

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.

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Chairman of the Board of Examiners

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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 understandings 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