

# **EXAMINERS' REPORT**

*June 2011 examinations*

## **Subject F104 — *Pensions and Other Benefits Specialist Technical***

### **INTRODUCTION**

The attached report has been prepared by the subject's Principle Examiner. General comments are provided on the performance of candidates on each question. The solutions provided are an indication of the points sought by the examiners, and should not be taken as model solutions.

## QUESTION 1

(i)

On one measure the scheme is in deficit and therefore the trustees must be concerned about security. If investments are all moved into corporate bonds it is that (Company accounts) valuation which shows a deficit. Therefore unless there are other margins in that valuation, a corporate bond investment strategy would serve to match the liabilities and preserve the deficit.

To extent that ERP was used in ongoing valuation and would need to be removed, the ongoing valuation may also now show a deficit.

Over the long term the bond strategy may be expected to produce a lower return than equities and hence the cost of the scheme will increase to the company.

That increase in cost over the long term may be just as likely as short-term fluctuations in the accounting cost to force the company in considering the viability of the scheme.

If the company stops pension provision in the future this is a concern for the trustees as members will stop getting benefits.

Also need to consider the possibility of wind up and the priority liabilities.

Trustees should be seeking to maximise return subject to reasonable degree of risk.

The company's attitude seems to be very short term rather than the longer time horizon over which the trustees view the scheme.

Cannot match mortality risk.

Strength of sponsoring employer.

Other investments of employer – employer may prefer to hold equity investments outside of the fund where surpluses accrue directly to it – ie ideas about about overall employer investments.

There may be constraints in legislation or the governing documentation concern over lack of diversification.

(ii)

Give credit for any suitable answer.

Company cost in the accounts fluctuates by  $>x\%$  once every  $y$  years.

Actual contributions increase to more than  $\text{£}xm$  in any year in next 10.

Ongoing funding level  $< x\%$  once every  $y$  years.

Discontinuance funding level  $< x\%$  once every  $y$  years.

(iii)

Set the parameters, number of simulations etc.

Decide on the underlying stochastic model e.g. Wilkie model.

Model will attach probabilities to future economic scenarios and the associated investment returns.

Set the demographic assumptions as per the valuation but with margins stripped out, options put in etc.

These may be deterministic or stochastic.

Any economic assumptions must be fully realistic.

Run the model to produce a series of cashflows both from the assets and liabilities.

Run 1000.s of simulations as required.

Consider the valuation results on one investment strategy, looking in particular at the volatility of the results over all the simulations.

Repeat the exercise for the alternative investment strategy (ies).

Consider the mean, standard deviation of the results.

Do a sensitivity analysis.

Use optimisation techniques to get a sensible investment strategy.

*Students had a mediocre performance in this question. One problem was that some tended to produce prepared, general lists of points rather than modifying to address the specific questions being asked. So a number of points about investment strategy in general and asset-liability modelling in general did not attract marks.*

## QUESTION 2

- The different remuneration basis for contributions may result in a higher than targeted pension
  - Contributions may be larger than before because they include portions of overtime, commission and bonuses.
  - For overtime particularly the extra contributions are more likely for younger members and thus benefit from a longer investment roll-up.
  - Whereas the targeted benefit would be based on a lower basic remuneration at retirement.
- On the other hand, pensions may be lower than targeted due to lower than expected contributions:
  - If there has been a break in service (e.g. maternity/paternity leave).
  - Members retire early (but a comparison would be affected by any ER reduction in the DB fund).
  - A cut in contribution rates (perhaps the employer is unable to sustain the increases in contribution rates, e.g. if the membership begins to age).
  - Early ill-health retirement
    - This may be particularly disappointing since the previous DB benefit was probably higher due to inherent cross-subsidies.
    - The DC scheme may deal with this via insurance.
- The age-related increases in contributions and, indeed, the initial contribution rate will be based on a set of assumptions
  - Probably on a best-estimate rather than prudent (for the DB fund) basis.
  - These may be general rather than particular for a member.
  - Probably assume zero exits before retirement.
  - The actual pension may exceed or fall short of target to the extent that these assumptions are met or not.
  - E.g. higher than expected salary increases may result in a lower than target pension.
    - Since earlier contributions will be less than assumed in the final benefit.
  - Conversely, lower than expected salary increases result in a higher than targeted pension.
    - Since the earlier contributions would now prove to be more than adequate.
- Investment returns different from that assumed may result in a pension differing from target
  - In particular, changes in market value close to retirement will have a significant effect (to the extent that these are not offset by changes in annuity factors, e.g. a drop in interest rates may push up bond values but annuities will be more expensive).
- Pensions may be lower than target if annuity rates are higher than expected due to:
  - Fall in bond yields.
  - Unexpected improvement in mortality (as assumed by the annuity providers).
  - Increased solvency margin by the annuity providers (e.g. if faced with greater uncertainty or increased regulatory capital requirements).

- Increased profit margins by annuity providers.
- Lack of competition in the market.
- Unexpected tax changes impacting on contributions, investments of benefits.
- Admin or investment charges greater than expected.
- Risk costs greater than expected – will lead to lower than target pensions.
  - Either because of rate increases by underwriters.
  - Or because of change in risk profile by age/gender (which age-related contribution increases do not cater for).
- Initial share-of-fund may be more than is needed (i.e. leads to a higher than target pension)
  - Because of prudent basis in DB fund.
  - Because of surplus allocation.
- Contribution rates may target a contingent spouses/children's pension
  - Particular member may not be married or have children, resulting in a higher than target benefit.
  - Similarly the actual spouse's age may be different from assumed (younger spouse, lower pension).
- A member joining before age 30 would probably exceed target pension.

*Students did not generally do well in this question, partly from misunderstanding the nature of the proposed contributions (e.g. regarding it as an EA method). Where students differed from the outline given above, but in a reasonable way, credit was nevertheless given for their answers.*

### QUESTION 3

(i)

investment return on assets (net of tax if applicable) would need likely asset-mix.  
amounts of future contributions.

mortality rate pre retirement is not required (+ other decrement demographics).

annuity rate at retirement.

including options such as :

- amount of spouses pension.
- pension increase rate.
- age of spouse at retirement.
- frequency of payment of pension.
- fixed term or payable for life.
- guaranteed period of pension.
- Expenses of the contract.
- Proportion taken as cash.
- Fees & expenses.
- Legislative constraints.
- salary growth.
- Inflation.

(ii)

Points to be covered include:

Investment return assumption is critical.

Comment on impact of, say, additional 1% return per annum in period to retirement.

Return will depend on class of assets the monies are invested in.

With a high expected return from risky assets e.g. equities.

Compared to lower risk assets e.g. gilts.

Say that assumption chosen in calculation is appropriate to the assets class selected.

But that there is no certainty that this return will be achieved.

Sensible comment about probability of various future contribution patterns e.g. fixed percentage of salary, fixed monetary amount, fixed duration.

State assume that will survive to retirement.

And cover the benefit if doesn't survive.

Comment that pension conversion terms (i.e. annuity rates) cannot be known with any certainty.

But will probably depend largely on the investment return available to insurers on a matching asset which will be bonds.

Either fixed interest or index linked depending upon the pension increase rate selected.

And illustrate the impact that say, a 1% difference in bond rates would have on annuity rates

Sensible comment on selection of options on annuity.

Emphasise throughout how uncertain the results of the calculation are,

But mention that some greater certainty can be achieved by investing in matching assets (to the annuity) throughout the duration of the contract

*A simple question that students did well in. There was a small penalty for assuming pre-retirement decrements. In the letter, students were expected to comment on the impact of the main assumptions only.*

## QUESTION 4

(i)

Adjust a 20% cost of accrual on AAM to a CUM rate with 1 year control period.

Convert to PUM first  $20\% \times a_{10/10} \times 1/a_1$  where  $an$  @ interest rate  $i = (1.10/1.08 - 1)$  payable continuously

$$= 20\% \times 0.1 \times (1 - v^{10}) / (1 - v)$$

$$= 18.4\%$$

Next convert to CUM (accrual element)

$$18.4\% \times 1/1.08^9$$

$$= 9.2\% \text{ CUM - Accrual rate}$$

CUM also has a "revaluation component"

Standard fund (Accrual Liabilities) on AAM = R200m based on accrued service to valuation date but salaries projected to retirement

Estimate equivalent liabilities by removing projected salary increases:

$$= 200 \times (1/1.08)^{10} = R92.6m$$

Add back salary increase for next year

$$92.6 \times .08 = R7.4m$$

Express as percentage of pay

$$7.4 / (40 \times a_1)$$

$$= 7.4 / (40 \times 0.98182) = 18.8\%$$

Total CUM rate (Accrual & Revaluation)

$$= 9.2\% + 18.8\% = 28\%$$

(ii)

- Total SCR has come out higher on CUM than AAM and PUM.
- Need to consider past service position in conjunction with future.
- CUM SCR has 2 parts: accrual and revaluation. First part is lower than PUM or AAM, but revaluation part is considerable.
- Particularly where past service very long when compared to future service could give CUM SCR > PU or AA.
- Mature scheme narrows gap on future accrual element if average age high, but here 10 years to NRA.
- Overall recommended cont. rate would be lower as Standard Fund lower and hence surplus to be spread
- CUM SCR clearly not realistic given closed scheme ie salary service age distribution cannot be stable
- extra marks for calculating MCR and commenting

Credit to be given for any sensible comments that were consistent with The calculations.

## QUESTION 5

Availability of contraceptive services:

- Extent to which these services are used.
- Effectiveness of methods of conception chosen.
- Religious/cultural influences on use of contraception.

Perceived costs of raising a child:

- Direct costs.
- Indirect costs through loss of earnings.
- Other opportunity costs.

Societal norms created by education and public opinion.

Economic prospects:

- If jobs uncertain, less willing to commit to bringing up a child.
- Poor country, no State benefits may have tradition of many children to look after parents in old age.
- Labour force participation by women (opportunity costs).

Political environment:

- If unstable, may not want to risk future security of children.
- Government may encourage/discourage having children:
  - By propaganda.
  - By regulation (China).
  - By provision of children's benefits.

*A 'bookwork' question on which students did fairly well. There was a tendency to confuse fertility with the rate of population increase.*

## QUESTION 6

The balance sheet of a company will show the pension benefits as liabilities of the company without the need to actually put aside the cash.

There will be no specific assets earmarked to provide pension benefits.

In practice, the effectiveness/security of book reserving depends very much on the priority of pension liabilities in the event of liquidation of the sponsoring company.

If pension liabilities rank higher than holders of secured stock, the security may be of an acceptable level., but possibly not if the pension liabilities have only low priority.

There are insurance arrangements available to protect against the effects of insolvency of the sponsoring company.

The method is likely to be realistic in that the company accounts can show a realistic cost of accruing pensions as it is incurred.

There are no liquidity or cash flow problems in terms of having to pay a regular contribution rate to a separate fund.

However, there is no guarantee that realisable assets will be available when the pension benefits are due. Liquidity could be a problem in this respect.

The cash outgo from the company is likely to be unstable (providing pensions etc) as opposed to regular contributions to a fund.

The sponsor may not suffer the opportunity costs associated with holding monies in a separate fund.

*This was a 'bookwork' question that was well-answered.*

## QUESTION 7

### Current Approach:

- LS of 3xAS is received from the insurer and paid to the beneficiary – zero net effect to the Fund (other than the regular risk premiums they have been paying).
- The spouse's pension begins to be paid from the Fund
  - The cash flow effect is easily manageable.
  - But a large liability is incurred and this becomes apparent at the next valuation of the Fund when a strain appears and the on-going contribution rate is increased.
  - The liability could be 7-8 x AS, given
    - Member's death could be at a young age.
    - The spouse is probably female.
    - Females live longer.
  - This strain may be partly off-set by the release of reserves held for retirement of the member.

### Insuring the value of the Benefit

Firstly, is the value of the spouse's pension to be insured in the same way that the Lump Sum is insured? In other words insuring the liability which arises immediately a pension is to be set up.

- Secondly, given that a pension is to be set up (whether self-insured in the fund as currently or by an insurance payout to the fund), will it simply be paid from the fund or will an annuity be purchased?
- Thirdly, if annuities are to be purchased, will you do so for the existing spouses pensions in payment as well.
- The risk to the fund is comparable with or exceeds that of the lump sum benefits.
- Being very large, self-insurance is a viable option (i.e. the current situation)
- However would need to consider some level of catastrophe or stop-loss cover on the spouses' pensions, though the release of reserves will go some way to meeting the strain, bearing in mind that:
  - The nature of their business will be vulnerable to sudden catastrophic loss.
- Where the strain is greatest (for young members, as a % AS), the reserves released are likely to be smallest.
- Spouses pensions do not present the same cash flow risks as a lump sum (unless annuities are purchased).
- Insuring will cede profits via margins to the Life Office.
  - Mortality caution.
  - Expenses.
  - Profits.
- The latter could be ameliorated by a profit-share arrangement.
- Mortality experience will probably be higher than average, but the size and maturity of the fund means experience is likely to be stable (so self-insurance remains acceptable).
- The conservative valn basis and the targeting of inflationary increases means the retirement reserves released will be substantial but not always enough to meet the liability arising.
  - Could reduce cost by insuring the SAR, but that may result in an increased valn contribution rate depending on the extent to which the release had been anticipated.
- What is the funding level? The healthier it is, the more risk one could take, particularly because of the conservative basis.

### Purchasing an annuity

- Need to consider for both future and existing spouses' pensions for consistent treatment.  
If value not insured (as currently), dramatically increases the cash flow problem (especially if existing pensions are also considered).
- Timing would be very important for annuity purchases.  
Buying at the wrong time (interest rates low) may nullify any benefits of purchasing.  
Again, purchasing annuities will probably cede profit to the Life Office via solvency margins profit margins and expenses.
- There may be some savings in administration expenses of paying the pensions, depending on how it is done.
- Pension increases could be expensive to "add on" to existing annuity contracts. Alternatively, some type of increasing or 'with profits' annuity could be bought. The greatest difficulty will be to match discretionary increases if one wishes to keep increases in line with the other pensions (e.g. retirement).
- Purchasing inflation-linked annuities tends to be very expensive.



- Purchase of annuities ties up assets in equivalent of gilts (broadly). Implications for investment freedom.

*Candidates did not generally do well in this question. No credit was given for simply restating the question (in answer to summarizing the operation).*

## QUESTION 8

- benefits could include retirement (probably most NB), death, disability, ill-health ret, medical care, unemployment benefits, child care.
- State can provide benefits directly
  - Financial.
  - State schemes.
  - Investment guarantees.
  - Structural e.g. free medical care.
- Benefits may be universal or means-tested (maximise use of resources).
- Educate people to make proper provision, understand risks.
- State compulsion of individuals or eers or both.
  - Either compulsory participation in State scheme, or
  - Compulsory setting up and membership of occupational schemes.
  - Minimum level of contribs (ee/eer).
  - Minimum level benefits (e.g. pension increases).
  - Type of benefits
    - (e.g. vesting on wdl).
    - Annuities rather than lump sum.
- State encouragement
  - Financial incentives.
  - Tax incentives.
  - Latter may be restricted in a progressive tax system.
- State may regulate private provision
  - Require funding in advance.
  - Regular valuations.
  - Guarantees by insurance or levies.
  - Restricting types of assets held.
  - Approval of fund rules.
  - Disclosure of information.
  - Auditing of financials.
  - Registration/approval of administrators/inv managers/trustees.
  - Restrictions on marketing/selling.
  - Restrictions on fees/charges.

*Candidates generally did well in this question but may have spent more time than was necessary. There was a limit on the credit given for different types of investment restrictions, tax incentives and forms of guarantee. The question did not invite extended discussion of means-testing, nor of funding methods.*

## QUESTION 9

Consider legislative restrictions (e.g. Inland Revenue rules)

- E.g. minimum benefits on leaving.
- Maximum contribution that is tax-deductable.

consider contract of employment when deciding scheme NRA.

consider state pension age when deciding scheme NRA for possible alignment.

unusual to include overtime and commission in pensionable salary because they tend to reduce close to retirement and this can lead to resentment (even with a two year averaging period).

Note inconsistency between pensionable salary and basic salary which is used for calculating member contributions (generous to those with high overtime / commission).

2% may be fairly standard ( i.e. design should reflect practice of competitive firms to attract and retain staff while remaining affordable). But are there State benefits and a desire to integrate with those?

unusual to base formula on company service rather than scheme service (past credits being given? Particularly for the initial entrants).

9% member conts much higher than normal. Does this exceed the tax limits? Will competitive firms seem more attractive?

No allowance for integration with state pension benefits.

Spouse's in-service pension inconsistent with post-retirement spouse's pension. Questionable whether 30% is adequate.

Spouse's pension after retirement should allow for the increases to the member pension between retirement and death. Also clarify if based on pre or post commutation.

6% fixed pension increases unusual, generous if low inflation, inadequate if high. Discretionary increases are more usual and afford greater flexibility.

Benefits on leaving service or redundancy poor.

Benefit on early retirement very poor (large step up at normal retirement unfair).

No mention of:

ill health or late retirement.

cash sum at retirement & commutation terms.

eligibility rules.

lump sum on death in service ( standard, popular, cost effective benefit).

5 year guarantee.

*Candidates did reasonably well, but one would have expected even better given the fairly simple nature of the question. Credit was given for any reasonable comment on the benefits.*

## **END OF EXAMINERS' REPORT**