

EXAMINERS' REPORT

June 2014 examinations

Subject F104 — Pensions & Other Benefits Fellowship Principles

INTRODUCTION

The attached report has been prepared by the subject's Principal 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. As a rough guide, half a mark would be given to each distinct and relevant (and reasonably significant) point made, up to the maximum number of marks for that sub-section of a question. Although any one point in the solutions may often show a number of acceptable sub-points, credit would usually only be given for one or two of these sub-points for any given point.

QUESTION 1

- Investment returns were other than assumed at the previous valuation, e.g:
 - Because of performance
 - By default
 - By some windfall (e.g. demutualisation shares)
- Salary increases were other than assumed, e.g.
 - Inflationary increases were different
 - Promotional/merit increases were different
- Pension increases were granted other than assumed
- Number of withdrawals from the scheme were other than assumed and the withdrawal benefits were not actuarially neutral (on the previous valuation basis – usually not)
- Number of early retirements from the scheme were other than assumed and the ER benefits were not actuarially neutral (on the previous valuation basis)
- Number of ill-health retirements from the scheme were other than assumed and the IHR benefits were not actuarially neutral (on the previous valuation basis – usually not)
- Possible late retirements that were not actuarially neutral
 - Taking into account possible post-NRA contributions.
- Number of deaths in service in the scheme were other than assumed and the death benefits (other than the insured benefits) were not actuarially neutral (on the previous valuation basis)
- There were benefit changes that
 - Changed the amount of benefit, e.g. increase in accrual rate
 - Changed the value of the benefit, e.g. reduced NRA
- The risk premiums changed during the inter-valuation period and the sponsor's contribution rate was not changed.
- Possible mismatch between risk benefits in the scheme and amounts provided by the reinsurer
 - E.g. not matching discretionary increases to spouse's pension
 - E.g. reinsurer not having been notified of birth of a child for a child's pension
- Option to commute/uplift at retirement where option amount not actuarially neutral and incidence of uptake other than assumed.
- Death in retirement benefits:
 - Actual age of spouse other than assumed
 - Actual age of children and number of children other than assumed.
- Number of pensioner deaths other than assumed:
 - For the member pensioners
 - For the spouse pensioners
- New entrants coming in at an age other than that corresponding to the recommended contribution rate (roughly the salary-weighted average age)
- Contributions made at a rate other than that recommended at the previous valuation
- Basis for the current valuation differing from that used for the previous valuation
- Surplus/deficit carried through from the previous valuation
- Taxes different from what assumed.
- Change in funding method from the previous valuation, e.g.
 - Move to EA method where $EAAL > PUAL$ (i.e. $EA < \text{salary-wted avg age}$)
 - Setting up (or release) of additional reserves.

General comments on student performance on the question (in italics):

Did not accept 'mistake in calculations'. "Change in benefits" was counted once, but not again for variations of benefit changes. Did not give extra marks for detailing whether a surplus or deficit would arise (on the other hand, a wrong indication resulted in no credit). Candidates sometimes made a valid point but then added a comment which indicated a lack of understanding. As a result, no credit was given for the point in such situations. A number of candidates organised their answers in a very haphazard way. This probably did not enhance their performance. Overall performance on this question was poor.

QUESTION 2

- i. **PAYG:**
 - a. In a '**Pure PAYG**' the contribution income in each year exactly matches the benefit outgo
 - i. So no Fund is built up
 - ii. $CR = (\text{Benefit outgo in that yr}) / (\text{Total contributing Salaries in that yr})$
 - iii. CR will tend to rise as system matures or population ages
 - iv. CR will in any case vary from yr-to-yr with population changes
 - b. Can have a '**Smoothed PAYG**' which keeps the CR steady over a period by building up/running down a contingency fund.
 - c. This is formalised for a fixed period (Control Period) as the '**Equalised PAYG System**' which keeps the CR fixed for the CP and varies the contingency reserve.
 - i. Usually the reserve is built up for the first part of the CP and then run down.
 - ii. Note that PAYG is vulnerable to an ageing population and may require a future raising of taxes or cutting of benefits
- ii. **GAP :**
 - a. Sets a level CR that will hold for the life of the scheme.
 - b. CR would tend to be much higher initially than the corresponding 'Pure PAYG' rate.
 - c. Rather like an 'Eq. PAYG system' with an infinite CP
 - d. Substantial reserves can be built up
 - e. $\text{Initial CR} = (\text{PV all future benefit outgo incl ne}) / (\text{Total future contr salaries incl ne})$
 - f. Later calculations would take the reserves into account
 - g. $CR = [(\text{PV all future bens outgo incl ne}) - \text{current fund}] / (\text{PV all fut contr sals incl ne})$
 - h. Contribution rate should be stable if assumptions met
 - i. Not fully funded (though big reserves). Targets CR, not fund.
- iii. **Terminal Funding:**
 - a. Aims to prefund benefits at the time they are awarded.
 - b. $CR \text{ in yr } t = (\text{PV benefits awarded in yr } t) / (\text{PV total contr salaries in yr } t)$.
 - c. Intermediate between PAYG and GAP.
 - d. CR not affected by whether benefit received as lump sum or annuity
 - e. Widely used for benefits from occupational injuries funds.
- iv. **Scaled Premium:**
 - a. Similar to 'Eq PAYG System', but the fund is not allowed to fall to zero:

- b. As soon as fund starts to fall, the CR is recalculated with new CP (but same length):
- c. So for $CP=20$, $CR = (PV \text{ bens to be paid over 20 yrs}) / (PV \text{ contribut salaries over 20 yrs})$
- d. SP is intermediate between PAYG and GAP
- e. In a maturing or ageing system, this results in a stepped, non-decr CR in successive CPs
- f. Also a non-decreasing fund
- g. So only investment income from the fund can be used to support the CR
- h. Can have stability if: $\text{income from assets} + \text{current contribs} = \text{current benefits}$

*General comments on student performance on the question (in italics):
A standard bookwork question on which students should have done well.*

QUESTION 3

In general, one would want individual personal information:

1. Age
2. Sex
3. Current (or pre-retirement) salary
4. Marital status
5. Number of dependants – spouses and children
6. Ages of spouse (s) and children – all of above for calculating various annuity costs
7. Member's degree of risk aversion – the LA (living annuity) is inherently more risky
8. Size of member's share – smaller means less flexibility and more risk in the LA option
9. What are member's cash flow needs in the first 10-15 years?
 - a. Regular – life annuity may be better
 - b. Irregular – LA may be better
10. Member's health?
 - a. Good – life annuity may be better if they live longer
 - b. Bad – LA may be better if life expectancy low
 - i. Use maximum draw downs
 - ii. Balance of fund available for dependants
11. How does pension/drawdown compare with member's total sources of income?
 - a. If only small % (i.e. other sources of income substantial) then can manage the extra risk of an LA
 - b. If not, best to stay with less risky annuity.
12. What happens to balance of LA fund on death during drawdown?
 - a. Is it available for dependants?
 - b. What are the tax implications?
 - c. What would be the cost of equivalent life cover in a life annuity configuration?
13. Get quotations on purchasing an annuity on various options:
 - a. E.g. escalations. Guarantee periods, spouse's pension, children's pension, life cover
 - b. Are these prices historically high or low?
 - c. What interest rate is implicit in the annuity prices
 - i. Remembering that the annuity purchase will 'lock' the member into that interest rate
 - ii. How does that rate compare with the returns the member may expect from the LA investment?
 - d. What interest rate changes might be expected in the next 10-15 years?

- i. i.e. can we use the LA as a 'parking bay' until interest rates improve, then purchase an annuity?
- 14. Confirm that the member will be able to transfer from the LA to annuity purchase without penalty in the future
 - a. Transfer in the other direction is likely to be penal
- 15. Does the member have investment choice with the LA product?
 - a. What range of choices?
 - b. Can switches be made? How frequently and at what cost?
 - c. This would all affect levels of return that can be expected/
- 16. Compare expenses of various options:
 - a. Commission
 - b. On-going admin expense

General comments on student performance on the question (in italics):

One or two candidates spent time considering factors relating to not exercising the OMO at all. Credit was given for all valid points, though this was not the main intention of the question, which was reasonably well-answered on the whole.

QUESTION 4

- i. SCRs
 - a. EAM: $1100/(720/7.5) = 11.458\%$
 - b. CUM: $(690 \times 1.07 + 25100 \times 0.07)/14400 = 17.328\%$
- ii. ALs:
 - a. AAAL=PUAL = $9000 + 5400 + 59400 = 73800$
 - b. EAM: $9000 + 5400 + 59400 + 252000(.15714 - .11458) = 84525.12$
 - c. CUM: $9000 + 5400 + 25100 = 39500$
- iii. Surplus/(Deficit):
 - a. EAM: $75600 - 84525.12 = (8925.12)$
 - b. CUM: $75600 - 39500 = 36100$
- iv. MCRs:
 - a. EAM: $11.458 + 8925.12/2520 = 15.00\%$
 - b. CUM: $17.328 - 36100/2520 = 3.00\%$
 - c. AM: $(9000 + 5400 + 59400 + .15714 \times 252000 - 75600)/2520 = 15\%$
- v. Discussion (underlying much of this discussion is the assumption that discount rate > salary incr rate assumed. Usually the case):
 - a. Entry age usually estimated from membership or from service table assumed.
 - b. EASCR increase with EA and EAAL reduces
 - c. EASCR usually insufficient for cost of future benefit accrual (since usually sal-wted avg age > EA)

- i. Remains stable as long as EA does not change
- d. So usually $EAAL > PUAL = AAAL$ hence gives greater security
- e. Under EAM if new entrants come in at ages other than EA, surpluses/deficits will accrue.
- f. PUSCR remains stable if the age/salary/sex profile of the fund remains stable
 - i. Possible but unlikely if membership expanding/reducing
 - ii. Would increase in a closed scheme
 - iii. So there is an implicit assumption of a continuous flow of new entrants
- g. Usually PUSCR calculated, not on basis of one year, but a CP to the next valn (usually 3 yrs)
 - i. So if assumptions met, financial soundness will be maintained
- h. AASCR generally exceeds PUSCR
 - i. If avg term to retirement $<$ CP for PUSCR
 - ii. And PUSCR usually $>$ EASCR (see above)
- i. AASCR takes no account of new entrants
 - i. AASCR can be regarded as stable for a closed scheme
 - ii. Other assumptions being met, AAM will first build up a surplus
 - 1. Since $AASCR > PUSCR$ which is designed to maintain $A/L + 100\%$
 - iii. But will later rundown the surplus
 - 1. When the (original) $AASCR <$ the (increased age) PUSCR
 - iv. So, theoretically, if all assumptions are being met, AASCR should not be recalculated with increasing age.
 - v. In practice, because of differing experience, the situation is reassessed at each new valn.

General comments on student performance on the question (in italics):

Only two students got all of the calculations correct. On the other hand, there was no additional penalty where mistakes were carried through but the techniques were correct. Section (v) was quite generous in the number of acceptable points available for marks. On the whole, this question was reasonably well answered.

QUESTION 5

- Generally the trustees would wish to maximise returns with an acceptable level of risk for as many members as possible.

- Scheme Rules would need to be amended – with a cost involved.
- Since a share of fund is ear-marked for each member, the investment of that share should ideally match that member's particular circumstances, e.g.
 - Term of liabilities
 - Appetite for risk
 - Option choices
 - Financial sophistication
- As it is a large fund, there will be a wide range of such circumstances:
 - So a single over-arching investment strategy would not be optimal for many of the members.
 - Provision of investment choice may go some way towards solving this problem.
- Perhaps offer several investment media with a range of:
 - Risk levels
 - Terms
 - Asset classes, e.g.
 - Equities
 - Bonds – with a suitable mix of terms to match pension liabilities
 - Money-market
 - A balanced fund
 - A smoothed investment fund – may need restrictions on switching out to prevent anti-selection
 - But not too many options (say 3-4), else:
 - Members might become confused
 - Admin may become too complex/expensive
 - Legislation may impose a restriction on choices available
 - Would be useful to have a 'lifestage' option, moving into pension matching assets:
 - Over what period?
 - Choice or compulsory in later years?
 - Will it be the default option?
 - Could give a lesser benefit if equity returns good in last few years.
 - So need good member communications
 - How to handle early and late retirements
 - Trustees must ensure appropriate asset managers/returns in each choice
 - Have a default option if choice not exercised
 - Appropriate to a majority of members
 - Recognising that a high proportion of members will probably go with it

- When and how often switching is allowed?
- At what cost and who pays?
- Matching of annuity purchase price:
 - As approaching retirement
 - Match annuity price with appropriate mix of bonds
 - With similar mean term
 - Less matching requirement if member intends to go 'living annuity' route
- Provision of investment advice:
 - Do the trustees have a responsibility for this?
 - E.g. if members make inappropriate choice
 - Especially if some members financially unsophisticated
 - Who picks up the cost when and how often?
 - What format?
 - Individual counselling
 - Group presentations, roadshows.

General comments on student performance on the question (in italics):

Candidates should understand that repeating a point in various different forms does not generally result in a higher mark. This was reasonably well answered overall.

QUESTION 6

- Defined Contribution Fund:
 - DC funds are popular because of their simple structure, easy to understand, their transparency, their general absence of cross-subsidies lack of need for actuarial input and the consequent reduction in expenses.
 - Note, though, that the proposed benefits effectively make this a DB fund with the consequent need for regular actuarial valuations and the costs therewith. There will also be a degree of cross-subsidy not usually found in DC schemes.
 - An advantage (from the sponsor's point of view) of DC schemes is the transfer of investment and other risks to the members. In the proposed structure part of the investment risk and longevity risk is shifted back to the sponsor.
 - Not only would there be additional expenses, but the sponsor may be called upon from time to time to contribute additional amounts to meet deficits in the scheme.
 - Most of these complications could be avoided if the 'share of fund' was simply used to purchase a pension in the market.
- Contributions: The nature of the business is probably such that some employees earn overtime, commission and bonuses in varying amounts in addition to their basic

remuneration. It would make sense with this additional income to save additional amounts toward retirement. The DC structure is particularly amenable to allowing this.

- Suggest that contributions be based on total remuneration
- Then pension benefit more likely to be in line with standard of living when working
- As the scheme is a 'start-up' many of the initial members who are older will not have time to build up adequate benefits in the scheme. Perhaps some flexibility should be allowed for higher, maybe age-related contribution rates.
- The 4% for members in any event seems a bit low and would not take full advantage of the tax relief available
- Normal Retirement Ages:
 - The modern trend is not to differentiate benefits by sex
 - The differential ages would be seen as discriminatory
 - This differential exacerbates some of the disadvantages mentioned below.
- Normal retirement:
 - Paying pensions from the scheme effectively makes it a DB scheme
 - Full conversion to a pension leaves no room for a lump sum benefit at retirement. A L/S benefit is very popular:
 - There are some tax advantages in taking part of the benefit as a L/S.
 - The L/S can be used to pay off a mortgage, take an extended holiday etc
 - The fixed 'conversion' factor is effectively a guarantee
 - Giving such a guarantee far into the future is very risky
 - It may not be supported by market returns (e.g. on Govt. Bonds) at the time it comes into effect
 - It will also come under pressure from improving mortality of pensioners.
 - Being applied to both sexes it appears to be equitable, but in fact it is disadvantageous to the males, who would be cross-subsidising the females:
 - Greater longevity of the females
 - Earlier retirement age of the females
 - Fixed pensions (without increases) are very risky in an inflationary environment (or one that might become so).
 - 20 years of inflation can significantly reduce the purchasing power of a pension if no increases are given.
 - Early Retirements:
 - Same conversion factor being applied irrespective of age means the ER option is not actuarially neutral.

- NRs are cross-subsidising the ERs.
- Exercise of the trustees' discretion can be mismanaged or seen as inequitable.
- General trend is away from assigning discretion to the trustees.
- IHRs:
 - Similar problems as arise with ERs
 - At younger ages or shorter service the benefit may be totally inadequate to meet the needs (insufficient time to accumulate)
 - Trustees may not have the specialised knowledge/skill to assess ill-health claims.
 - May have to use specialist consultant
 - Perhaps consider an insured benefit rather than the IHR which, once granted, is irrevocable.

General comments on student performance on the question (in italics):

Despite the indication in the question, a number of candidates wasted time discussing benefits which were not directly relevant. This question required the application of intelligence and generally differentiated the better students.

QUESTION 7

- i. Points to be investigated:
 - Recent trends in premium rates
 - Possible increase in mortality of working people (e.g. AIDS-inflicted country)
 - Improving longevity increasing cost of spouse's pension
 - But probably not both of these at once!
 - Bad claims experience of scheme
 - Large enough for experience to be credible
 - Current provider has pushed up premiums:
 - No longer competitive
 - Previous losses and anti-selection by schemes
 - Perhaps for business/strategic reasons
 - Perhaps an absolute increase in premiums, but not relative to cover

- Increased salary roll
 - Increased number of members
 - Changes in membership profile:
 - Ageing (e.g. scheme closed to new entrants). But not so simple as spouses would be older, reducing liability. Depends on balance.
 - Shift in gender proportions e.g. more males would mean overall active mortality up and spouses mortality down.
 - Or just the salary-weighted age increasing
 - Proportion of members married increased?
 - Relative age of spouses decreased?
 - Some of the above changes might have come about by:
 1. Actual changes to membership
 2. Changes in assumptions about membership
 3. Change from assumptions to using actual data.
 - Change in assumption for discounting spouse's pension (to calculate lump sum)
 - Change in underlying discount rate assumption
 - Change in assumption on pension increases.
- ii. Suggestions for reduction:
- Reduction in benefits
 - Not a strong option as they are in line with market
 - Reducing could make them inadequate and uncompetitive
 - Rebroke the risk in the market. Will involve some cost, but should be done regularly anyway.
 - Consider self-insurance:
 - Avoid insurer's margins for profit, contingencies, expenses.
 - Large scheme so probably stable experience and credible data
 - Could self-insure both the benefits or, more likely, just the spouse's
 - Fewer liquidity problems on a claim
 - More time to put funding in place if adverse experience
 - No extra admin paying spouse's – already doing it.
 - Consider partial insurance of spouse's:
 - E.g. insure flat amount and self-insure increases

- Any shortfall will appear in the valuation and can be funded over time
- Some discretion over future increases
- Have a mismatch anyway between insured amount and the increases
- Danger that one will lose track of the full cost of self-insuring
- Increase member's contribution
 - Would require negotiation, not popular
 - Perhaps give choice of reducing cover or increasing contributions – admin hassles
 - Probably best to negotiate in advance and agree to cap the cost at some point, either by reduction in benefit or increased member conts.

General comments on student performance on the question (in italics):

Many candidates ignored the fact that the insurer paid a lump sum equivalent of the spouses' benefit so that questions of 'spouses' mortality or pension increases' related to the insurer's assumptions rather than the insurer's experience of the scheme. Points about salary increases were not credited unless the point about absolute vs relative increases was also made. Reducing benefits was credited, but not infinite varieties of benefit reduction.

END OF EXAMINERS' REPORT