meet high increases in cost of living (utilities, fuel, food)
 - perceived poor value of DC plans.
- Or higher member contributions to maintain previous expectations (if this can be afforded),

Often candidates did not state the obvious points. Too many failed to include any discussion on the issues they identified for part (i).

6

Scheme design

- Different territories may have different employment practices, e.g.:
 - the split of staff between part time / fulltime,

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- permanent / contract,
- different make up of salary (basic / bonus).

The current scheme basis may not culturally fit local conditions

- ..e.g. if it assumes a stable pattern of earnings which peak towards retirement
- ..or if it is dissimilar to the benefits offered by competitors
- ..or the balance of benefits between in service / left service / retirement does not fit local needs
- .. or a certain part of the benefit package turns out to be too expensive
- ..such as significant death benefits provided in a territory with poor health care.
- May not be easy to tweak scheme basis to cover financial conditions e.g. inflation, in all territories and currencies
- ..e.g. revaluation of benefits pre retirement, increases in payment
- ..so might need to end up with different benefits in different territories.
- Different territories may have different social security systems.
- There may be an opportunity to “contract out” of state arrangements in some territories

Funding

- To assess long term costs need to set financial assumptions
- ..and demographic assumptions
- .. but suitable demographic data may not be readily available for all territories
- ..and will need assumptions about likely take up from employees
- ..and funding method.
- Arrange calculations for likely long term increase in costs to employer
- ..offsetting any saving from cancelling existing arrangements.
- Decide on whether to offer past service credits for those previously excluded
- If scheme can contract out of state arrangement
- ..this might lessen the cost of extending the scheme membership and so the cost to the employer.
- Similar calculations to assess likely affect on employees.

Investment strategy

- Would need to be reviewed so as to consider how to match assets with liabilities
- in different territories and different currencies
- and consider whether to earmark investments in different territories / currencies
- if permitted or required by legislation / regulation.

OTHER

Regulation

Different territories are likely to have different requirements:

- e.g. over solvency funding
- treatment of surpluses / deficits
- disclosure requirements
- taxation
- minimum benefits, increases etc.
- Discrimination laws
- ..it may not be possible to accommodate all these (possibly conflicting) requirements within one scheme.

Legislation/ documentation

- The different legislative requirements in different territories may result in complicated scheme documentation / announcements / disclosure documents
- ..possibly needed in different languages / formats to suit local conditions.

Communication

- There would need to be a communication process, possibly on many sites and in different countries.

Existing arrangements

- If employees join the scheme for future service, need to consider transitional arrangements to deal with any existing arrangements.
- ..e.g. whether to allow existing employees the option to continue with these, and for how long.

Covenant

- Likely to be even more important to monitor it as scheme size will grow.

Administration

Need satisfactory processes to:

- collect and invest contributions
- maintain records
- pay benefits
- arrange common computer systems

- taking account of local issues such as different currencies
- ensure security of member data worldwide.

There was little evidence that candidates had thought about the scenario outlined in the question with many missing the international aspects so did not address the suitability of the scheme for local needs. Some candidates limited their points on funding to a list of the alternative methods and didn't consider how the assumptions might be set.

7

(i) Rules and legislation

- What do the scheme rules require?
- Compliance with any legislative requirements
- e.g. age discrimination, sex equality.

Type of basis

- Are the terms to be cost neutral.
- Or should TV be less than expected cost of providing benefit within the Scheme.
- Should the terms be fixed or market related.
- Pragmatic scales / ease of administration

Employer

- Consider employer objectives
- e.g. encouraging early retirement to reduce active workforce.
Or encourage commutation to reduce risks.

Considerations

- Uni-sex or sex dependent rates.
- Allowance for discretionary benefits
- Eligibility criteria.
- Why has take up of TVs and early retirement been so low.
- Competitor's rates.
- Member's expectations.
- Value for money for previous TVs in.
- Expenses of calculation and payment.
- Consistency of transfer out and transfer in terms.

Assumptions

- assumptions will need updating regularly, these include:
 - mortality assumption
 - interest rate assumption
 - pension increases
 - consider any reduction for underfunding
 - actuarial neutrality / equation of value
 - allowance for taxation in commutation factors

Practical issues

- Timing of new factors
- Communication of change
- Any contractual issues

(ii) *Allowance in funding*

Need assumptions for

- amount of pension commuted or cash taken
- conversion terms

Amount

- could be zero (i.e. no allowance is made for commutation)
- could be maximum amount allowable or something in between
- degree of prudence depends on whether the conversion terms are equivalent to the value of the pension given up
- e.g. if terms are such that lump sum is less valuable, assuming no lump sum is taken is the most prudent assumption

Terms

- current factors could be used
- or it might be appropriate to allow for them to increase as longevity improves
- if commutation terms are market related (but not necessarily equivalent in value to pension on funding basis) then simple adjustment might be made to value of pension

(iii) *Analysis of Surplus*

- For each member who retired since the last valuation.

- Compare the amount of cash taken with that assumed.
- If different, consider contribution to surplus or deficit.
- Depending on whether terms are less / more valuable than pension respectively.
- Sum across all members who retired between valuations.
- If individual analysis impractical (very large scheme and/or poor data), then approximate methods may be acceptable.
- e.g. identify total commutation lump sums paid from accounts
- and work back using typical terms to approximate contribution to funding position.

Uses

to review commutation assumptions — consistently large amounts in analysis suggest reviewing:

- assumptions (unless basis deliberately prudent), or
- terms (are factors too generous / penal to members)
- to set/justify assumptions for other valuations e.g. if best estimate required for accounting even though not allowed for in funding
- need to be sure that we have credible amounts of data

(iv) Cost impact

- The commutation terms are not currently offering full actuarial equivalence for the pension surrendered so there is a “gain” when pension is exchanged for cash.
- Improving the commutation factors will reduce this gain
- but may actually increase the total amount of pension exchanged for cash
- so the overall cost of the scheme may actually reduce.
- So improving the transfer value and early retirement bases may continue to generate profits on the funding basis
- However legislation may restrict terms to at worst the “best estimate cost” so maybe no change to expected long-term cost.
Administration expenses may increase if more quotations.

(v) What are terms under which ill-health ER might apply?

Eligibility

- Consider any statutory requirements.
- Is ill-health retirement option to be a right, or a discretion for trustees / sponsor?
- Set terms for eligibility for ill-health benefit .. e.g. minimum age, e.g. 25 / 30?
- May wish to apply a minimum service qualification, e.g. 2 years?

Evidence

- What evidence of health is required to be eligible for benefit?
- .. e.g. independent certification by company doctor / own doctor?
- .. inability to carry out own job / any job? (or any other appropriate definition).
- Is continued monitoring / certification required after benefit starts, e.g. on an annual basis.
- Should the trustees introduce medical evidence / declaration for new scheme members to screen out potentially expensive early claims.

What should basis be for calculating benefit payable?

- Different (e.g. lower) accrual rate to main benefits?
- Based on accrued service only?
- or including some or all potential service?
- Perhaps depending upon extent of ill-health.
- How does basis compare to that for normal early retirements e.g. expectation for ill-health basis to give higher level of benefit
- Could compare to cash equivalent transfer value
- Consider level of dependants' benefits

Funding/long-term cost

- Need to consider effect on the employer's long term costs
- Is any historical data available from company records or from general industry data.
- Should the trustees increase employer or employees' contribution to scheme to offset additional costs by reserving for potential claims
- or should the company top up the fund when a claim arises
- or can such a risk be insured in whole or in part.

What disclosure / Scheme documentation is required?

- Determine the extent to which the underlying basis is to be determined in advance and disclosed to scheme members e.g. in announcement / booklet / rules.

Some candidates distracted themselves in part (i) by writing (at length!) about liquidity and cashflow issues if the take up of transfer values and commutations increased.

For parts (ii) and (iii), most candidates included the basic issues but did not expand their answers sufficiently.

Part (iv) was answered particularly poorly as it required some thought beyond the immediate. Other candidates ignored the question and chose to discuss the effect on the risk profile of the scheme.

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For part (v) most candidates appreciated that medical evidence would be required and that the terms could be more generous to reflect the shorter life expectancy.

END OF EXAMINERS' REPORT