

# **INSTITUTE AND FACULTY OF ACTUARIES**

## **EXAMINERS' REPORT**

April 2011 examinations

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

#### **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

July 2011

### **General comments**

*The overall standard of scripts was slightly higher than previous settings, perhaps reflecting some relatively straightforward bookwork and application questions in the paper. Questions 3, 5 and 8 appeared to cause candidates most difficulty and these required much more application of knowledge and analysis. Candidates that struggled often made the same point several times, or repeated points in later parts of a question they had already made, without relating to them to the specific context of the later part, or comparing their answers with previous parts to demonstrate understanding and structure their answers logically.*

*When reviewing the model solutions below, candidates should note that there are typically more points on the schedule than were necessary to score full marks for the relevant section, and that the passing standard would require even fewer. Even the best prepared candidate is not expected to be able to write down all the points below in the time available. Most bullet points listed below would score 0.5%, and examiners were also instructed to give credit for relevant points not on the schedule that demonstrated understanding of the syllabus.*

- 1 (i) *Discontinuance options*
- Continuation of the scheme without any further accrual of benefits
  - Transfer of the liabilities to another pension scheme with the same sponsor
  - Transfer of the liabilities to another pension arrangement the member holds (e.g. individual DC scheme, another DB scheme)
  - Transfer of the funds to the beneficiary to extinguish the liability
  - Transfer of the funds to an insurance company to invest and provide a benefit
  - Transfer of the liabilities to an insurance company to guarantee the benefits
  - Transfer of the liabilities to central discontinuance fund, operated on a national or perhaps industry wide basis
- (ii) *Risks*
- The principal risk is that the scheme runs out of money before the last benefit payment is made.
- This could arise for a number of reasons:
- Event may cause measure of liabilities to increase e.g. buy-out, merger
  - Investment risk – investment returns are lower than expected
  - E.g. mismatching, reinvestment etc. (*max ½ for one example*)
  - Longevity risk – the members live longer than expected
  - Inflation risk – pension increases are higher than expected
  - Dependants' benefits are greater than expected
  - e.g. more members married or younger age of spouse
  - The administrative costs of running the scheme are higher than expected
  - [Maximum ½ mark for example of other risks, e.g. legislative changes, fraud, mismanagement]
- Different impact on older and younger members*
- In general, younger members are exposed to greater risk than older members
  - This is because, if the scheme runs out of money at some stage, this is likely to happen many years into the future
  - Older members may have received their benefits in full (i.e. died) before this happens
  - ... noting that dependants' pensions may then be payable
  - Whereas younger members are more likely to be in receipt of benefit (i.e. still alive)
  - Of those members still in receipt of benefit if the money runs out, the older ones are likely to have received a greater proportion of their eventual benefit than the younger ones

*Q1 was well answered by most candidates.*

2

| (i) Method   | (ii) Advantage & disadvantage  |
|--|--|
| <b>Business Outlook</b><br>An assessment of the business outlook in general and specific to the sponsor's sector   | <ul style="list-style-type: none"> <li>• Relatively easy to obtain<br/><i>but</i></li> <li>• Results are subjective and difficult to quantify</li> </ul>   |
| <b>Financial Metrics</b><br>Financial statistics and accounting ratios can be compared with similar companies and with previous years to spot any trends, particularly any deterioration                     | <ul style="list-style-type: none"> <li>• Simple to undertake<br/><i>but</i></li> <li>• Does not give an indication of the absolute level of risk</li> <li>• Financial statistics of other companies can be out-of-date/infrequent</li> <li>• Group accounts may not provide information specific to sponsor</li> </ul>   |
| <b>Implied Market Default Risk</b><br>Where a sponsor has issued investments such as equities or bonds, market prices can indicate market view of sponsor's credit risks, and how views can change over time | <ul style="list-style-type: none"> <li>• Where securities traded, up to date information is easily accessible</li> <li>• Quantifiable measure of credit risk<br/><i>but</i></li> <li>• Risk to pension scheme will differ e.g. priority / security provided</li> <li>• Other factors determine market prices and hence yields</li> <li>• Only available if investments are regularly traded and prices quoted</li> </ul> |
| <b>Credit Rating</b><br>Companies can pay a specialist agency to provide them with a credit rating   | <ul style="list-style-type: none"> <li>• Based purely on financial circumstances of the company, eliminating impact of market forces</li> <li>• Agency may have access to information not publicly available<br/><i>but</i></li> <li>• Only larger companies tend to have full credit ratings</li> </ul>   |
| <b>Merton-type credit risk models</b><br>A model is used to determine the probability of default based on the behaviour of the equities  | <ul style="list-style-type: none"> <li>• Quantifiable measure<br/><i>but</i></li> <li>• Requires sponsor to have traded equity</li> <li>• Ratings not widely available (as securities not quoted)</li> </ul>   |
| <b>Quantitatively derived credit risk</b><br>Model deriving a credit rating or probability of default from standard accounting data and credit information.  | <ul style="list-style-type: none"> <li>• Quantifiable output and wide usage<br/><i>but</i></li> <li>• Relies on accounting information which may be out of date</li> </ul>   |

|   |   |
|---|---|
| <b>Independent business review</b><br>Report by an external credit advisory specialist, typically an accounting firm, insolvency practitioner or other niche operator | <ul style="list-style-type: none"> <li>• Can take explicit account of interdependence of funding and sponsor covenant</li> <li>• <i>but</i></li> <li>• Requires sponsor cooperation for access to confidential information</li> </ul> |
| <b>Risk based levy</b> <ul style="list-style-type: none"> <li>• Credit assessment used by central discontinuance fund when determining levy to be paid.</li> </ul>    | <ul style="list-style-type: none"> <li>• Quick and easy method of obtaining a broad indication of credit rating <i>but</i></li> <li>• Only a one-year view</li> </ul>   |

*This straightforward bookwork question was very well answered by most candidates, illustrating that recall of core reading is rarely a problem. Some candidates chose to describe more than five methods – whilst this approach was not penalised by the examiners, it would not score extra credit, and may have taken up time candidates could have better spent on other questions on the paper.*

### 3 (i)

- The shape of liability cash flows can be predicted with some degree of accuracy
- So a mixture of corporate bonds and governments would be suitable for matching these cash flows ...
- ... as pension in payments are bond like in nature
- currency of bonds needs to match liability cash flows
- Could include the use of index linked bonds if available (“nature”)
- Need to consider term of bonds vs liabilities
- Swaps / derivatives may also be used to improve this match
- The aim would be to remove the interest rate risk
- and the inflation rate risk
- As such the value placed on the assets and liabilities should move up and down together
- but the scheme would still be exposed to the longevity risk
- and longevity fluctuations could invalidate cash flow projections
- Investing in corporate bonds still carries a credit risk with a probability of default...
- ...this risk can vary greatly from bond to bond (i.e. AAA-rated to junk)
- Possible lack of diversification
- Bonds and gilts may not be good match for any active salary-related benefits
- Bonds may be a good match to annuity prices if company buys out pensions at retirement
- The likely impact on funding position depends on current investment strategy and how funding assumptions are determined
- The change to this investment strategy may require a change to the investment return assumptions used to value the liabilities

- The funding deficit may initially increase if a lower investment return assumption is used in the calculation of the liabilities
- E.g. if high proportion of equities held currently
- There might be less reliance on the covenant of the sponsoring employer

*Q3(i) asked for comment on the key features of the investment strategy – many candidates misinterpreted this and focused on the key characteristics of the suggested investments themselves. Also, candidates failed to demonstrate understanding of the impact by simply stating that, e.g. the deficit would worsen, without explaining why.*

(ii)

- Appropriate bonds for the liabilities might not be available
- i.e. duration, nature or currency (max ½)
- Bond cash flows are also 'lumpy' in nature
- So it will only partially match the sensitivities of the liabilities
- Swaps / derivatives can overcome some of this problem
- ... and may be expensive and introduce counterparty risks
- There will still be a reinvestment risk
- Refinements to the strategy could be considered to move from a broad match through to a partial match or a full cash flow match
- This would add complexity to the investment strategy
- The volatility in the future funding level will depend on how well the cash flows are actually matched
- There may be practical difficulties in directly investing in a suitable matching portfolio
- transaction costs of selling current assets and purchasing bonds & gilts should be considered
- Also need to consider the timing of such a switch
- ...and administration involved
- Need to consider any legislation or scheme documentation restrictions
- Any requirement to disclose or communicate this change?
- ...or any updates required to scheme documentation?

*Q3(ii) was generally well answered, but some candidates concentrated solely on employer preferences and issues, even though this part of the question was around implementation.*

**4**

(i) *Reasons for disclosure*

- So owners of capital of the company (and potential owners) are aware of the significance of the benefit obligations that exist
- So readers of the accounts can form a realistic opinion of the company's current and future financial position
- So members and/or regulators can assess the security/risks for defined benefit schemes

(ii) *Common Aims*

- Recognising the realistic cost of accruing benefits
- avoiding distortions resulting from fluctuations in contributions

- consistency in the accounting treatment from year to year
- (although not necessarily from company to company)
- disclosure of appropriate information

*Differences*

- Relative importance of balance sheet and profit/loss account
- Choice of actuarial methodology and/or assumptions for liabilities
- Smoothing of year on year fluctuations
- Amount of information to be disclosed
- Recognition of gains and losses
- Approach to valuation of assets

(iii) *{Where appropriate, candidates should be clear on why their suggestion supports the higher funding level for the accounting results.}*

- Party for whom funding valuation is being completed has lower risk appetite and/or stronger funding objectives
- Funding valuation might include a margin for prudence
- Explicit additional reserve or implicit in assumptions
- ...whilst accounts might be realistic
- Accounts may show a smoothed (lower) valuation of liabilities
- Actuarial method may produce a higher accrued liability for funding
- Different actuarial assumptions:
  - E.g. Funding may have lower discount rate
  - Or higher inflation rate
  - Or lower real discount rate overall
  - Stronger demographic assumptions
  - In particular for longevity (*max 2 examples, ½ mark each*)
- Might allow for options and guarantees differently
- E.g. funding basis ignores options that members in practice take on unfavourable terms
- Funding basis might allow for discretionary benefits
- Accounting calculations were approximations (e.g. roll-forwards) produced before funding valuation
- Lower value of assets in funding valuation (e.g. admissibility criteria)

*Q4 was answered well by most candidates, although, as noted in the marking instructions deliberately left in at the start of part (iii), some candidates simply talked about “different” assumptions etc., rather than demonstrating that they understood why the accounting valuation showed a better funding position, as stated in the preamble to part (iii).*

## 5

### FD's Proposal

*Supporting calculations*

- Expected annual dividends – £125m \* 3% = £3.75m
- Expected coupons – £100m \* 6% = £6m
- Total pensions in payment – 100/12 = £8.3m
- Surplus is £25m

*Current strategy*

- Currently the company is unlikely to need to make further contributions due to the surplus
- Liquidity risk is low
- The investment strategy should provide enough cashflow to pay the benefits as they fall due
- As the bonds provide £6m income per year
- And there is a reasonable percentage in cash
- The bonds should be liquid if more cash is needed in the future
- There is however inflation risk...
- ... as the scheme assets are mismatched
- i.e. the risk that the fixed interest assets do not provide a high enough return if there is a period of high inflation
- and the risk of default on the corporate bonds
- although for high quality bonds this is historically very low

*Proposed strategy*

- Equities are a volatile asset
- Falls in market values in real terms will contribute to investment underperformance
- And increase the risk of not being able to pay the benefits as they fall due
- Or that the company would need to make additional contributions in the future
- A high return on equities would only reduce company costs if surplus could be reclaimed
- There is liquidity risk
- as expected dividends from equities are not likely provide enough income to the scheme to pay for the pensions in payment
- Therefore equities may need to be sold each year, possibly at a low point in the market
- It is unknown how liquid the market for equities is
- but traded shares are likely to be liquid
- Some consider equities to be a real asset, therefore should hedge inflation risk in the long-term
- Consider risk due to lack of diversification
- Consider taxation implications
- Significant expenses in restructuring the entire portfolio
- Regulations in some countries specify a minimum % of bond investment
- May also need to consider any scheme-specific restrictions
- Bonds are likely to be a better match for buy-out/annuity costs
- Members are unlikely to want currently stable well-funded scheme to take on risks...
- ... particularly if there is no reward for them
- If strong sponsor covenant, then implications of taking more risk are less significant.
- Similarly if currently funding basis is strong (noting 125% funded)
- Consider just investing surplus (£25m) in equities?



Whilst answers to Q5 generally addressed some of the issues, they typically lacked explanatory detail. The question gave a very clear steer on where comments should be directed, e.g., “ ...implications for the relative income and outgo...”, yet very few candidates used the numerical information given in the question to quantify this.

- 6**
- (i) Funding method criteria
- Security
  - Stability
  - Durability
  - Realistic
  - Liquidity
  - Flexibility
  - Opportunity cost
- (ii) *Model shortcomings*
- population change has been more complex than the simple rate of growth models suggest
  - the rate of growth varies over time (due to factors such as)
  - ... resource constraints
  - ... inward and outward migration
  - ... availability of birth control
  - ...
  - when such models have been used, the estimated rate of decrease of population growth using past data has tended to understate the actual rate of decrease
  - resulting in population projections which are too large
  - simple rate of growth models can lead to anomalies
  - e.g. populations increasing without limit, population sizes that become negative
  - The projection of population size in this way leads to little understanding of the mechanisms of population change.
- (iii) *Suitability of PAYG*
- a government is generally assured of its continual existence
  - therefore the method may seem secure
  - but regime / commitment to past promises may change
  - If benefits are higher than the available tax revenues, it may struggle to continue providing this benefit
  - The government may need to reduce benefits
  - ... or increase the tax rate charged
  - ... and/or increase borrowing
  - and will have less flexibility over the timing of these changes with no reserves.
  - Could set up a funded arrangement...
  - ... but would need to consider political opinion, transition arrangements, investment options, macroeconomic effects etc.
  - ...in particular, unpopularity of one generation contributing twice (for current retired population and themselves)
  - PAYG has no opportunity costs

- ... and no requirement to administer invested funds
- The level of outgo is likely to be stable in this country
- ... assuming level of benefit increases is predictable
- Stability of contributions may be an issue if total national earnings falls relative to benefit outgo
- Instability may result from a lack of uniformity of the age profile of the population
- there is also dependence on the stability of the size of the working population.
- The government should now have a realistic impression of the future pension costs
- PAYG as a funding method seems reasonable
- ...but perhaps not realistic if costs appear expensive as working population is small relative to retired population

*Q6 was generally well answered by most candidates. A common failing, however, was that candidates discussed PAYG in generic terms in part (iii), rather than in the specific context of the question. Once again, this leaves examiners wondering if candidates are simply recalling core reading, rather than demonstrating their understanding of the material, and their ability to apply it.*

## **7 (i) Issues for sponsoring employer**

*General comments for both offers*

- If set up under trust, consider TD&R, and Trustees' views
- The options would need to be clearly explained to members
- ...and appropriate timescales given
- to ensure members can make an informed decision
- Ensure compliance with any legislation or regulator guidance
- Consider paying for independent advice to members to mitigate reputation risk
- Employer should take appropriate legal and actuarial advice
- Consider the impact on accounting disclosures
- There may be significant costs in providing communication and financial advice to members
- Also, significant administration demands and costs for individual calculations
- ...and no guarantees members take option so overall take up rate and cost savings / risk reduction uncertain
- Need to consider investment strategy after exercise complete

*Transfer value inducement*

- Any transfer payment out removes longevity and investment risk
- The transfer value is likely to be lower than the scheme funding reserve
- Therefore members taking transfer values should result in an improvement in the funding position for the scheme
- The employer needs to decide on the size of the enhancement

- Enhancement may require the employer to provide upfront funding for the exercise (direct cash to members or additional funding of the scheme)
- So enhancement should be set to maximise the take up rate by members but minimise the total cost of the exercise
- The inducement could be as a direct cash payment
- or as an uplift to the standard transfer value
- Some targeting of the enhancement may be appropriate
- E.g. higher enhancements for most significant liabilities
- There may be future complaints from members and a reputational risk for the employer if future benefits turn out lower
- Need to consider liquidity of investments if significant volume of transfer values will be paid

*Forfeiting future pension increases*

- A reduction in pension increases would reduce the risk exposure
- It reduces longevity risk as pension is lower for those that survive the longest
- ... and inflation risk and investment risk could be reduced
- May be more able to match the benefit in payment with suitable assets
- Need to consider the terms of exchange to be offered
- If these were less than cost neutral on the valuation basis the funding position would improve if members accepted the offer
- There may be a selection risk against the scheme
- e.g. members in ill health would gain by accepting the offer
- The overall take up rate however will be uncertain
- Need to consider whether change will affect dependants' benefits

(ii) **Member issues**

*General comments for both offers*

- Need to be sure an informed decision is made
- Hence financial advice may be needed
- Need to consider personal circumstances e.g. other savings and income
- May benefit member with shorter than average life expectancy

*Transfer value inducement*

- May prefer to consolidate their pension benefits into one source
- May prefer to have control over their investment
- ... and/or additional flexibility to choose form of benefit
- But significant investment and longevity guarantees are being given up
- May benefit member with shorter than average life expectancy
- How secure do they believe their benefits are currently (sponsor covenant)?
- What is the size of the enhancement?

*Forfeiting future pension increases*

- Members may value a higher pension now
- Especially if their financial circumstances require cash in the short term

- But inflation may increase rapidly in the future
- Need to consider impact on dependant's benefits
- What is the size of the proposed one-off increase relative to future expected increases?

*Q7 was answered reasonably well by most candidates. Some weaker candidates simply listed issues in part (i), ignoring the instruction to discuss them in the question.*

## 8

*This relatively large question was disappointingly answered overall, with the majority of candidates failing to score half the marks available. The Examiners wonder whether some candidates left themselves sufficient time to both plan and write up their solutions to this question, as many candidates simply didn't make enough points to score well. Further comments are included below on each part of the question.*

(i)

### *Advantages*

- Ensures the needy are provided for
- Benefits not paid to wealthier citizens so keeps costs down
- Redistributive as taxes received from those with more wealth and benefits received by those with less wealth
- Once means test is carried out, flat benefit is simple to administer
- PAYG means government does not need to put aside funds so no opportunity cost...
- ... or need to administer and meet costs of investment

### *Disadvantages*

- Means testing may be expensive to carry out...
- and may mean benefits are not taken up by all those who are entitled to them...
- due to the perceived stigma or difficulty of claiming benefits
- Unclear what is included in the definition of savings
- ... income (e.g. private pensions, employment, investments etc.)
- ... assets (e.g. property)
- Liquid savings e.g. cash deposits are a poor measure of wealth
- It may be difficult to value illiquid assets e.g. property...
- ...and whether/how to make allowance for mortgages and other debt
- Creates a two-tier system...
- with a sudden cut off point between those who meet the means test and those who do not
- e.g. a citizen with \$100,000 will receive the pension and keep their savings...
- but a citizen with \$100,001 may need to use all their savings to provide an equivalent income
- May be perceived as unfair by citizens
- Citizens may be discouraged from providing for themselves

- May create a poverty trap whereby increasing a person's savings merely reduces the level of State benefits
- May encourage people to squander existing savings shortly before age 65 so they meet the means test
- Or citizens may try to "hide" assets...
- e.g. by transferring to family members or placing offshore  
[1/2 mark for any valid example]
- The citizens who do not meet the means test may not be able to realise all their assets (e.g. they may be tied up in property)
- PAYG means benefits may become unaffordable in an ageing population...
- especially in difficult economic conditions
- Value of flat pension may be eroded by inflation over time...
- and may become insufficient to meet minimum standard of living
- \$100,000 may not be sufficient to provide a pension of \$5,000 per annum
- ...particularly if longevity improves
- ...and the government bears this risk
- Is 65 an appropriate age
- What is the expectation of life at age 65?
- Do citizens generally stop work at age 65?
- Unclear what provision, if any, for dependants on death of citizen

*Some students concentrated on more complex analysis and failed to include some straightforward key issues, ignored the possible merits of the current system, or focused on one aspect of the design (their answers had "depth" but no "breadth"). Note that any candidate that included half the points listed above would score close to full marks on this question.*

(ii) *Citizens' perspective*

*Citizens with savings under \$50,000*

- will be unaffected

*Citizens with savings between \$50,000 and \$100,000*

- will now have to give up \$50,000 to obtain a State pension...
- ...or opt out of the scheme...
- ...but they are unlikely to have sufficient means to provide an adequate standard of living

*Citizens with savings more than \$100,000*

- are now eligible for a State pension...
- at a cost of \$50,000 which appears to be very good value...
- as under the previous system it was effectively deemed that it would cost twice as much to obtain the same level of pension
- This may be particularly attractive to citizens who expect to live for a long time after age 65
- Citizens are likely to be pleased with the voluntary nature

- May not provide sufficient income for the individual so additional pension arrangements may be needed
- The absolute cut off point for the means test means that a two-tier system still exists
- Remains a flat pension, so value may be eroded by inflation

*Government's perspective*

- Ensures total State funding in retirement is targeted at only the most needy (those with less than \$50,000 savings);
- those with \$100,000 savings may not be considered to be in as much need
- Citizens with savings between \$50,000 and \$100,000 must now contribute towards their State pension; a cost saving
- Ensures the whole population can achieve a minimal level of pension provision at a competitive price
- Opening the scheme up to all citizens may encourage a culture of saving for retirement which previously did not exist
- Lowering the means test threshold may encourage more saving by citizens
- ... as citizens would face getting by on a much lower level of savings to meet the means test
- It appears that citizens who have over \$50,000 will only meet half the expected cost of their pensions...
- leaving the State to pay the rest
- ... including those with savings over \$100,000, for the first time
- The State would be directing resources to citizens with savings over \$100,000 so system is less redistributive
- Depending on the savings levels of the population and voluntary take-up rates...
- **...the proposal may cost the State more than the previous system**
- and leave the State open to more risk
- Proposal does nothing to reduce the costs of means testing
- ... and adds additional complexity / administration costs
- ... and require extensive communication / education of citizens
- ... and some form of transition plan for the change from \$100,000 to \$50,000 and the subsidised pension
- The government may need to review the annuity rate periodically
- The voluntary nature means there is a selection risk...
- as of the citizens with over \$50,000 only those who expect to have a reasonable life expectancy will buy the pension

*For part (ii), far too many students simply repeated the points they made in part (i), without reference to whether the proposal diminished, exacerbated or left the problem unchanged. Better candidates added logical structure (and mark-scoring opportunities!) by splitting their answer to separately consider citizens with up to \$50,000, between \$50,000 and \$100,000, and over \$100,000 of savings – the proposed changes had very different impact on those groups. Surprisingly few candidates commented on the potential cost implications of the apparently government-subsidised annuity.*

(iii) *Possible changes*

- Increase the age from which the pension is payable
- Increase the contribution that is payable in exchange for the pension at age 65
- Would need to look at this in conjunction with the means test level
- Stricter means testing to avoid fraud...
- ... e.g. apply test over several consecutive years to catch those who 'hide' wealth around their 65<sup>th</sup> birthday
- Reduce the means test level below \$50,000 so less people receive a pension without contributing
- Could look at relating contribution to savings at retirement, rather than a discrete cut-off point
- Say a fixed percentage of savings in exchange for the pension
- ...so the pension would become overpriced to the wealthy
- ... and they would choose not to purchase it
- Or only offer the option to buy a pension to the less wealthy citizens since the current annuity rate is generous
- ...and the wealthier citizens are more likely to have other provision
- Pay a dependant's pension on death of a citizen...
- ...if dependant not already in receipt of pension in their own right
- Compulsory contributions from all citizens before retirement
- ...which could be related to income so viewed as fairer
- ...this would provide some contributions from the members who currently meet the means test for whom benefits are currently met out of general taxation
- ...and could then consider removing the means test which may be costly to carry out
- ...especially as with compulsory contributions a pension for all would appear fairer to citizens
- Encourage/compel employers to provide savings vehicles so more people have wealth over \$50,000 at retirement
- Add eligibility conditions to reduce costs
- ...e.g. minimum years of residence / period of contributions

*For part (iii), most students simply made far too few distinct points for the marks available. This may have been the result of time pressure, but the solution above illustrates that a technique such as revisiting each of the weaknesses of the design they identified earlier in the question (creating a breadth and logical structure to the solution) and considering sensible variations (demonstrating understanding of the issues) will help candidates to score well.*

## **END OF EXAMINERS' REPORT**