

## THE COMPARATIVE VALUE OF PENSIONS

BY E.A. JOHNSTON, C.B., B.A., F.I.A.

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1. This note incorporates a large part of the evidence given to the Scott Committee by the Government Actuary's Department, with additional material by myself as appropriate.

### *The Pay Comparison system*

2. The actuarial calculations in question arise from job comparability exercises, when the value of the total remuneration package of specified jobs is being compared. In recent years, assessments have been made in the following circumstances:

- (i) Pay comparison studies for the Non-industrial Civil Service.
- (ii) Pay comparison studies for the Industrial Civil Service.
- (iii) Adjustments are made by the Review Bodies, who recommend salaries for the Armed Forces, Doctors and Dentists and Top Salaries. The Review Bodies consider various pension comparisons, but are not obliged to give reasons for their salary recommendations.
- (iv) Advice to the former Standing Committee on Pay Comparability (Clegg) for staff groups referred to them.
- (v) Compensatory additions to pay are quoted for a number of bodies whose staff are paid by reference to Civil Service and other public service rates, but who are in other pension schemes.

3. The principal reference, which sets the pattern for the others, and for which we have most data, is (i) and this paper will concentrate on it. Nowadays, a report is published for each Non-industrial Civil Service assessment giving details of the actuarial basis etc., the latest report being that published in 1980. Since then, the comparability basis of pay has been in abeyance, and at the time of writing it is not known what system will be employed in future. However, the subject is still worth discussing as a number of interesting actuarial points arise, and it seems unlikely that all ideas of comparability can be completely removed from the determination of public sector pay. Also, comparisons of some sort must underlie the pay recommendations made in the private sector by management consultants, and pensions will be a factor for these also. Even if strict comparability is only one of the considerations involved in fixing pay, actuarial assessments are still required in order to bring prospective pension rights into the comparison.

4. Describing the system in use until 1980, which is basically that set up following the Priestley Commission in the 1950s, the identification of comparable jobs and collection of data concerning them was known as *pay research* and was carried out by the *Pay Research Unit (PRU)*. This process started with

internal surveys of Civil Service posts, and surveys of outside employments. Guided by the results of these surveys, *analogue* employments considered to be comparable to specified Civil Service employments were chosen. 'Comparable' means comparable work and responsibility; the choice clearly should not be made by reference to the terms of service obtaining in the outside jobs. Details of the analogue pay and fringe benefits were obtained by the PRU from the outside employers, and were reported to the negotiating parties as providing the basis for comparisons. The work of the Unit was supervised by the independent *Pay Research Unit Board*, which published annual reports (including a report by the Director of the Unit).

5. The second stage, which was carried out within the framework of negotiations, was to calculate the *True Money Rate (TMR)* for each grade in each analogue employment. The TMR allowed for cash pay and fringe benefits such as holidays, lunch facilities, cars, staff mortgages etc., and also for any member's contribution to a pension scheme in the analogue employment. (To be precise, it allowed for the difference between these items and those obtaining in the Civil Service.) It also incorporated an adjustment where the analogue employee was a member of a contracted-in pension scheme. The basic principle was that the TMR is the cash rate which a civil servant would have to be paid, given Civil Service conditions and fringe benefits, to get remuneration of the same total value as the analogue employee (remuneration being taken prior to deductions for personal taxation and national insurance contributions).

6. The TMRs for the analogues to any one Civil Service grade will show quite a spread, and the negotiations, which were conducted on the basis of the data provided by the PRU, concentrated on the area around the median.

7. A pension scheme is a fringe benefit, and strictly speaking the pension rights earned by service in an analogue post should be allowed for in the TMR for each analogue (remember that the allowance would cover the *difference* between the analogue and the Civil Service schemes). In practice, the difference in members' contributions and the adjustment where the analogue scheme was not contracted out were allowed for in each TMR, but it was not practicable to calculate the further item covering the value of accruing scheme benefits in time for each TMR to be adjusted. Instead, therefore, an average for all the analogues was calculated, which was applied at a fairly late stage in the negotiations. This final item is known as the *Deduction*.

8. The terms of reference for the Non-industrial Civil Service Deduction were:

After True Money Rates have been established, a deduction will be made to take account of differences between the superannuation benefits of the Civil Service grades and of their outside analogues. This assessment will be reviewed with effect from a given operative date if one Side so proposes at least 6 months before that operative date, and if it is confirmed that no major change of Civil Service superannuation benefits is in prospect. In that case, for that and subsequent operative dates the account to be taken of differences in superannuation benefits will be a new assessment of the difference for the time being current between the benefits of the analogues in all current surveys and of the Civil Service grades in question, to be made for each operative date by the Government Actuary's Department from an actuarial comparison taking account of all relevant factors.

9. Thus the parties who are negotiating Civil Service pay—the Official Side and the Council of Civil Service Unions—had agreed to put the superannuation adjustment into commission. In other words they bound themselves to use the adjustment calculated on actuarial principles by GAD. Had they not done so, the adjustment could have been the subject of negotiation between them and/or arbitration. As the remit is given jointly by the opposing parties in pay negotiations, the assessment has to be strictly even-handed. There have to be sound actuarial reasons for margins taken in either direction. GAD is not asked to act as an arbitrator and indeed could not do so as any arbitration would have to refer to the pay rates, not to one relatively small element which they take into account.

10. I hope this makes it clear that the assessments were simply a part of a comparison of total remuneration between Civil Service grades and outside jobs selected for comparability. The comparison was not intended to relate to a typical cross section of pension schemes nor to a typical private sector scheme. Indeed there is no reason why the analogue schemes should be typical of any wider group; they are what they happen to be, and that is what was allowed for. In practice, many analogue schemes were somewhat better than the generality of pension schemes, but this is a function of the choice of analogue jobs; in the light of sections 145–7 of the *Priestley Report* it is not unlikely that the employers selected as analogues would be those with better than average pension schemes.

11. The Priestley Report recommended that the field of selection should include public, semi-public and private employment; in practice, about 20% of the 1980 analogues appear to be from the public sector and 80% from the private sector (GAD does not know the identity of the analogue schemes). As the public sector schemes mostly have index-linked pensions, the deduction is smaller than it would be if comparison were purely with private sector schemes, in which less such protection is given, although private sector schemes may be better in other ways, e.g. death benefits. The pay rates from which the deduction is made would of course be different if the analogues were limited to the private sector.

12. The points in §§ 10 and 11 show that the outcome of the comparisons is not ‘the value of an index-linked pension’ as opposed to a non-indexed one. The comparison covers many benefits other than index-linking and takes account of the pensions increases awarded in practice by the analogue schemes, some of which are index-linked.

13. The exercise concerns the pay and prospective pension rights of serving officers, not pensions in payment to those who are now retired which consequently do not figure in any way in the calculations.

#### *The pension comparison: fundamental considerations*

14. The terms of reference require ‘all relevant factors’ to be taken into account; just what factors are relevant? As an actuarial comparison is called for, they must be factors capable of being taken account of in that way. I have to have actuarial reasons for what I do. An actuarial comparison of different schemes will take account of the quantum of benefits provided by the scheme rules or

expected on other grounds (e.g. pension increases awarded *ad hoc* by the employer); the contingencies which govern entitlements to those benefits, by means of probabilities of retirement, death etc., and other actuarial rates and factors; and the number of years which will elapse before those benefits will be paid, by varying the extent of discounting. Any contingencies which affect the quantum of benefits have to be allowed for; they may occur in various ways.

15. In principle, an actuarial assessment of a pension scheme looks purely at the financial value of the benefits which are to be provided, and evaluates these purely in financial terms. The assessment is rational and objective, and cannot place any value on subjective attitudes which civil servants or outside employees might be thought to hold towards the scheme's benefits.

16. This is a vital point, as the burden of criticism is that in present circumstances the Civil Service pension scheme is more attractive to staff than the assessment allows. If a competent authority were to agree that this was so, and to decide the extent of adjustment needed, it would be a simple matter to make this adjustment by amending the actuarial basis. But this would be quite different from assessing on actuarial grounds what the comparative pension schemes were worth, and so obtaining an actuarially derived assessment. Firstly, the item is obviously a subjective one, and is simply outside the scope of actuarial assessment. It might arise, for instance, because staff or the public tend to take a shorter-term view of the situation than is necessary for a rational assessment of any pension scheme's value to a serving officer. There is really no actuarial way of assessing the value of subjective items. Secondly, a person cannot take the Civil Service pension scheme by itself; the only choice is whether to take the job with all its conditions of service, or not. Thus any question of undue attractiveness or otherwise of the job should be looked at in relation to the terms of service as a whole. The question which would have to be asked is whether, after all precise comparisons and evaluations have been made, there is any unquantifiable item left over which would be taken into account by staff of the type and quality required. Given the structure of the situation, i.e. negotiation of pay rates on the basis of comparisons, with one particular item subject to actuarial evaluation, it would be totally inappropriate to attempt to 'stretch' the actuary's terms of reference so as to include an item which in any case cannot be dealt with satisfactorily by actuarial methods.

17. It also follows from the terms of reference that the methods used must tie in with those used for calculating True Money Rates. Accordingly, the value to a civil servant of the benefits of his pension scheme is compared with the value of the benefits of 'scheme X' *to that same civil servant*, assuming that he retains the Civil Service career profile etc., because this corresponds with the way in which pay and other fringe benefits are dealt with in calculating the TMR. This contrasts with an alternative assessment, which some commentators may have in mind, which would set the value of scheme X against the value of the Civil Service scheme rules *to a person in job X*, with the career profile etc. appropriate to that job. The difference between these two approaches is important when dealing with

pensions, especially in relation to benefits for early leavers. It may be added that, in practice, the alternative comparison could not be made without collecting data about career profiles, rates of termination etc. in the analogue employments. It is most unlikely that such data could be made available, and there would be several practical problems in processing it if it were.

18. Subject to the foregoing paragraphs, the terms of reference leave a free choice of actuarial method. Although the Civil Service scheme is financed by pay-as-you-go, not funding, this feature of Government finance is considered irrelevant to the present exercise. It is thought to be implicit in the doctrine of fair comparisons that the methods and the approach to the selection of bases should be the same as an outside actuary, who was calculating the contribution rate for an ordinary funded pension scheme, would use. This means, among other things, that the methods are based on the concept of funding, not pay-as-you-go.

19. The comparison is based on the benefits of the Civil Service and analogue schemes as their rules stand at the time, these being the promises of future benefits which form part of the current terms of service. However, a strict comparison of rules is inadequate in respect of post-retirement increases, since a number of employers in the private sector are making increases to pensions on an *ad hoc* basis, with an implication, but no firm promise, that further increases will be made if the cost of living continues to rise. Those schemes are paying pensions of money amount greater than was promised at the time that those pensions were earned, and members now in active service would appear to have some reasonable expectation that the practice will continue. Indeed the practice is now so common that it could be argued that employers who do not follow it probably will in future. This important addition to the money value of the analogue benefits cannot fairly be ignored, but its assessment presents difficulties as no specific promise is made for the future.

20. It is implicitly assumed that a substantial gap between increases in the public and private sector will continue in the long run. This is thought to be consistent with the long-term rate of inflation incorporated in the basis. However, public service pension increases are not guaranteed, but are provided under an Act of Parliament which could be amended at any time. If very high inflation were to persist for a long period, it seems likely that some form of action would have to be taken to limit the gap between the public and private sectors. One cannot forecast precisely what action would be taken, but presumably some form of de-indexation would be likely. A radical change in private sector practice seems highly unlikely, but the possibility cannot be totally ignored in the longer term. The situation is quite different from valuing a contractual guarantee given by a corporate body such as an insurance company, where the valuation has to cover the corporation against the possibility of insolvency if sued for the guarantee.

### *Evaluation*

21. When evaluating fringe benefits, it is a question whether one should

evaluate the cost to the employer of providing the fringe benefit, or the amount which the employee would have to pay to obtain the same benefit elsewhere. There is a real choice of approach when dealing with items which the individual could purchase for himself on the open market. But there is no choice in relation to pension benefits as in both the Civil Service and all the analogues these take final salary form, which an individual cannot purchase for himself. Benefits of this sort are provided only through employer-sponsored schemes. So it is the costs of providing the benefits, i.e. the contribution rates, which have to be compared. In many schemes, contributions are split between member and employer. For this purpose, however, the total of both contributions should be looked at, to represent the full value of the benefits. A separate adjustment is made in the TMR to allow for the difference in members' contributions between the Civil Service and analogue employments. However, the actual contribution paid into the fund of an analogue scheme is not used, for several reasons. Firstly, the pace of funding will vary in different schemes. Secondly, the Civil Service scheme being unfunded has no contribution corresponding to the employer's contribution in a funded scheme, so there would be no obvious contribution to be used for comparison. Thirdly, there is a risk of double counting because it is not known how far the salaries paid by an analogue employer, which have been brought into the pay comparisons, have been affected by the level of pension contributions which that employer is paying. Moreover, certain parts of the employer's contribution may be irrelevant to the comparison.

22. If we consider a typical funded scheme, the contributions being paid into the fund can be analysed into a number of components. The basic contribution, which may be described as the 'normal' contribution, is defined as the average level percentage contribution payable throughout the whole career of a member of the scheme, which would be just sufficient on average to finance the benefits arising from that member's service. The size of this contribution as assessed at any time will depend on the benefits which the scheme promises at that time, and on the basis which the actuary uses. The actual contributions which an employer will pay into his fund (over and above the share paid by the employee), however, will depend also on the history of these two items. For instance, when a scheme starts, the initial members will enter above the normal age of entry to service, and as pensions are more expensive for older employees the normal contribution rate will not be adequate for them. Thus an additional contribution will have to be charged from the outset. In the same way, an additional contribution will have to be charged if the scheme is enlarged by bringing in new groups of members. In either case, service prior to the date of joining the scheme may be allowed to reckon for pension either in whole or in part, and additional contributions will have to be paid to cover this liability. The same situation arises if the benefits of the scheme are improved. But provided the calculations allow for the full benefits accruing for current service, these additional contributions are not relevant because they arise from past history and not as a part of the reward for current service.

23. Also, it may happen that the progress of the fund has been different from what was projected by the actuary when the contribution rate was established. For instance, pay increases may have increased the fund's liabilities by more than was anticipated or than can be covered by additional investment earnings. In this case, the employer will be paying an additional contribution so that the fund will be able to pay the benefits when they fall due. In a sense, the additional contribution represents contributions which would have been paid earlier had the need for them been foreseen. But it does not follow that a corresponding contribution should now be deducted from Civil Service pay. Consider the situation when the extra contribution began. The scheme members were not promised additional benefits at that time. Did the employer reduce or restrict the salaries he was paying because he had to make extra contributions to the pension fund? If the answer to that question is yes, then it is the restricted salaries which will have been reported to the PRU and brought into the comparisons. But if the answer is no, it would seem wrong to make any reduction in Civil Service salaries on this account.

24. The contributions to a self-administered fund may be analysed into the normal contribution, together with additional contributions which may be needed for any of the various reasons given above. In the past, actuaries used to distinguish between these contributions in their reports, but nowadays many actuaries (including GAD) recommend a unified contribution without a published analysis of the type mentioned above. However, the analysis remains true in principle, and the conclusion drawn is that differences in the normal contribution should be allowed for in the deduction, but that differences in the additional contributions should not. Unfortunately this conclusion carries a presentational disadvantage; most funds have additional contributions for at least one if not more of the reasons given, and pension managers and others are used to seeing larger figures for the total contributions than those used for the present exercise. The above analysis may not occur to people. It must be stated categorically, therefore, that the contribution rates quoted are not necessarily the totals which I would advise for the purpose of funding the various schemes considered.

25. Instead of using the normal contribution, the value of benefits accruing in a year to employees at each age could be calculated, and averaged according to the actual age distribution of the Civil Service. In current conditions, when pay settlements are not expected to last for more than a year, there is an obvious case for this alternative method, although the normal contribution ties in better with the way in which pension fund contributions are actually calculated in practice. At present, the alternative calculation would produce a lower Deduction; the 1980 assessment, for instance, would have been 3.4% on the alternative method as against 3.8% which was quoted based on the normal contribution. The difference occurs because, in order to be consistent with the overall approach, Guaranteed Minimum Pensions are assumed in the alternative method to accrue at the rate appropriate for the attained age of the employee. The rates are generally higher than the rate assumed in arriving at the normal contribution,

which is the accrual rate applicable to the age of entry. In particular, the accrual rate is higher at the older attained ages, where the pension values would otherwise be greatest. The effect of allowing for the higher accrual rates of GMP is to increase the savings to schemes resulting from the responsibility taken by the State scheme to increase GMPs, so that the value of the scheme pensions is reduced. The effect is proportionately higher for the Civil Service than for the analogue schemes, with the result that the difference between the value of the schemes is reduced, thus leading to a lower Deduction from Civil Service pay.

26. The method of calculating the normal contribution is a matter of standard actuarial practice, but in view of the volume of calculation required special methods were used, as described in Appendix 8 of the 1979 Report which is reproduced as the Appendix to this paper.

27. Allowance has been made for the full price protection which the State provides for Guaranteed Minimum Pension where a scheme is contracted out. This materially improves the value of the analogue benefits, as it means that a substantial proportion of analogue pensions arising from current service will receive full price protection instead of the lower level currently afforded by many of those employers to their pensioners now. The basis implicitly assumes that, as GMP builds up, employers will restrict the scope of their own pension increases.

28. The basis is in principle that which would be adopted for calculating the contribution rate to a funded scheme. It should be a middle of the road basis rather than an unduly severe or unduly light one.

29. It is sometimes objected that the principle should be different from that stated in the previous paragraph, because the Deduction cannot be altered retrospectively whereas a fund can be topped up later (or a surplus distributed) if events differ from the actuary's basis. But it is not clear which way we should adjust the basis. Should we make it weaker or stronger? As my remit is jointly from management and union representatives, it could equally well be argued that the basis should be light, because an overpayment cannot be refunded, as that it should be heavy on the grounds that an underpayment cannot subsequently be made good. The critics have assumed too readily that a margin for 'once for all' should be towards increasing the contribution. Moreover, the argument runs that employers' contributions to their pension funds are fixed in the knowledge that if they subsequently turn out to have been inadequate, additional contributions can be made at a later date which will place the fund in the situation originally aimed at. But the actuary to a funded scheme will not quote a contribution in the expectation that it will turn out too low; quite apart from professional considerations, to do so would imply that the company's accounts for the year in which that contribution was paid were known at the time not to be giving a true and fair view. The considerations leading to the choice of basis are similar in both cases.

30. The details of the bases used are given in the 1979 and 1980 Reports, and can readily be compared with those used by other actuaries. The appropriate comparison is with the ordinary valuation reports of pension funds (which, of



course, aim at the recommendation of a contribution rate). Comparisons could be made with many public sector schemes which give increases linked to the Retail Prices Index, and also with private sector schemes (including insured schemes) which, although they do not normally give index linked increases, base their pensions on final pay as do the Civil Service and analogue schemes.

31. One comparison has often been wrongly made. GAD methods (which are thought to be similar to those used for self-administered schemes in general) allow separately for career increases in salary by using a scale of  $s_x$ , and for inflationary increases by means of a deduction from the rate of interest. Some actuaries, especially when costing insured schemes, merge both these allowances into one larger deduction from the interest rate, thus getting a lower net rate. If the GAD calculations had been done by the latter method, the net rate in deferment would have had to be  $-\frac{1}{2}\%$  in order to get the same answer, and it is this rate which should be used for comparisons with insured schemes and others costed by the latter method.

32. When comparing bases, it is of course essential to look at all the items together. In particular, the net rate of interest after retirement needs to be considered along with the valuation of discretionary increases in the private sector, described in §§ 34 and 35 below.

### *Uncertainty*

33. Much has been made of the relative certainty of index linked increases, as compared with the private sector position. The Scott Committee considered this on the basis of a report from Professor Brealey and Dr Hodges of the London Graduate School of Business Studies. A number of points arise.

34. Firstly, the Pensions (Increase) Act does not constitute an absolute guarantee, as any Act of Parliament can be amended. However, members of a scheme which provides only discretionary increases after retirement will *feel*, and to some extent *are*, less certain of the real value of their prospective pensions. As explained earlier, the subjective element in this has no place in an actuarial assessment, but some allowance was made in the valuation of analogue schemes because of the objective element. In the 1980 evaluation, the net rate of interest after retirement was taken as 3% for schemes with pensions linked to the RPI, but a higher net rate was used for schemes giving discretionary increases, depending on the increases given over the previous 5 years expressed as a proportion of the rise in the cost of living over that period. For these schemes, the valuation rate was interpolated between the gross and net rates of interest. The assumption is that the proportion experienced during the previous 5 years will continue in force indefinitely. But the previous 5 years was a period of very high inflation, when much was made by the private sector of the inability of schemes to pay adequate increases. Yet this experience was used for the long-term future without adjustment, in conjunction with the other assumptions which do not assume that the high inflation and low yields of the previous 5 years continue indefinitely. So a margin was taken here. Moreover, GMPs will provide an appreciable part of the

pensions which are currently accruing, and will be increased by the State scheme so that employers will only have a narrower band of pension to deal with in future.

35. As discretionary increases will vary from time to time in relation to the cost of living, schemes which had been giving 100% compensation were valued at 95% on the grounds that they have downside but no upside potential. Schemes which had not been giving any discretionary increases (about 19% of the analogues) include some which have been given fixed increases at a low rate, and some no increases at all. It was assumed that they would never give any discretionary increases, in spite of the manifest illogicality of providing final salary pensions with no corresponding measure of inflation proofing after retirement. Perhaps it would have corresponded with the treatment of 100% schemes to have assumed 5% compensation for the Nil cases, but no allowance for this was made. Also it was assumed that the substantial proportion of private sector analogue employers who give no increases at all on deferred pensions will continue to give none; adoption of the OPB's recommendations would falsify this. These assumptions were regarded as being extremely stringent (i.e. weighted against the civil servant), but it was thought right to read the data as described in these two paragraphs because of the uncertainties surrounding pensions increases in the private sector.

36. Brealey and Hodges approached the question via the discount rate, and state that "the appropriate discount rate is the return that individuals could expect to earn from an equally risky investment in the capital market". Their approach looks at the pension rights as an asset of the individual, which is valued by reference to a portfolio of investments which displays the same pattern of future cash flows (although Brealey and Hodges refer only to the riskiness of these flows, and not to their term or other characteristics). It must be remarked that there is no difficulty in applying differential discount rates to the various schemes. The problem is to justify objectively the size of the difference. This paper can do no more than point out some of the questions which arise.

37. As explained in § 21, we are looking in principle at the cost of providing the pensions, so that the question of investment and discount rates have to be looked at from the point of view of a pension fund. This is not necessarily an argument against Brealey and Hodges' thesis, as it can be argued that pension funds should invest to match their riskiness as well as according to other factors. If 'norm' portfolios could be established for schemes with and without index-links, the difference in yield between them would provide a measure of the difference in the discount rate appropriate when valuing the benefits for comparability purposes. It is not clear from their paper whether Brealey and Hodges are arguing that pension funds providing index-linked pensions should invest according to their model portfolio, or not.

38. A further point is that the individual cannot choose whether or not to have a pension. A pension scheme is attached to the Civil Service jobs and almost all the analogue jobs which come into the comparison. The only choice which the

individual has is whether or not to take the job as a package, including the pension scheme.

39. The portfolio assumed by Brealey and Hodges could not be realistic, given that suitable investments did not exist. The use of small savings media as an indicator for discount rates seems irrelevant; pensions are provided through institutional investment, and the terms offered by the Government to encourage small personal savings are neither here nor there. Index-linked SAYE bonds are not available to pension funds, and have as their main attraction the protection of capital. Moreover, these investments are tax free, whereas the alternative investments available to individuals are taxable as is a pension if regarded as an investment by the individual. A pension fund, however, is tax free and can take advantage of the relatively higher gross yields available on the alternative investments. Treasury Bills are bought by discount houses, banks and the like to match very short-term liabilities and as reserve assets, an entirely different use from that of the pension fund. They are risk free in nominal terms, but pension funds are less concerned with reducing the risks arising from fluctuating market values because they normally expect to continue to increase in size.

40. Appendix 3 of the Scott Report lists a number of public sector pension schemes, showing the provisions for pensions increases. Many of these schemes are funded, and a number of different actuaries in private practice and GAD are involved in advising them. Some of these funded schemes are shown as being inflation-proofed under the rules of the scheme or by statute, while others provide discretionary increases. If the inflation-proofed schemes invested in a markedly different way from the others, so as to secure a lower yield but at less risk, a comparison of the yields between the two groups of funds would indicate the difference in discount rates which should be used in the assessment. But such information as we have indicates that there is no systematic difference of this sort between the funds. While there are naturally differences of view between managers, they appear to invest on similar principles. The model portfolio is quite unlike those of actual Pension Funds at the present time.

41. It may be, though, that the assets of these schemes *ought* to differ, because of their different liabilities. This brings us back to the point about norms; if norm portfolios could be established, it wouldn't matter that the portfolio of a particular fund deviated somewhat from the norm.

42. Any attempt to establish a norm must take account of other characteristics besides riskiness; the term to maturity is a major item. The use of very short-term or liquid assets such as Treasury Bills does not seem relevant to pensions whether considered as an asset or a liability.

43. Even if norm portfolios could be established, the valuation of discretionary increases in private sector schemes remains a problem. These increases are not a formal liability which can be matched for. Unless those employers set out to provide an uncertain benefit, they would hardly regard investments of uncertain real yield as being better matched to their liabilities than more certain investments, were such to be available. Even then, they might well buy the less certain

investments—equities and property—in preference to an index linked certainty in order to obtain a better yield. We do not know whether to regard a fund whose increases amounted to about half the rise in the cost of living as wishing to provide that level of compensation for sure, or as attempting to do the best they could at the expense of certainty, yet according to the theory different discount rates would be appropriate to these two situations. We might be able to establish a difference by looking at the yields of the actual investments of various funds, but this means abandoning the approach via a norm.

44. Brealey and Hodges' model does not correspond to the actuarial assumptions made in the 1980 assessment, as it assumes a long-term real yield assumption of zero per cent, against the 3% used by GAD. It would be interesting to know what their model procedures would produce if the real yield was taken as 3%. It is very questionable whether the 0% real yield is consistent with the assumption of 7% inflation, both figures being long-term averages.

45. Brealey and Hodges' analysis leads to an increase of about 1% in the deduction on account of riskiness, though their figures show a much larger increase because their model portfolio leads them to postulate negative real rates of return for the long-term future, rather than the positive rates used in the assessment. But the latter point is not relevant here. If their adjustment is made, the amount already allowed, as described in §§ 34 and 35, would have to be offset so that the increase in the Deduction would be less than 1%. Thus there does not seem to be a large amount at stake here.

### *Other Staff Groups*

46. The other comparison studies listed in § 2 are made on similar principles and bases to that for the Non-industrial Civil Service. Although the position of the actuary *vis-à-vis* negotiations is not the same in most of the other cases, the authorities concerned normally wish the assessments to be consistent with that for the Non-industrial Civil Service.

### *Megaw Inquiry*

47. The Government has recently announced a new inquiry into Civil Service pay under the chairmanship of Sir John Megaw. The inquiry had not begun work when this paper was written, but it will doubtless need to consider the way in which the pension assessments are brought into the determination of Civil Service pay.

## APPENDIX

### NOTE ON THE METHOD USED TO CALCULATE THE VALUE OF ANALOGUE SCHEME BENEFITS

A1. The standard actuarial method of calculating the new entrant contribution rate for the benefits of a superannuation scheme is a lengthy one even though carried out by computer. With 458 such calculations it was necessary to devise a simpler method. Accordingly, full calculations were carried out for a limited set of model schemes and the value of each analogue scheme was obtained by interpolation between these results.

A2. The set of model schemes was chosen to cover the full range of variations of the benefits of the analogue schemes. For example it covered the range from full cost of living increases on pensions after retirement to no increases at all, the range of benefits on ill-health retirement from deferred pension only to an immediate pension based on full potential service and the range of normal retirement ages from 60 to 65.

A3. The benefits of each scheme were then split up in the following way:

- Pension on age retirement;
- Lump sum on age retirement;
- Widow's pension on death after age retirement;
- Pension on ill-health retirement;
- Lump sum on ill-health retirement;
- Widow's pension on death after ill-health retirement;
- Deferred benefits and contribution refunds on withdrawal from service;
- Lump sum on death in service;
- Widow's pension on death in service;
- Children's benefits;
- Lump sum on death after retirement;
- National Insurance modification;
- Saving of pensions increases on GMPs.

For each of these benefits the value was expressed by a formula, obtained from the model scheme results, depending on the accrual rate, type of enhancement, level of pensions increases, etc. of the particular scheme.

A4. The combined formula giving the value of a scheme's benefits in terms of the variables as described above is extremely lengthy. An illustration of how it operates is shown below where the derivation of the value of a single benefit, the pension on ill-health retirement, is described.

A5. Suppose the scheme has a normal retirement age of 65, has pension benefits based on 60ths of final pay per year of service, is assumed to increase pensions after retirement by 65% of the increase in the cost of living and gives benefits on ill-health retirement based on full potential service to normal retire-

ment date. The value of pension on ill-health retirement would be:

$$V = B \times (A \times 80) \times C$$

where  $B$  is a value from a model scheme of ill-health pension at an 80th accrual rate, full cost of living pensions increases, normal retirement age 65, all service counting, final pay defined as pay in the last year of service and ill-health benefits calculated on full potential service to normal retirement date. This value is 2.05% of pay as a new entrant contribution rate (it would have been 1.59% if ill-health benefits had been based on accrued service only instead of full potential service).

$A$  is the accrual rate of benefits, 1/60 in this example.

$C$  is the factor for pensions increases. This is calculated in two stages. First the rate of interest net of pensions increases is calculated. This rate,  $I\%$  per year, is given by the formula

$$I = \frac{46350 - 300D}{5150 + 3D}$$

where  $D$  is the percentage proportion of cost of living increases assumed to be given by scheme. This formula gives rates of 9% when  $D$  is 0 and 3% when  $D$  is 100. For a  $D$  of 65, the value of  $I$  is 5.0234

$C$  is then given by the formula

$1.2484 - 0.927I + 0.0033I^2$ , which gives a value of 1 when  $I$  is 3 (i.e. when full protection is given) and .6814 when  $I$  is 9 (no pensions increases). For  $I = 5.0234$  the formula gives  $C = 0.8660$ . (The parameters of the formula for  $C$  depend on the normal retirement age and the type of ill-health benefit.)

Thus, for the example being considered,

$$V = 2.05\% \times \frac{1}{60} \times 80 \times .8660, \text{ or } 2.37\%.$$

This calculation gives a value of pension on ill-health retirement of 2.37%. It compares with the value in the Civil Service scheme of .98% and the difference is due to accrual rate, pensions increases, normal retirement age and type of enhancement of service. The main reason for the large difference is the relatively high incidence of ill-health retirements in the 60s, after the normal Civil Service pension age, and the analogue benefit illustrated is of the more generous type. The formula given would have contained extra terms if the definitions of final pay and reckonable service had been different from the standard definitions of pay in the last year of service and all service including fractions of a year respectively.

ABSTRACT OF THE DISCUSSION

**The author** (presenting the paper): This evening we have before us the Scott Report and, in expansion of the technical side, my memorandum, which is basically the evidence that my Department gave to the Scott Committee when it was sitting, so it covers the points that were at issue 15 months ago.

This subject leads to the question: if a comparison is made between the total package of remuneration of two jobs for guidance on the pay scales of one of them, how should allowance be made for pensions?

Controversy centred around the assessment of the value of Civil Service pensions, which is a job I did on a joint remit from the Government as employer and from the Civil Service unions. The remit being directed to myself as an actuary, I always felt it essential to stick to actuarial methods as commonly used in the profession. To do anything else would not seem consistent with my responsibility towards whichever party was disadvantaged by the change.

The most important event since Scott reported is the issue of indexed gilts, which is not dealt with in the papers before you. While it is too early yet to say how they will settle down, the market experience so far, which is of real yields between 2 and 3%, just cannot be brushed aside. We do not know how a generally available issue would go, but there is no doubt that pension investment is the right field to test for our purposes, and pension funds, with their final salary liabilities, require an indexed bond.

There is no mention of private sector practice in this field, but there are management consultants who advise on pay scales. They make job comparisons of various sorts and some, I believe, build up data banks. I know some employ actuaries. Pensions must come into these comparisons, but I cannot find anything published about private sector practice. It would be valuable to hear something about how private sector methods compare with those we use in the public service.

**Mr R. G. Brown** (opening the discussion): We are concerned with the valuation of index-linked pensions against the background of the salary comparability exercise. This subject has been considerably clouded by a large number of ill-informed comments or just plain misunderstandings.

The main misunderstanding has been that the 'Deduction' recommended by the Government Actuary represents the cost of the index-linking. This misunderstanding is clearly demonstrated by the evidence of the Committee for Policy Studies. The purpose of the exercise is to evaluate the difference between the benefits of the public sector scheme concerned and the analogues. How this should be done is the central issue for tonight's discussion.

I think the three key questions for consideration are: (1) the choice of the analogues; (2) consideration of the question of uncertainty; and (3) the assumptions used in the valuation.

Since the publication of the Scott Report, we have seen the first two issues of index-linked gilts and these do help a little when considering some of these key questions.

Dealing first with what is probably the least controversial of the three points—the choice of the analogues—I had not realized until the publication of the Scott Report that the analogues include public sector schemes. The pensions' calculations are part of a wider salary comparability study and, clearly, if public sector schemes are included in the analogues for basic salary comparison, then they must also be included for pension purposes. However, the inclusion of public sector analogues does introduce circular arguments and must inevitably lead to a degree of public disquiet. I believe Scott's recommendations to exclude public sector analogues from the salary comparability study to be justified.

Key point (2) is the question of uncertainty. I believe the fundamental area of concern has been that the calculations take no account of the value to the individual of the guarantee of inflation protection, i.e. inflationary increases are guaranteed rather than being discretionary. The author makes the point in § 34 that there is no absolute guarantee, as an Act of Parliament can be amended. This is analogous to a private sector scheme promising a particular benefit in the scheme rules. Just as an Act of Parliament can be amended, so can the scheme rules. Both situations might arise, for example, if the cost of the particular benefit becomes excessive. As a few recently well-publicized cases show, rule changes that reduce benefits do not happen easily. In practice, it is a very difficult decision for an

employer to reduce benefits promised in the rules. It is considerably easier to reduce discretionary benefits. I conclude that the difference between a benefit promised by rule (or by Act of Parliament) and a discretionary benefit is large, and this should be taken into account. In § 15, the author states that the assessment does not take account of subjective factors and clearly this uncertainty is highly subjective, although of considerable value.

Scott clearly recognized this value and hence commissioned the Brealey and Hodges' Report. They have developed the idea of using different discount rates to value a 62% escalating pension compared with a 100% escalating pension, as the former is less certain and hence more risky. They have not attempted to allow for the uncertainty of the 62% figure itself and hence their model, if accepted, is likely to produce under-estimates. Their approach has a certain intuitive appeal. Just as it is reasonable to look for higher yield on a more risky investment, so it seems reasonable to value a more risky pension at a higher discount rate. The problem arises in determining the difference between the rates to be used. However, we will not have got very far if we only transfer the problem of putting a value on this uncertainty to the problem of putting a value on the difference in discount rates.

To assess this difference Brealey and Hodges use an interesting statistical model. It is a pity that some of the detail of their model is so clearly inappropriate. For example, Treasury bonds should not have been incorporated, as we are considering long-term funds. Their use of 'Granny' bonds is also inappropriate for gross funds and has led them to assuming negative yields, which now look very low compared with the yields currently available on the index-linked gilts. It would be interesting to see their model reworked with Treasury Bills replaced by index-linked gilts, and with some modification of their assumptions to fit in more closely with those used in the 1980 assessment.

One must ask, however, does their model miss the point altogether? Surely the main area of uncertainty is in the 62% figure, which is far less certain than the 100% Civil Service basis, for the reason previously mentioned. Thus the model is being used, at best, to tackle only part of the problem. We should arrive at the difference in discount rates by considering fully indexed investments and non-indexed investments. This should, in my view, be the case if the public sector analogues were excluded. Perhaps the best approach is to arrive at a reasonable range for this difference. Currently the yield on long-term gilts, compared with projections of long-term inflation, exceeds the yield on index-linked gilts. This suggests a margin between an inflation-linked and a similar non-inflation linked investment to be of the order of 0 to 3%. In time we should be able to form a better view, but I put forward this suggestion as a not-unreasonable range for the difference in discount rate.

The third key area of dispute has been the actual assumptions used by the Government Actuary. In particular, the use of a 3% real yield has attracted considerable criticism. Fortunately, we are able to get a better idea of the reasonableness of this assumption by considering the index-linked gilts which have subsequently been issued. They have yielded 2 to 3%, so *prima facie* 3% is of the right order. Index-linked gilts have a very short track record and before being more definite we will need to see how the yield varies over a reasonable period of time when a wide range of stocks are available.

Many commentators have confused the 3% margin between interest and prices with the 0 to 1% margin often employed as a difference between interest and salaries. Introduction of the salary scale makes the effective interest/salary margin  $-\frac{1}{2}\%$ . Other actuaries may use a different assumption, but the 3% figure is clearly within the range of reasonable assumptions.

I would like to emphasize two things that significantly compound the problems in arriving at a recommended 'Deduction' from the range of reasonable figures, namely, sensitivity and margins. We are looking at the difference between two relatively large numbers, the large numbers being effectively the funding rates of two pension schemes. Hence the results are highly sensitive to the assumptions used. Secondly, it is normal in pension fund work to build in appropriate margins to deal with uncertainty. In this case, there is no place for margins, as it is not clear in which direction any margin should be applied.

**Mr S. Benjamin:** I hope the discussion tonight will not be limited to techniques, but I want to discuss the Appendix to the Scott Report by Brealey and Hodges.

There are several comments that can be made. They seem, for example, to have simulated through each future year independently. In that case they have violated a general working rule on all



simulation work, that each simulation should follow through a self-contained single realization of a future.

Also, they seem to have aimed at an investment portfolio which minimized variance instead of allowing a trade-off between expected return and variance. I am not sure if this is partly because they aim at a discount rate whereas, I think, a discount rate is irrelevant to their approach.

I would like to describe the mechanics of what, in my opinion, is a more consistent working of their own approach, and I will stick to their own details as much as possible.

They start off essentially with six models. They have models on: (1) Treasury Bills, (2) long-dated gilts, (3) equities and (4) something which I will call a managed fund. Number (5) is inflation and model number (6) is salary progressions. As each model is played through in time, the values for any one year depend on previous values plus a random element. They bring in market expectations, which also depend on previous values. That is the style of the model.

We could use the following procedure, starting with the Civil Service scheme, which we take to be fully index-linked. It is similar to Brealey and Hodges, but I maintain it is more self-consistent.

Assume all investments are in Treasury Bills. We start to simulate and follow through one realization of the model, playing through inflation, salary progression and the investment return on Treasury Bills. Starting at age 25, invest 100% of salary in the Treasury Bills until age 65. This will produce a fund at age 65. In order to avoid problems of discounting, we carry the fund forward in the model, without further new money except dividend income, through the period of retirement until the last age of the life table. This produces a fund at age  $\omega$ .

Now, re-start, within the same realization (i.e. simulation No. 1), and invest the pension amounts in the Treasury Bill portfolio from age 65 to age  $\omega$  to produce a second fund.

The first fund is the value of 100% of salaries. The second fund is the value of the pension payment. Both are at age  $\omega$  within the same universe. So, if we divide the second fund by the first fund we obtain the contribution rate as a percentage of salary for the first simulation realization.

It does not matter whether mortality is also treated as a random variable or the life table is followed deterministically.

We now re-run that same realization of a possible world, with the same values and random fluctuations, but invest wholly in the second pure portfolio, long-dated gilts. We obtain a second contribution rate. We do the same thing with equities, and again with the managed fund.

We now have four contribution rates,  $C_1$ ,  $C_2$ ,  $C_3$  and  $C_4$  from four different runs of the same single realization of the model. If we were to take proportions  $x_1$ ,  $x_2$ ,  $x_3$  and  $x_4$  of the four investment portfolios, we would get a weighted average of the four contribution rates.

That was simulation No. 1. Now, suppose we carry out 100 simulations, we get four contribution rates for each. If we again take proportions  $x_1$ ,  $x_2$ ,  $x_3$  and  $x_4$ , we would get a weighted average contribution rate for each, and end up with 100 such contribution rates, each one of which would be a linear combination of those proportions, which have yet to be determined.

That sample of 100 values from our model would have a mean and a variance, each in terms of  $x_1$ ,  $x_2$ ,  $x_3$  and  $x_4$ . The means would be linear, the variance quadratic.

We could now use a procedure which is used in modern portfolio theory. As we vary  $x_1$  to  $x_4$  we get a different mean and variance of the contribution rate. In modern portfolio theory it is assumed to be useful to try to minimize an expression of the type

$$\text{mean} + \lambda \times \text{variance}.$$

In other words, we trade off mean for variance. The values of  $x_1$  to  $x_4$  which do this will be a function of  $\lambda$ . That will depend on personal preference but I suppose a value of 1, 2 or 3 might be acceptable. We would probably avoid values which led to negative values of  $x_1$  to  $x_4$ , although Brealey and Hodges were not worried.

We have not quite finished because that is the value of a contribution rate for the Civil Service scheme. If we now use the same simulations, but assume the pension is only 62% inflation proofed—we shall again get four different contribution rates in each of 100 simulations. Almost certainly we shall find different values of  $x_1$  to  $x_4$ , and we shall end up with a corresponding contribution rate for the scheme with 62% inflation proofing. The Government Actuary, of course, also had to deal with a lot of other differences between the schemes.

The difference between the final two values is the difference in contribution rates, which is equivalent to the difference in those benefits.

I have some final comments of a general nature. I have used the Brealey and Hodges' approach, but I have used a different procedure. In so far as I have had their procedure explained to me, I disagree with it.

There are two aspects of any models such as theirs:

- (a) The form of the model, for example, is it autoregressive and with how many terms?
- (b) The values of the parameters in the models.

Inside the working party on Maturity Guarantees we found that two models of different forms could be fitted to history and would give similar results in the short-term, but over the long-term—and pensions are long-term—they could give vastly different results. The next point we found was that the standard error of any particular parameter was very large.

Brealey and Hodges end up with an investment portfolio which no investment manager would use. Their model sets up explicit mathematical equations which interpret past results and establish expectations about the future. Investment managers do the same but without explicit mathematical equations. Investment managers are the market, so almost by definition the Brealey and Hodges' model must be wrong. The most difficult feature to model is the fundamental item of future expectations at any point in time; that is my guess in a model of that sort.

If we do not accept a model unless it agrees closely with the actual market, then we return to the argument put forward by the Government Actuary that you need to look at actual investment portfolios or, at least, an acceptably typical portfolio.

The approach by Brealey and Hodges is interesting, but I think it is very unfortunate that their final numerical result was given any prominence.

The alternative to a lot of mathematics is a real market in index-linked bonds. The work by Brealey and Hodges reinforces the comment in Sir Bernard Scott's Report to the effect that mathematics by the Government Actuary, or anyone else, is a poor alternative.

**Professor A. D. Wilkie:** I also want to talk about the Brealey and Hodges Appendix to the Scott Report. Like Mr Benjamin, I am sure that their approach is a good one in principle, but we do need to remember § 114 of the Scott Report: "The Brealey and Hodges' study was intended to be illustrative rather than to provide an answer to the problem of valuation. Its rates of return are derived from past experience and do not claim to be a forecast or assumptions concerning the future."

Thus, while they are right in their general principle, I think that a lot of the details of their methods are faulty in some way. Their assumptions (which obviously they do make) are not all valid, and their numerical answers are therefore not justified.

Mr Benjamin has described an alternative method of using their answers. I want to concentrate on the investment model in the paper, actually by Cooper and Hodges, on which the Brealey and Hodges' paper is based. Their stochastic inflation model is similar to that used in my paper on index-linking presented here last March (*J.I.A.* 108, 299). Their fixed-interest rate model appears not unreasonable, but it produces negative expected real rates on both long- and short-term fixed-interest stock. While I accept that the historic real returns in recent years have, in fact, been negative, I cannot accept that investors have expected (using the word 'expected' in a colloquial sense) to obtain negative real rates of return any more than we expected inflation from 1970 to have been so high. We have had a run of bad luck, in the sense that inflation has always been higher than expected in the past 10 years, but that should not cause us to assume that the coin is permanently biased.

Their equity model, which is an adjusted random walk model, appears to me to be unsound for long-run forecasting. It does not take into account the dependence of share prices on dividends, the comparative stability of dividend yields, along the lines of the Maturity Guarantees Working Party Report, and then the dependence of dividends on inflation. Thus, it implies that equities in the long-run are badly correlated with inflation, and are not suitable for matching indexed benefits, whereas Treasury Bills (which have short-run correlation with inflation) are seen as suitable, even

though they have negative returns. If Brealey and Hodges had used a different model for equities, their portfolio might have performed much more like real pension fund portfolios.

The trouble is that their conclusion that the 'ideal' pension fund portfolio should consist of large positive holdings of Treasury Bills and negative holdings of gilts is so clearly unreasonable at first sight, that something must have gone wrong in producing it.

The Brealey and Hodges' paper shows that each separate year's pension payment or contribution receipt is matched independently of other years. This assumes that the simulation results in successive years are independent, which can hardly be true. If there is a negative correlation between the returns on investments in neighbouring years (as would be the case for equities using a maturity guarantee type model), then losses in one year may be balanced out by profits in another, or *vice versa*.

Also, Brealey and Hodges assume that fixed-interest stocks are not matched by term, but are included in a portfolio of constant term, rolled forward continuously from year to year. Now, the investment returns on redeemable fixed-interest stocks must be negatively correlated in the sense that if they decrease one year they must climb back up later to reach the maturity value.

I entirely agree with the alternative method, explained by Mr Benjamin. The lowest variance need not necessarily be chosen, because the lowest expected rate of return is obtained in this way. There is a trade-off, and you might obtain a much better rate of return with only a slightly higher variance, which is worth while considering.

Of course, now we have got 3% index-linked stocks, but not enough of them, it probably shows that the Government Actuary's assumptions were reasonable in the first place.

However, Brealey and Hodges' methods do cast a new light on the problem of dealing with uncertainty and I would urge actuaries to try to understand the set of ideas developed by financial economists under the general heading of 'Modern Portfolio Theory', and see how to apply them to actuarial situations. There are plenty of situations to which we can apply these items.

**Dr S. D. Hodges** (a visitor): Tonight I am speaking on behalf of Professor Brealey and myself.

In any task that requires judgements about the future, it is almost inevitable that there will be differences of opinion. The important issue, however, is that there should be agreement on what is being measured, rather than on assumptions about the future. We should like to focus our comments on the former.

Although it does not provide any tailor-made solutions to the problem of valuing risk, we believe that the growing body of literature in the field of financial economics does suggest that direction in which actuarial techniques may be extended to deal with these new problems. The issue centres around the choice of the rate of return at which the expected future benefits are discounted. While the choice of this rate is a difficult matter, it is almost universally agreed that a risky benefit should be discounted at a higher rate than a safe benefit. Not only do the beneficiaries value the extra safety, but it also costs more to supply it.

The theoretical basis for pricing risks started from Von Nermann's *Theory of Choice Under Uncertainty* in 1947 and, of course, we all know how it has been developed successively through the work of Arrow, Pratt and others. The problem is to apply it because it does not give us tailor-made solutions.

When the actuary appraises a pension scheme, his principal concern is whether the scheme can expect to meet its future obligations. To judge this, the actuary quite correctly discounts all future contributions and benefits by the expected return on the fund. In this way he obtains an estimate of how large the pension fund would need to be for the scheme to expect to meet its obligations.

However, the Scott Committee was not concerned with the adequacy of pension funding. Its brief was to compare the value of alternative schemes. For the purpose of determining the value of our pensions, the expected return on pension funds is irrelevant. For example, suppose that pension funds were restricted by a future government to investing in gilts only, which lowered their expected returns. As long as our pension benefits remain unchanged, their value must also remain unchanged, even though if we discounted on a lower rate of return it would appear to make them more valuable. If Professor Brealey and I could get an increase in value as easily as that we would be lobbying hard for that kind of legislation.

If we wish to calculate the value of any set of future cash flows, we need to measure how much

people are prepared to pay for them. So we must look in the capital markets at the price at which similar packages of cash flows are sold. Thus, we should be discounting by the rate of return that investors require on an investment with an equivalent risk and time pattern. If we wish to value a fully indexed pension, we need to discount by the expected rate of return on a freely traded indexed bond.

If it is accepted that the appropriate discount rate for an indexed pension is the expected return on a freely traded indexed bond, then the problem is to measure that return. When we made our estimates, no indexed bonds were in issue and therefore we attempted to construct a portfolio of existing securities that was as close as possible to an indexed bond. The assets offering the least real risk were Treasury Bills and so these were our main investment.

Long-term gilts are very adversely affected by unexpected inflation and, therefore, we were not surprised that our portfolio contained a short position in long-term gilts, which provided the required insurance against inflation (but required a premium to be paid for that insurance). Thus we ended up with a negative rate. None of the assets individually offered the negative rate but the total portfolio did.

The author suggests that because pension benefits are many years away, a matching portfolio of long gilts would reproduce those cash flows with less risk than Treasury Bills. Unfortunately, while long gilts have a date with destiny in terms of their nominal pay-off, they have no such date in terms of their real pay-off. We have calculated real returns on Treasury Bills and long-term gilts over 10-year periods and found the long-term gilts to be significantly more variable.

I would like to mention a number of misunderstandings, although there are some we do not have time to mention here. For example, we did not use 'Granny' bonds in our model. We did have separate realizations of the future and that did imply serial correlation of deficits. The point that we used was that values are additive. It is not a question of ignoring interactions. That is why we adopted our approach.

We did not regard our analysis as illustrative. We rather resented that word in the Scott Report, although we would be the first to concede that it is capable of quite a lot of improvement.

Most of the author's criticisms of our estimates seem probably to stem from a misunderstanding of the rôle of the fund that we constructed. The appropriate investment policy is an important question on which there have been some recent theoretical developments, but we were not concerned with those issues. We were not saying that pension funds should hold our portfolio, nor that they cannot expect to earn a real return of 3%. Indeed, since we assumed an expected real return on equities of about 6%, our estimates are quite consistent with an expected real return on the typical fund of around 3%. We believe that if the consequences of unexpectedly good or bad investment performance are borne in part by the company rather than the pensioner, the pension benefits must be less risky than the pension fund and must, therefore, be discounted at a lower rate.

We believe that the estimation of rates for this type of analysis is a crucial issue, where both actuaries and financial economists have important rôles to play.

**Mr K. G. Smith:** There is one fundamental assumption made by the Government Actuary which I find difficult to accept, and I suspect that it lies at the heart of some of the unease expressed elsewhere.

From § 120 of the Scott Report and § 23 of the current paper, it is clear that the adjustment, i.e. the 'Deduction', is based on the value of benefits in the form of a notional funding rate for a new entrant at age 25, described as the 'normal contribution rate'. Section 102 of the Scott Report reveals that the 'normal contribution rate' is 16.8% of salary which leads to the 'Deduction' of 3.8%.

Notwithstanding the points made by the Government Actuary about why this might differ from actual experience, I was surprised that the Scott Committee, which listed, in Table 6 of their Report, the number of employees and the provision for pensions increases of a number of other employments in the nationalized industries and public corporations which are operated on a funded basis and provide similar benefits, did not also include the current funding rates for those schemes.

As this might be considered of some relevance I have extracted the information. In Table 5 only two of the schemes are funded, and the current joint contribution rates for staff benefits as a percentage of pensionable pay are: for London Transport, 24.9% less £83 per annum; and for the Universities Academic Staff, 20.25%.

In Table 6 virtually all the schemes are funded, but those for British Aerospace and British

Shipbuilders do not provide index-linking, and the Water Authorities (like Local Authorities) pay pension increases out of revenue. The other current joint contribution rates for their staff schemes as a percentage of pensionable pay are as follows:

British Airways Board	23.2%
B.B.C.	27.75%
British Gas Corporation	35%
British Nuclear Fuels Ltd.	21%
British Railways	23.33%
British Steel Corporation	24%
Electricity Council	18%
National Bus Company	32.5%
National Coal Board	22.14%
National Freight Corporation	18.75% plus Government subsidy for past service.
Post Office	21%
South of Scotland Electricity Board	18%
U.K. Atomic Energy Authority	17.5% to 32.5% for differing groups.

In addition, two further public corporations with indexed pensions and some 7,500 employees each, are:

British Airports Authority	23%
Civil Aviation Authority	30%

The Government Actuary is consulting actuary to three of these schemes, which no doubt accounts for the disclaimer in the last sentence of § 24 of the paper.

In the light of these figures it seems probable that, if the Civil Service benefits were being provided from a properly funded scheme, the current joint contribution rate would be in excess of 20% of pensionable pay.

My own experience of pension negotiations (in both the private and the public sector) is that the employer and the responsible trade unions take account of the current cost basis, and do not attempt to arrive at an answer on the basis of a notional cost to a new entrant at age 25.

Furthermore, such a notional basis would seem to imply that there will be no future retrospective improvements for future entrants, and that present employees should bear no share of the cost for past benefit improvements which have already been applied to them. Such assumptions seem unfairly weighted in favour of the employee. By their nature, pension costs in a final salary scheme constitute broad averages not strictly applicable to individuals, and I remain unconvinced that certain costs ought to be omitted before such averages are derived.

I suggest that a practical alternative to the Government Actuary's theoretical approach would have been to compare an average current funding rate for the funded indexed nationalized industries schemes, with the average current funding rate for the analogue schemes (excluding those in the public sector), including any difference in the pensionable pay, and to derive a 'Deduction' therefrom. Such a comparison would not have involved the 'presentational difficulties' referred to in § 24 of the paper. Furthermore, if it produced an answer consistent with his theoretical calculations, I would have felt much greater confidence in supporting the Government Actuary's assessment.

One of the most refreshing things about the Scott Report is that the Committee have not become so mesmerized by technicalities that they have failed to consider the first principles, viz., what a pension scheme ought to provide. The first sentence of their summary and conclusions reads: "It is a highly desirable social objective that the standard of living of those in retirement should be protected." They proceed to draw unflattering comparisons of the United Kingdom with France and West Germany, who seem more easily to adapt their particular provisions to the requirements of their beneficiaries.

Similar realism was shown by the Occupational Pensions Board in their recent report on improved protection for early leavers. Their conclusions start in similar fashion: "We consider that the objective that job mobility should not undermine occupational schemes as a major form of provision for retirement has not been achieved."

My plea, therefore, is that, rather than waste endless time on a defence of the *status quo* or on opposing radical change for the future, we should appreciate that our present system of occupational pension funds has its weaknesses as well as its strengths. It is possible to rectify the defects without dispensing with the advantages, but if we rigidly refuse to adapt, it becomes more likely that the whole system will be overturned and replaced by new and untried arrangements, no doubt bringing with them a different combination of shortcomings.

The particular weaknesses needing remedy, to which the Scott Committee and the O.P.B. have drawn attention, are the maintenance in value, during high inflation, of pensions in payment and the preserved benefits of early leavers. They need protection just as much as those employees whose benefits escalate with their earnings, if occupational schemes are to serve the purposes for which they were intended.

**Mr L. V. Martin:** I worked for many years for the Government Actuary's Department and I was a consultant to the Scott Committee, but my comments represent entirely my own views and not those of either the Department or the Committee. I wish to make two points.

First, the Scott Committee was an Inquiry into the *value* of pensions, yet in the Report there is no full discussion of the meaning of value. The methods described by the author relate to the cost to an employer of providing pensions. However, I doubt if that is the appropriate concept of value for the purpose for which results were to be used. Ideally, salaries would be fixed so that the Civil Service job and the analogue job were equally attractive to those employed in them, or contemplating employment in them. Employees' conception of the value of their pension scheme may well differ radically from the actuarial assessment of cost. It is clear that many employees in the private sector consider that public sector employees enjoy a far more valuable advantage than the calculated adjustment in their index-linked pensions. Those people I have talked to in the public sector tend to see these aspects very differently, and to doubt if, in the event, they will fare much better than the private sector. A point that has been made to me very strongly is that Civil Servants are told that they have extra rights of great value for which they ought to pay a very large contribution, but they note with some concern that those who press this most strongly often press simultaneously for the guarantee of index-linking to be withdrawn forthwith. This difference between the ways in which the public sector and the private sector tend to look at these aspects shows that it is absolutely impossible to produce an adjustment that will achieve any wide degree of acceptance.

The other point I would like to make follows from what Mr Smith has just said, in that it is clearly undesirable that these calculations have to be made, just because pension schemes are so very different. It seems highly undesirable that an individual's pension prospects should depend so greatly on his employer's scheme, the fortunes of that scheme and of that employer, and on whether or not he works for the same employer throughout his career.

The real value of the pension that a given rate of contribution to a funded scheme will produce is highly sensitive to the real rate of return. A 1% difference in yield can easily mean 20% or more difference in pensions. For this reason, funded pension schemes cannot be designed to produce the type of pensions needed for a fixed level of contribution with any accuracy.

Why do we have funds at present? Principally for security reasons, because each employer has his own scheme, and we need to insure against him going out of business.

I am drawn to the conclusion that the only long-term answer lies in assessmentism with large nation-wide schemes or one national scheme. Assessmentism may give rise to problems of demographic unbalance, but these are likely to be of manageable proportions compared with the uncertainties and difficulties of funded pension schemes, as they exist at present.

**Dr J. A. Kay** (a visitor): I think much of the discussion tonight, and particularly much of the disagreement between the Government Actuary and Professor Brealey and Dr Hodges, rests on what is a semantic confusion. The source of this semantic confusion, I believe, is that it is the practice of actuaries to describe an exercise of determining appropriate contribution rates for pension funding as a 'valuation'. Now, that use demonstrates its legitimate technical use, but it is not a valuation as the man in the street or I, as an economist, understand the word valuation. Proceeding from here, it is pointed out that the value of an asset and the determination of the value of an asset or a liability are

really separate questions from the issues of how that asset is provided or how that liability is to be met. As a simple example, if I hold a non-profit insurance policy, then although that policy is of value to me, its value is not affected by the investment policy which the insurance company adopts in order to meet that particular liability. The value of an asset is, in general, independent of how that asset is provided. Of course, the way in which it is provided will doubtless determine the prices of that asset and hence the value of that asset, but it is that way round and not the other way round.

For most goods with which economists or actuaries, or anyone else, have to deal, there is a single value, which is determined by the price at which these goods are bought and sold in the market place. If one is dealing with an ordinary common commodity like a pound of butter, some people may want it, some may not, but because they can buy and sell it in the market at a market price, there is a market value for it. Where markets exist, arbitrage between people who want the goods, and people who do not, ensures that there is a single price that prevails.

However, the goods which we are discussing tonight are not of that kind; partly because they are pension rights which cannot be assigned, and partly because they are indexed securities and there are very inadequate markets in indexed securities. We are dealing with goods for which there is no market, and that means there is no single valuation for them.

Any number resulting from this exercise will not be a measure of the worth of an indexed pension to a Civil Servant, because there will be a different answer for every single Civil Servant. Nor is it a measure of the charge a company or an individual will make to provide an indexed pension, because again there is a different amount for every individual, or every organization which might provide it. If there was a market in these assets, these differences would be arbitrated away. As there is no market, there is no such arbitrage. Brealey and Hodges attempted to guess at such a market price, but the attempt was speculative.

What does this imply for the exercise with which the Scott Report and the Government Actuary were concerned? I share the view, fundamentally, of the previous speaker. There is a market test of a remuneration package, but there is no market test of an element of a remuneration package. Each individual element of the worth of a Civil Servant's pay or remuneration package cannot be determined. The attempt to do so, which was the exercise with which the Scott Report was engaged, was based on the belief that there is a method of calculation which will give a just price of a particular commodity, which is in some way independent of the price at which that commodity is bought and sold. People have been trying to undertake that exercise for 500 years, but have not succeeded.

The only test of the value of an asset is to notice its market price. This point underlies not only pension determination, but Civil Service comparability, in general. All that can be achieved is to see whether these jobs are attractive or not at the going salaries, given the salaries which are being offered elsewhere.

I believe that the exercise with which the Scott Committee was concerned was fundamentally misconceived, and that the problem of determining fair salaries for Civil Servants can only be determined by market tests of that kind taken as a whole. This outcome seems to be emerging as a result of the new inquiry into Civil Service pay, which is currently taking place. If the results of that inquiry are appropriate, and there is a reasonable chance that they will be, then the kind of exercise we are discussing tonight will, in five years' time, no longer be necessary.

**Mr R. E. MacDonald, F.F.A.:** As far as I can see, I am the only one of the Scott Committee examinees who has dared to attend this assessment of their examination scripts tonight.

I have great difficulty in accepting the underlying risk concept which gives rise to the modern portfolio theory of investment. Thus, I have even greater difficulty in accepting its rather obscure application to the very different type of risk, the uncertainty factor, involved in pensions valuation. Even if it was accepted for valuation purposes, it must surely be applied to the expected experience of the future, and not to the experience of the past. Of course, Brealey and Hodges were sitting a different examination from the Committee. They were dealing with the question: Given that the Government Actuary's assumptions about future inflation are correct, how do you set about valuing these pensions? Whereas the Committee was asked: Given these pensions to be valued, what do you think about the Government Actuary's assumptions?

The terms of reference of the Scott Committee required two main subjects to be examined. The first

was the evaluation of the differences in index-linked pensions, and the second was the value of relative job security in the two sectors.

It did not take us long to conclude that we would be able to say nothing about job security, so that eliminated one of our subjects. It then appeared that, if the range of rates of inflation was to be quite unrestricted, it was impossible to value index-linked pensions at all. I do not know whether a committee of this type has ever come back after a fortnight and said that it did not know the answer to any of the questions it had been posed. The reasoning, which led us to continue, is contained in § 20 of the paper. So the Committee endeavoured to convey that while an unrestricted link to the Retail Prices Index was incapable of valuation, such a link was not, in fact, present in the public sector schemes, and it was quite improper for any section of the community to be immune from economic emergencies such as at present.

Our case might be more convincing if the Chancellor of the Exchequer, who recently announced that standards of living in the country must be reduced, had also said that, for the time being, index-linking of public service pensions had been converted from prices index to an earnings index. He could still do so and quote § 123 of the Scott Committee Report in support of that action.

Index-linked stocks, provided with no apparent 'escape' clause, are being valued by the market at around 3%, and I congratulate the Government Actuary on the restraint with which he referred to this.

I would now like to refer to the question of pension scheme costs. Mr Smith referred to the rates of funding adopted in various public sector bodies, and asked why we did not quote these rates of funding in our Report. We thought that these rates would be more confusing than helpful to the argument, and they certainly were not comparable with the normal contribution rate which the Government Actuary was using. They would be quite unsuitable rates to charge to the employees.

There is no doubt, of course, that index-linked pensions, and pensions in general if they are intended to maintain their value, will cost considerably more than much of the private sector has been accustomed to paying. The conversion of the private sector to such a basis must inevitably be a gradual process. As for those who ridicule the whole idea, I wonder what their contingency plans are for dealing with the possibility that the Government might eliminate inflation, and that interest rates might be reduced to something of the order of 2 or 3%.

In terms of the cost to the nation, according to some of the estimates made by the Government Actuary, pensioners' share of total consumer expenditure could rise from its present level of about 12½% of the total to around 16 to 17½% of the total by the end of the century. These figures are based on a continuation of present practice, and so they provide for a significant loss of the real benefits of private pensions in favour of the active population. Any attempt at substantial improvement in the maintenance of real benefits must involve the risk of outright rejection by the working population. At the very least, therefore, we ought to resolve to resist unnecessary worsening of the situation which would be involved in, for example, reducing normal retirement ages or in the encouragement of early retirement on a large scale.

**Mr S. J. Green:** Section 6 of the Scott Report states that it is a highly desirable social objective that the standard of living of those in retirement should be protected. They compare us unfavourably with West Germany and France. Then, in their Appendix, they point out that the state schemes in France and West Germany are, in fact, 'fraying at the edges'. I have just returned from another Western European country where the state has come to the same conclusion for precisely the same reasons. Some years ago, it was forecast that the German scheme would be 'fraying at the edges', because the cost of inflation-proofing pensions is too expensive to the community as a whole.

It is many years ago since I ceased to be an actuary in practice. In those days, valuations of pension funds concluded with an analysis of surplus. I know that the Civil Service pension arrangements are not funded, but it occurs to me that since the Government Actuary made certain assumptions in 1974, he could well assess those assumptions in the light of what has now transpired. Also, an assessment of the cost of the difference between those assumptions, which he was making as a forecast, and those assumptions based on the knowledge of movements of salaries, inflation and interest rates, could be calculated. In other words, it is not an impossible task to do an analysis of surplus retrospectively, even on an unfunded pension scheme.



**Mr C. M. Stewart:** I have two comments. First, in the Scott Report, equal prominence was not given to the difference between the yield on investments and the annual rate of increase in earnings compared with the prominence given to the real rate of return on investments, that is, in excess of prices.

I regard this as important because, at the upper end of their range for the actuarial contribution, the result is considerably higher than the pay-as-you-go contribution. Very roughly speaking, the actuarial contribution would be equal to the pay-as-you-go contribution when the real rate of return on investments is 1%, and the net rate used for valuing before retirement is  $-\frac{1}{2}\%$ .

I am not convinced that the funding of final salary pension schemes either could or should continue for a long period in such conditions. Not only would the contribution rate be higher than necessary on pay-as-you-go, but it would be higher than employers could afford, and would create a demand for investment for pension funds which could not be met. If I might be topical, it would also create a demand for contribution rebates from the Social Security Scheme on the same, or on an even more generous basis which, in my opinion, would be folly for the state fund to accept.

My second point follows what Mr Green has just said. "Why doesn't the Government Actuary examine the experience since 1974?" Let us look at the experience. Reliable authority informs me that I may be awarded a 4% pay increase next year. The same source stated that the yield on gilts has risen to 16%. Does this mean that next year the Government Actuary will assess my superannuation contribution on a 12% net interest rate? Presumably not.

If I include 1981, and take these two years together, a 10% interest rate would result, which is lower, but I do not think that would be the correct approach.

Would eight years' experience be better? I think this is what Mr Green was recommending. The last time that my pay was determined by a system of objective comparison was at the beginning of 1975. Since then the purchasing power of my salary has fallen by about 25%, and it is set to fall again next year. Taking the eight years' experience, I calculate that a net interest rate for the period before retirement of between 3 and 4% would result. This rate exceeds the Scott Committee's most favourable assumption of  $+1\frac{1}{2}\%$ . So, examining the eight years' experience gives an answer which is higher than either the Government Actuary actually assumes or the Scott Committee, at its most optimistic, would be willing to assume.

What, then, is the answer? Should the Government Actuary prepare two sets of estimates? One would be similar to his present basis, for use if the Government intends this to be part of a process which will result in Civil Service pay moving roughly in line with the general level of earnings. The alternative basis would be that used under the present system where pay is determined by a method which may be described as intuitive rather than objective. The Government's intentions on pay would then be fed into the calculations as a variable to replace the figure for the change in the general level of earnings.

Total pay and pensions for life in the public sector can easily be equated in value to total pay and pensions in the private sector. However, the pension differences between the public and private sectors are too large for differential pay to be offered in compensation. It really does not satisfy either private sector pensioners or public sector employees. They belong to different generations and, not unreasonably, they tend to compare their circumstances with those of their contemporaries in the other sector. The problems in pension provision are much more fundamental than can be resolved by charging different actuarial contributions for public and private sector pensions on assumptions that are thought to reflect an uncertain future.

**Mr C. S. S. Lyon:** In Appendix 7 to the Scott Report there is a tabulation of the Government Actuary's estimates of the contribution rates that would be needed to fund the relevant benefits of the Civil Service and the analogue schemes. One helpful way of looking at those estimates is by noting that a theoretical contribution rate for the Civil Service would be about 138% of the corresponding average rate for the analogues. This means that 14% of the extra 38% allows for the different expectations of indexation of pensions in payment. The sensitivity and significance of that 14% advantage for indexation was not, in my view, sufficiently examined in the Scott Report.

There is a popular belief—and Mr MacDonald referred to it—that if only politicians could rid us of inflation there would no longer be any problem in maintaining the purchasing power of pensions. The

problem that would arise, of increased cost of pensions and related expenses, is usually overlooked.

Some simple figures may help to illustrate this point. Consider a regime with no inflation and a constant risk-free interest rate of 3% per annum. A man retires at age 65 on a pension of sixtieths of final salary, the pension continuing at half-rate to his widow. In this situation the pension could reasonably be given a commuted value of about 24% of final salary for each year of pensionable service, at the moment of retirement. A pension of 40/60ths would be valued at nearly 10 times the man's final salary.

If we now introduce inflation, and imagine a consistent risk-free investment return of 3% per annum higher than the rate of price inflation, the same retiring employee could be promised a full link with the price index, without the commuted value of his benefit being affected. However, benefits which are not indexed, valued in conditions of zero inflation at about 24% of final salary for each year of pensionable service, would be worth only 16% of final salary at 5% inflation and 9% of final salary at 15% inflation.

Although these illustrations are over-simplified, they indicate the sensitivity of any estimate of the Civil Service's indexation advantage to the assumptions about the rate of erosion of analogue pensions. They show that indexing looks considerably more expensive at higher rates of inflation due to the diminishing commuted value of non-indexed or partially indexed benefits. It is important to realize that the pay-as-you-go cost of a Civil Service pension does not increase in real terms as a consequence of indexation, but it remains constant.

It does not follow from this argument that the contractual (as distinct from discretionary) indexation of private sector pensions is either feasible or justified. We do not have a regime where pension funds can be sure of obtaining a risk-free investment return of 3% above the rate of inflation. We cannot be certain that salaries will not grow at a much faster real rate than we originally expected.

The question is whether we are offering today's employees the prospects of benefits which cannot, in real terms, be afforded. In our increasingly competitive world, how feasible is it to promise on a wide scale either funded or unfunded pensions, which could have a commuted value at retirement of the order of 10 times final salary, if their purchasing power is to be fully protected? If it is not feasible, then is it acceptable for a high proportion of the strain to be taken through the erosion of the real value of high nominal pensions and of preserved pension rights, particularly in the private sector? The alternative, of lower accrual rates, coupled with a stronger resolve to maintain the real value of the benefits, is not easy to implement.

**Mr G. V. Bayley, C.B.E.** (closing the discussion): The Scott Committee was not invited, as explained in §49, to say whether the arrangement for public sector superannuation was a sensible one, and whether, for example, inflation-proofing should be abandoned in favour of some alternative. The Committee was confined to pricing its value, or rather its differential value, and suggesting how that should be done. The furthest it went beyond that was to suggest that the Government should look seriously at the case for issuing index-linked securities.

In spite of press reaction to the Report, it still remains with Parliament to debate and to decide on the wider question of public sector indexation of pensions. The private sector experiences very different problems from the public sector. In general, it faces competitive pricing of its products and services, and cannot necessarily pass on the costs of inflation-proofing its pensions. Incidentally, there are one or two examples of public sector industries, such as Airways and Steel, where international competitive forces also operate, but they form a relatively small proportion of the total public sector.

Thus, what are the options for competitive industry and commerce? They should be carefully considered when economic growth as a whole is negligible or negative. In 'macro' terms, one answer is for the workforce to forgo real earnings to permit a transfer of resources to pensioners in the private as well as the public sector, in order to maintain their pensions in real terms. Now, as §61 of the Report points out, this is already programmed over a period through the expansion of coverage of state pensions and the inflation-proofing by the state of G.M.P.'s in course of payment. Beyond that, private sector employers run up against the harsh realities of wage negotiations and staying in business against competition. It is difficult to see how many private sector employers can provide for discretionary improvements exceeding known pension commitments.

Nevertheless, there are two reasons for being optimistic. First, wage negotiations in the private

sector include the provision of pensions much more than hitherto. It is now much more understood that the cost of both pay and pensions have to be found from output. Secondly, index-linked securities can now be purchased by pension funds, so that the price of inflation-proofing a benefit can be more determinate, and can, to a limited degree, be laid off. It becomes easier to quantify, for example, the alternatives of a fixed money pension on the one hand or a smaller one, index-linked, on the other.

Mr Lyon and Mr Smith both argued persuasively that the objective of a good pension scheme ought to focus on a level standard of living throughout retirement, rather than the starting pension only. If employers can subsequently afford to finance improvements, it could be more sensible and equitable to uplift smaller pensions whose value is more resolutely maintained.

If there is widespread indexation of approved pensions, as in the public sector, and now the opportunity to accept some limited indexation of liabilities of approved pension funds, what is the logic of stopping there? I have other means of superannuation in mind, for example, the businessman who elects to dispose of his accumulated assets to another when he wishes to retire. The proceeds are his provision for the future. He should also be entitled to purchase an income which is index-linked. What about other savings, like life assurance, for example? I expect it will be difficult for the authorities to resist these and other pressures for further indexation. It reinforces my belief that every move in that direction is profoundly logical, but nevertheless aggravates the instability of the currency.

I would now like to turn to some of the more actuarial aspects of the Inquiry and the author's analysis. Mr Brown supported the Committee's view that analogues should not be drawn from the public sector because of feed-back. Indeed, it seems a pity that they were ever included, because they certainly caused unnecessary confusion in the public's understanding of the results.

The author approached his remit by orthodox actuarial techniques, using discount factors and expected values. There have been several suggestions for alternative approaches or assumptions. The criterion of the age 25 contribution rate was challenged. Mr Smith introduced other criteria, but they lead, I think, to the alternative anomaly that their calculations would include costs which are not related to current employees' service. As to contingent future improvements in either public sector or analogue schemes, the costs are, of course, difficult to assess in any rational way.

In § 17 of the paper there is the assumption that the Civil Service career profile, as distinct from the analogue one, should be used in valuing the analogue benefits. I would like to know a good deal more about the TMR calculation, which is presumably the critical point in that particular issue.

Another variation in judgment clearly applies to the proportion of the inflation rate which analogue schemes might award in future compensatory increases, because the percentage is likely to be higher in times of low inflation, and conversely.

I was pleased to hear that Mr MacDonald felt that the choice of a real rate of return of 3% was reasonably validated, subsequently, by the issues of index-linked stocks. It brings me to the alternative approach by Messrs Brealey and Hodges. If it is felt that 3% real or thereabouts is a reasonably valid assumption for riskless investment, there remains the question of how the riskiness of the analogue benefits should be reflected in the calculations. My own difficulty in accepting their technique is really one of logic, because the stochastic process that reproduces uncertainty in their different portfolio cash flows seems to have only a limited connection with the total variability affecting analogue benefits. Investment performance of actual pension funds affects those benefits, but I agree with Mr Brown that other considerations, such as variations in the percentage of indexation that operates in the analogue schemes, have much more effect. If, therefore, it is valid to measure the element of uncertainty in pensioners' benefits, the Brealey and Hodges' model, or something like it, needs more justification of its appropriateness for measuring the difference in the rate of discount that it produces.

We have been primarily concerned in providing the forum for discussion which the author suggested to the Scott Committee. He has disclosed exactly how he tackled his remit, by making a kind of Fourth Schedule Return in reverse. Strong support for his approach and figures was accorded by the Scott Committee.

**The President (Mr A. R. N. Ratcliff):** It is my privilege to move the vote of thanks to the author. This evening has been something of a unique occasion.

In the Scott Report, the Government Actuary told the Committee that he would like to make greater use of the professional actuarial bodies as a forum for discussion of the problems involved, and the Scott Committee strongly supported that suggestion. I think his forthcomingness to the Committee, and their endorsement of that, has prompted us to invite him to expose his workings to this critical discussion this evening. The discussion has been carried on in the highest traditions of our profession. It has been an extremely valuable discussion to me and, I hope, to everyone present.

**Mr E. A. Johnston** (replying): Perhaps I could start my response with Professor Brealey and Dr Hodges, who stated that I often disagreed with them. Firstly, their fundamental point is that they are looking at the value of the pension to an individual and not to the cost of providing that pension. I can see the plausibility of that approach, but I have been looking at, in principle, the cost of providing the pension, because when making these comparisons, it has to be remembered that the individual has no choice about his pension. He can only change his job, in which case he gets a different pension and a different salary. There is, perhaps, a collective choice, by employees as a whole, and there is certainly a choice by the employer of which scheme he will introduce. Let us suppose that an employer decides to have a less good scheme. He would ask his actuary "How much less do I have to pay into the pension fund if there are lower benefits?" It is that amount of money which is available to pay more salaries. Employer's costs must be examined, because they indicate how much is available for the purpose of determining salary scales. I have known dealings in pension rights, for example, when they are transferred in bulk between employers; or when the Government puts money into pension funds of nationalized industries. On these occasions it is always the cost that is discussed.

An actuarial basis cannot easily be judged by the sort of criteria that Dr Hodges mentioned. When 3%, or any other rate, for the real return, is assumed, that is not considered as being a risk-free estimate, because it is not thought of in those terms. The actuary has to set a price at which dealings will take place. These dealings may be payment into a pension fund or purchase of an insurance policy. The basis used is simply the basis of calculation. Philosophically, the job has similarities to that of a Lloyds' underwriter, although the mathematical details are more extensive. It might be useful if we looked at our bases according to the theories which underlie Brealey and Hodges' paper.

There can be no doubt that allowance should be made for the uncertainty as to the real value of the private sector pensions. The basis, described in §§ 34 and 35 of the paper, is a common-sense basis, to which the data happens to lend itself. It is interesting that nobody has criticized the quantum of that allowance.

I am willing to allow for the uncertainty by means of variation in the discount rates but, as the opener pointed out, the variation has to be decided upon. Possibly the Brealey and Hodges' approach may provide an answer, but I feel, along with other speakers, that it needs a great deal of further development, and I cannot accept it in the form in which it is put forward. I would like to see further development which should be made in conjunction with actuarial work.

I did not suggest a wholly gilt portfolio. As we are looking at cost, I feel that we must look at portfolios which pension funds ought to adopt. In life office work, we are used to the concept of a matched portfolio which the office does not actually hold, but which it knows theoretically it ought to be holding; the office knows how far it has deviated and what the consequences of that deviation are.

As far as I understand the model, a zero real yield is built into it, so it is not on the same basis as my calculations.

On the question of the index-linked gilts, there is a narrow market. We have not yet had an issue available to everybody, but I would expect pensions funds and the self-employed, who buy annuity contracts, to be keen on an indexed contract. If we take Brealey and Hodges' ideal portfolio as providing secure real value, then indexed gilts were the bargain of the century. There was a yield differential of over 2% at issue, now 3%. The investment managers will very vigorously pursue real differentials which are only a small fraction of the aforementioned. I feel that these two aspects just do not correspond. The stocks were first issued after Brealey and Hodges' paper was written, but seem to provide new data pointing in a different direction.

I would like to comment about imponderables and the general value of index-linking. There have

been suggestions that the link ought not to exist because it is, in essence, something that cannot be valued. Imagine you are under 35 years of age, and are looking ahead to the time when you will retire. You will be in receipt of pension between 25 and 50 years from now. Are you really going to believe, and act on that belief, that there will be any substantial difference between public service and private sector pensions so far ahead? There *may* be, and in my valuation I have assumed that there will be such a difference, but if we are talking about imponderables, we are talking about the attractiveness of a job. People under age 35 are those who change jobs. What is the attractiveness of the index-link to them? I would say it is relatively low, following my experience of people resigning from the Civil Service. The reasons given for resigning show the attractiveness of private sector fringe benefits, which is not always reflected in the formal comparisons.

There has been more official information published about the 3% which actuaries deduct from the rate of pay than there has been about the 97% which remains. This applies particularly to Mr Bayley's point about the career profile. It is mentioned in the paper that, by using the Civil Service career profile, we merely follow the overall comparison method. We have no choice in the matter. It would be interesting to discuss the principles underlying the comparisons.

Mr Smith quoted various contribution rates. I am sure it would not be right to base the comparisons on the actual contribution rates being paid into the various funds without a study of those rates and how they are assessed. Different actuaries may use different bases and, as explained in the paper, the contributions may include deficiency contributions and other items. Schemes have been altered, and past alterations, perhaps, are being paid for now. Experience may differ from what it was expected to be some years ago. How are these factors allowed for? I do not think that they can be allowed for in any detailed way. It would require considerable detailed information and analysis of 600 schemes to make such an allowance. Even then, it is doubtful whether such allowance should be part of the terms offered for current service.

Referring to deviations from expected experience, it was commented that it ought to be possible to carry out an analysis of surplus. The trouble is that without a fund, an analysis of surplus is very hypothetical. Different results can be obtained from apparently equally plausible assumptions. If the Civil Service scheme was funded, a comparison would be made between the actual experience and contribution of the fund with other funds. However, I cannot see them going to the expense of funding the scheme just to ease my job. So we have to use an hypothetical contribution. It is a presentational disadvantage, as Mr Smith pointed out very tellingly, that most funds are paying more than the yardstick used. In fact, if the Civil Service scheme was funded, I would expect the contribution in payment to be greater than the yardstick, but I still maintain that it is right for its purpose.

## WRITTEN CONTRIBUTIONS

**Mr T. G. Arthur:** I would like to make a few points on the Scott Report itself; I have little to say on Mr Johnston's paper which I have found most informative and I agree with a good deal of it.

I am sorry to disappoint Mr MacDonald in criticizing the Scott Report, but I am sure he would not have expected 100% approval.

It is important to note the Scott Committee's terms of reference; in brief they are described by the report's own subtitle "an Inquiry into the value of differences in the inflation protection of occupational pension schemes, and the value of relative job security for the purposes of determining public sector pay and other conditions of service".

In my view the report is deficient in that having stated its terms of reference it appears to ignore them thereafter. On the question of job security which is given the rôle of co-star in the subtitle the report opts out, giving the topic one paragraph plus a conclusion that it was "quite unable to come forward with any evaluation". Yet the most reliable guide to any pay comparability exercise—supply and demand—remains undiscussed and apparently undiscovered. Surely something could have been said about rates of redundancy, rates of switching between public and private sectors, relative success or failure in attracting personnel, and so on?

Nor does the report really fulfil its other main requirement on inflation-proofing (which I reckon

to be at least as difficult to evaluate as job security and I have great sympathy with Mr Kay). The report states (§ 39) that the committee have offered a range within which a value for inflation proofing can be established. I would like to be told where in the report I can find this range. All I can find is figures for an appropriate 'Deduction' from Civil Service pay to take account of the differences in pension scheme benefits, some of which relate to inflation proofing and some of which don't. Indeed, in my view Professor Brealey and Dr Hodges deserve the major portion of our thanks not for their approach to uncertainty, but rather for enabling us to extract from their note the Government Actuary's evaluation of inflation proofing only, as well as their own.

Instead of attempting to carry out its allotted tasks, the Committee has given a lot of emphasis to extraneous matters, which unlike Mr Smith I do not view as refreshing. Hence it tells us what we should rank as highly desirable social objectives, and suggests its work may have helpful lessons for private sector pensions and their financing. It makes a strong recommendation for index-linked gilts (§ 28) on the grounds that more accurate evaluation would then be possible. This seems a rather flippant way to argue for something with very serious implications, not all of which are beneficial. It distresses me to hear so many actuaries calling for index-linked gilts purely because they make for easier sums.

I suggest that a stronger case could be made for offering Civil Servants the alternatives of a three-year renewable contract and permanent security of tenure, with the take-up giving a good guide to the most appropriate salary differential and hence to the value of job security which so bewildered the Committee.

Turning briefly to Mr Johnston's paper, and having criticized the Scott Report's failure to fulfil its terms of reference, it would be nice to know what Mr Johnston's terms of reference were for giving evidence to the Scott Committee. Section 12 of his paper makes the point I have made earlier—namely that many benefits other than index-linking are taken into account in arriving at the notorious Deduction. How is it that the Scott Committee has fallen into this trap?

According to the Scott Report Mr Johnston would welcome greater outside scrutiny and professional discussion regarding his work. This must be beneficial to all concerned, but to be of help we ought to know exactly what it is he has been asked to do, and whether any of his assumptions form part of his instructions or not—this does not seem to be always clear, although I have no criticism in this respect on the paper.

I have only two queries on the paper itself. Firstly § 27 discusses the effect of the State's price protection on G.M.P.'s for contracted-out schemes. I find this paragraph unclear and don't know what it is trying to say. Secondly, with my tongue in my cheek, I would like to know in which direction Mr Johnston believes he has taken the margin referred to in § 34.

**Mr S. J. Green:** A shortage of time prevented me from developing my theme. In the light of experience since 1974 the Government Actuary has altered his assumptions. It is a perfectly feasible exercise to assess the difference in the deduction which he would have recommended if he had used his new assumptions instead of those he originally used.

In the full knowledge of the actual pay received by the Civil Servants covered by pension arrangements for which he was making recommendations during the intervening years since 1974, an accurate calculation can be made of the cost of the difference between the original assumption and experience to date. If this difference is significant it can be allowed for by increasing or reducing the revised deduction. This, of course, would be onerous for new entrants, since they would be paying for the underdeductions of earlier generations, or would benefit them unduly since they would profit from the overdeductions applied to existing Civil Servants.

This, however, is the usual procedure in funded schemes. If it was deemed to be unfair then the cost or benefit could be confined to existing members by altering only their deductions. Even if this was not done the fact that a figure was known would at least enable the authorities to assess the cost or benefit of previous assumptions when negotiating new levels of remuneration. Although the Government Actuary is reporting to the two sides of a negotiating committee he must be aware that not only they but the taxpayers, for whom the Government is to some extent in the position of trustee as well as the employer in the negotiations, have the right, under current codes, to sufficient information to retain

their confidence in the procedures. By including information which is easily calculable this confidence can be enhanced.

**Mr C. G. Lewin:** The Government Actuary determined an overall average value of the difference between the superannuation benefits of the Civil Service grades and of their outside analogues. However, might it not have been better to have determined different values for different salary ranges?

There is reason to suppose that if the latter approach had been adopted some variation might have been found between the values for different salary ranges. One factor is that the relative weight to be placed on Civil Servants' pensions increases from the scheme is greater at the higher salary ranges, where the increases which are paid through the National Insurance Scheme are less important in percentage terms. On the other hand, this might be offset to some extent by a more generous level of basic pension provision in the private sector at the higher salary ranges.

If the net effect of the various factors is to produce values which do not differ much for the different salary ranges, then to take an overall average value would be reasonable on the grounds of general simplicity. If, however, there are considerable differences between the values, an averaging process seems less justified, since it could (in effect) result in some groups of Civil Servants subsidizing others, and hence distort the comparison with the private sector.

**Mr R. B. Colbran:** Although the opener asked us to keep politics out of the discussion, it would be wrong to ignore the emotions aroused by indexed pensions. These are especially strong among those living on fixed incomes and paying considerable taxes in the knowledge that these help to maintain those retired from the public sector at their accustomed standard. Their intuitive reactions can be more realistic than refined calculations.

I was glad that Mr Smith drew attention to the understatement of the value of the extra benefit from using the new entrant contribution rates. This approach means that those in middle life when index-linking was introduced can have only a partial adjustment of pay for the extra benefit they enjoy. Those already retired have no adjustment. In § 121, the Scott report suggests that a suitable pay differential has been established for many years but they do not seem to be fully convinced. It is difficult to see how any adjustment made before full indexation was promised can reflect that benefit.

A further point which I find disturbing is the credit taken for revaluation of G.M.P.s. This is in theory fully justified for those who were more than 20 years from state pension age in 1978. However, like index-linking itself, this revaluation can also be removed by a future Act of Parliament. It seems the least likely of all the features of the Social Security Pensions Act 1975 to survive unscathed.

The Scott Committee fairly said that they were unable to put a price on job-security. The public sector employee has, in fact, a double security. If he is dissatisfied or finds a better opportunity, he can change jobs voluntarily and enjoy a preserved pension which is indexed both before and after retirement age. This gives him a freedom which is not available to those in mid-career in the private sector.

Speakers from the public service pointed out that an uncompetitive salary was unlikely to appeal to the young Civil Servant in return for a distant and uncertain promise of index-linking. The Scott Committee quoted a range of possible adjustments from slightly below the Government Actuary's figure to about double the level. The points I have made would raise those levels.

The difficulties arise from the attempt to protect the position of a special group in the community when successive governments are unable to protect the value of money generally. Putting more realistic figures to the pay adjustment may still be the best course to encourage those involved to accept that the promise is over-generous in current conditions.

**Mr G. G. Bannerman:** I welcome Mr Johnston's paper as an opportunity for a very important matter to be brought before the profession and discussed fully.

The Government Actuary has a very difficult task in that his reports, often commissioned for political ends by the Government of the day for specific purposes, are liable to be quoted out of context by the press or by other interested parties who want to use them for their own ends. This case is no exception. Most people felt that the report was one on the value of index-linking as such and not one on the value of the index-linking that a Civil Servant receives in his scheme compared with those

which he might have had in a 'good' scheme. There is a world of difference between the two—especially if a fair proportion of the analogues are public sector schemes which already have full index-linking.

I make this point first because it is so important—not only from the point of view of the assessment of the Civil Servants' benefits but also from the point of view of industrial relations throughout the country. I can just hear the Union negotiators saying "If the Government Actuary thinks that full index-linking costs so little, why does your actuary want so much extra for 5% increases?" Could we ask for all G.A.D. reports to be overprinted with a notice "Danger: this report may seriously damage the health of your industrial relations."

The G.A.D. had a difficult job—advising the two parties to pay negotiations on the value of the pensions. By 'difficult', I do not mean the mathematics themselves, which I fully appreciate, but the underlying assumptions which have to be chosen and the professional responsibility involved.

The terms of reference are in § 9. We have here two sides—the staff side which has a vested interest in understating the cost of the benefits because that way they will get more pay and the Government which, despite all its protestations about seeking to reduce inflation, has a vested interest in playing down its short-term effects. You then have an actuary who is at the same time a member of the staff (whose remuneration will be reviewed) and an employee of the Government. Obviously, an actuary in such a situation cannot claim to be independent and if his assumptions are questioned he is, therefore, on relatively weak ground. In the Scott Committee Report the view was expressed that the assumptions made, although within broadly acceptable limits, were on the low side.

I have a lot of sympathy here with the G.A.D. but, as I say, so much of the Report has been taken out of context and it was not until the Scott Committee Report came out that I for one realized that (as mentioned in § 20 of the paper) there was an underlying assumption that cost-of-living increases were not, after all, regarded as guaranteed for Civil Servants. Is this a matter for serious consideration? Can you imagine the reaction if one national paper were to publish the headline "Government Actuary says full index-linking is excessive for Civil Servants"!

The other point which must be considered in the valuation of benefits is the comparison of assumptions between schemes. The G.A.D. have used the assumption that for all their valuations they will use Civil Service experience—the value of 'Scheme X' to the Civil Servant as § 17 refers to it.

The view has been taken that other items—stability of employment, etc., are matters for subjective opinion and not capable of actuarial assessment. I agree that there are many imponderables but I feel that this is something which demands more thought and I feel that the difficulties have possibly been overstated. After all, many actuaries incorporate withdrawal rate assumptions into their calculations and more would do so were it not for the extra work involved and consequent extra cost to the client. Surely if the experience of 'Scheme X' has been investigated and the cost of the benefits assessed using the actual withdrawal patterns of the scheme then the difference between the contribution rates for the benefits of Company X and those assessed for Civil Servants if they received Scheme X benefits is a measure of the *pension element* of job security and different promotion patterns.

This becomes highly relevant in connection with benefits for those leaving service where there is a feature of public service schemes which is not very common amongst those in the private sector—namely the cost-of-living adjustment to benefits on withdrawal. I accept that this has been reported on by the O.P.B. and may be the subject of future legislation but it must, I think, be considered fully at this time. I have raised this matter privately in the past and was informed that the G.A.D. had allowed for this in their calculations but only, as I understand it, on the basis of the low Civil Service withdrawal pattern. Now either escalation of benefits on withdrawal is a major issue or it is not. If it affects only a small proportion of employees then, even though it may be a major point as far as the individual is concerned and needs to be dealt with on equitable grounds, it is not a major financial matter. On the other hand if, as many people allege in emotive terms, pension funds have been saved from insolvency by the profits made from those who leave, the financial effect of withdrawals on private sector schemes must be much greater than the G.A.D.—and the O.P.B. in their report—suggest. I certainly believe that the escalation of leavers' benefits is a much more valuable item than is allowed for in the reports.

G.A.D.'s position is difficult and it is compounded by the British tradition of the Civil Service not defending itself. Mr Johnston's original report was made for a specific purpose and in specific



circumstances and has been widely quoted out of context. I may disagree with some of his assumptions—this is our professional judgement and I would not wish to see our profession suppress such differences. If an actuary in outside practice gives a report he gives it to his client and thinks of it as having only limited application and circulation so that he can, fairly quickly, deal with a client's attempts to take quotations out of context and extrapolate on incorrect assumptions.

This is, unfortunately, not the case with the Government Actuary. His reports are in the public domain. Everyone is in a sense his client. Normally if the client puts a wrong interpretation on the report the actuary gets the feed-back and can correct the wrong impression but obviously with over 50 million clients there are logistic problems.

This paper highlights the problem and I am glad that it has presented the opportunity for the author to restate his points more fully. I should not like to see the same degree of secrecy applied to G.A.D. reports as apply to those for private clients but I do feel that there must be more explanation of the issues involved and also of the extent to which assumptions are made independently or after guidance from the politicians.

**Mr H. A. R. Barnett:** It is a pity the terms of reference of the Scott Committee did not include the consideration of the extent (if any) to which the economy of the country can stand the inflation-proofing of pensions in both the public and the private sector, since this is a question which transcends all the other questions which were put to them. Without this consideration the two papers under discussion become no more than an interesting exercise which no doubt will be the bane of examination candidates for years to come, and an item of academic fiddling while the economy burns.

To make my point I should like to start away from occupational pensions in both sectors, and to consider what has happened to self-employed pensions by way of illustration; these are purely money-purchase and, as such, have not kept pace (nor can they) with inflation either before or after retirement; a self-employed pension can of course be re-arranged to increase year by year when in payment, but only by reducing the pension from the outset; and no self-employed person can expect a pension at age 65 of  $2/3$ rd's final salary with inflation proofing, nor should he be able to do so. His own personal economy could not stand such provision.

It is the same in the private sector. Where generous final-salary pensions are provided at the comparatively young age of 65 (or less) and an attempt is made either 'partly or wholly to inflation-proof these pensions, the result is frequently that the cost of the product or service provided becomes higher than the consumer wishes to pay, and either the employer goes out of business or the higher prices are accepted, leading to more inflation.

And it is the same in the public sector; generous inflation-proofed pension provisions make the cost of the service rise to a level which either is unacceptable, or causes more inflation.

Much has been said recently in favour of flexibility of retiring ages, and this is clearly desirable. However, if there were to be flexible retiring ages for both sexes between (say) 55 and 75, the age at which an inflation-proofed  $2/3$ rd's pension may be obtained ought to be at least 70, to enable the economy to cut its coat according to its cloth.

All pensions are to some extent inflationary as they provide an income to non-producers, and if they are set too high for too large a slice of lifetime then the producing population just will not accept the reduced standard of living necessary to support these pensions to the retired population.

With a higher general retiring age there would immediately be an outcry that this would cause more unemployment, but in my opinion this is fallacious. The way to provide for our large population in this country is to produce more, not less, and the greater the number who do useful work, the *more* work should there be for others. Just consider what would happen if all stayed at further education until age 25, and retired at 50; there would be far less production, far less prosperity, more stagnation and more unemployment. I repeat that the way ahead is to have later retirement, not earlier. The elderly population contains a wealth of vigour and experience at all levels, and this should not be wasted.

Granted that later general retiring ages would require a wide range of early retirement ages in cases of failing health (not necessarily amounting to total incapacity), or of no longer being able to carry out one's normal work (especially in heavy occupations). Granted, too, that the change would have to

be made over a period of years, as those already retired cannot be un-retired. But as soon as such a change is made the drain on the resources of employers and of the State would be controlled.

Pressure for the growth of pension schemes has been rather like the fable of the woman who lived in a hovel, whose husband was told she could have three wishes. The desire for pensions at a comparatively young age is analogous to the first wish for a magnificent palace ("Go home, she's in the palace already"). The pressure for pensions to go up to 2/3rds of final salary compares with the second wish ("Go home, she has untold wealth already"). And the demand for inflation proofing is like the third wish to govern the Sun, Moon and Stars ("Go home, she's back in the old hovel already").

To sum up, I consider the comparison of public service pensions at a level which is too onerous on the economy, with analogue pensions which are also too onerous, a complete irrelevance. In time, pension schemes will have to be slimmed, by raising retiring ages, or by lower target pensions, or by less inflation-proofing or by any permutation of these, otherwise all will be back in the old hovel. Seek not to ask for whom the bell tolls. It is tolling for you now. And it is not just the mumbling and rumbling of an old man.

**Mr C. A. Long:** I would like to direct my comments to the method adopted by the Government Actuary, of using a 'normal' contribution rate, which is the new entrant contribution rate for the particular pension scheme under consideration. The Scott Committee tells us that this rate is the theoretical new entrant contribution rate at age 25.

There seem to be problems with this approach, stemming from the fact that benefits prior to the 1980 review date are ignored. As the author says, the progress of a private fund may have been different from what was projected by the actuary when the contribution rate was established. I have usually found that the employer does not in fact reduce the salaries paid due to the extra contributions to the pension fund, at least to any identifiable extent. Whether this was so or not, however, I do not conclude that it would be wrong to make any adjustment to the Deduction calculation on this account. What has happened is that the actual experience has been less favourable than was originally expected, and indeed less favourable than we might now expect for the future. The private employer has to pay the additional cost, in effect bringing the originally expected contribution back onto the lines which could have been adopted if we had only known what the future held. Under the funded approach, the Government as Civil Service employer, should notionally make the same adjustment, the only difference being that we *are* in a position to adopt a more correct assumption from the start. Thus we should conduct the valuation of the relevant benefits on a basis which was realistic from the outset, in order to arrive at the actual cost of the different benefits, not at an artificial cost which has never been experienced.

The benefits which may now be notionally underfunded will largely be the benefits applicable to years before 1978. At that time there was no G.M.P. to absorb some of the pension increases, so the differences in benefits to be brought into account are very much higher than those accruing currently.

Finally, the method adopted does not of course take into account the circumstances, even on average, of Civil Servants actually employed. In practice, they are not new entrants at present, and I am not sure even whether they enter on average at age 25; I should be interested to know.

I do not think it would help to adopt the alternative approach, mentioned by the author, of valuing the benefits accruing during a year and averaging them according to the actual age distribution. This too would ignore the accrued benefits to date, which I regard as very important.

The problem may be summed up as being that Civil Servants (and any other members of a Final Salary Scheme) enjoy benefits which fall into two parts:

1. Purchasing currently accruing benefits, and
2. Protection for benefits already accrued to date, in final-salary terms.

This second point is most important, and has been ignored on the grounds that employers do not adjust salaries to reflect the cost. In my view that misses the point, which is that the salary adjustment is being made in the Government Actuary's comparison, which *could* notionally reduce the private employee's salary to reflect this point, as well as making a rather larger adjustment to the Civil Servant's salary.

The Scott Committee referred to the difficulties of making such an adjustment, and to it producing 'very rough justice'. This cannot be an acceptable reason for not trying to make at least an approximation to the cost; and even if it were to prove quite impossible the Government Actuary should state categorically that there is an understatement due to its absence.

One solution might be that a range of Civil Servants should be looked at, to reflect different ages at entry and different ages now. Contribution rates should be calculated as at their original entry ages, which might have been 10 years or 20 years ago. The benefits brought into account should be those which were at that time in prospect, allowing for any major changes in benefits which have taken place since, and in particular the introduction of the G.M.P. from 1978. These benefits should be valued on a basis which on average is realistic, by which I mean using the average real yield actually experienced in the past, shading into the Government Actuary's basis (which I accept) for the future.

For example, over the 15 years 1965 to 1980 the real yield in excess of general salary inflation will have been the most pertinent factor in respect of a new entrant; the average rate actually experienced for a mixed fund was probably about  $-1\%$ , as opposed to the  $+1.5\%$  used in the 1980 review. Similarly, for the 10 years 1970 to 1980 the experience was about  $-2.5\%$ .

If this approach were adopted, it would of course be necessary to deduct from the valuation of benefits, the value taken from benefits accrued to date on the Government Actuary's more optimistic basis, since this is what has already been allowed for in previous comparisons.

**Mr T. S. Shucksmith:** The Expenditure Committee of the House of Commons in 1977 said:

"One man ultimately has this awesome responsibility and has hardly any chance of getting it right, which is no criticism of the Government Actuary but is a criticism of a system which sets him an impossible task".

In recent years the allowance which should be made for the pension benefits promised to Civil Servants has been a very live issue and continues to be so. The Government Actuary has come in for a lot of criticism, of which a large part is due to his terms of reference. I feel sure he has the deepest sympathy of all of us and we appreciate the way in which Council has supported him. I trust that other members of the Institute may feel confident of Council's support, if within the latitude of reasonable variations in professional judgment, we come in for criticism in the future.

The Government Actuary's terms of reference have been adequately criticized by the Scott Committee and I take it that this debate is primarily concerned with the discussion of the actuarial aspects of the calculation of 'the Deduction'. The Government Actuary said in evidence to the Scott Committee that he would like to be able to make greater use of the professional actuarial bodies as a forum for discussion of the sort of problems involved. I presume that his means that frank discussion is being solicited and I give a few comments of my own in that spirit.

The cost of prospective pension benefits is highly dependent on the real rate of investment return, which it is correct to assume. This matter has been widely discussed and I offer no comment other than to agree with a real rate of return of the order of  $3\%$  p.a. However, what is crucial to a valuation of the difference between cost of living indexed pensions and analogue pensions, of which a large proportion promise non-escalating pensions or a low arithmetically fixed rate of pension, is the rate of inflation assumed. The future rate of inflation cannot be determined objectively by a computation technique, but is a matter of actuarial, I also would not say, subjective judgement. Probably one of the best indicators is the approximate rate of inflation implicitly being assumed by fixed-interest markets which seem to be anticipating double-figure inflation as far ahead as they can be taken as a guide. The rate of future inflation is highly uncertain and the lower the rate assumed the lower the value of the difference between indexation and non-indexation. Personally I feel that an assumption of average long-term inflation of  $7\%$  p.a. is too low for present purposes and a rate of not less than  $10\%$  p.a. would be more appropriate.

This would mean that the valuation rate of interest for fixed pensions would be  $13\%$  p.a. with general salary escalation of  $11\frac{1}{2}\%$  p.a. I doubt whether any United Kingdom actuary recommends funding of a benefit formula scheme on such a weak basis. This does not, however, mean that this would be the wrong basis upon which to value the difference between indexed and non-indexed

benefits. I would draw a distinction between the mean expected resource cost of benefits on the one hand and a recommended funding rate on the other. The possibility of a significant fall in the rate of long-term inflation to say 5 to 7% p.a. is a serious financial risk for private sector schemes. It is to provide a margin against this risk and other uncertainties concerning the eventual cost of pension benefits that private sector schemes are commonly funded on stronger bases. What is required for the comparison of the Civil Service schemes and analogue schemes in the first instance is an estimate of the mean expected resource cost of the benefits promised by each scheme or funding rates which contain equal proportionate margins for uncertainty.

The next thing is the question of allowance for early leavers. It seems to me quite right that the Civil Service benefits should not be reduced as they might be if an analogue employee, in Scheme X in the language of the paper, were promised Civil Service benefits. It seems to me that Scheme X benefits should be valued with the statistical assumptions appropriate to Scheme X members and Civil Service scheme benefits with statistical assumptions appropriate to Civil Servants. The fact that it is extremely difficult to obtain statistics on withdrawal rates from private sector schemes, does not, I feel, justify not making a very serious attempt. Given that many analogue schemes will not index deferred pensions, this is likely to have a very significant effect on the Deduction. Many private sector schemes are funded on the basis of a low assumed rate of withdrawal to provide a margin against uncertainty. For the purpose of calculating the Deduction, I feel it is important not to use underestimated withdrawal rates, as well as not to underestimate the future rate of inflation.

Incidentally, in this connection I would consider it better to estimate the accrual cost with allowance for future salary increases for a standardized cross-section of ages and salaries than to make the comparison on age 25 normal contribution rates.

There is also a problem in the allowance which should be made for 'ad hoc' pension increases. There is a big difference between legal rights, whether conferred by statute or contract and an associated trust, and a mere expectation of future generosity. I would have thought that it is legal rights which ought to be costed and if expectations of discretionary increases are to be included they should be heavily discounted. In the majority of private sector schemes, if actuarial surpluses emerge, the trustees are not obliged by law to grant 'ad hoc' pension increases. The employer is at liberty to reduce his future rate of contributions, or at least the application of surplus, like wages, is a matter of employee/employer bargaining at the time.

Of course, contracts, trust deeds and statutes may be amended and there is a difference in security between funded private sector pensions and pay-as-you-go backed by the power of taxation—although I must say I don't know which is the more secure. I would agree that differences here are too subjective to be taken into account by an actuarial assessment.

Apart from the security aspect many people consider that there is a difference in the value of a benefit which is linked to the cost of living by scheme rules and, for example, a benefit equal to the expected rate of increase in the cost of living, but determined in some other way. In terms of the type of actuarial assessment under discussion this would be the difference in yield between a portfolio matched to provide index-linked benefits and a portfolio matched to provide the sort of benefits currently promised by analogue schemes. Unfortunately, it is not possible to construct such portfolios, because the assets are not available. I entirely agree with the criticisms of the portfolios constructed by Messrs Brearley and Hodges, made by the author. In particular I would agree that riskiness in the context of an ongoing large pension fund is not the same thing as short-term volatility relative to inflation or otherwise.

However, I do think there is a value in index-linkage as compared with mean expected index equivalence and that actuaries are in a much better position than anybody else to make an intelligent estimate of the discount that financial markets might put on the yield of a portfolio of assets enabling index-linkage to be matched.

The behaviour of indexed gilts, which so far, have been offered exclusively to gross investors now provide an indicator to enable actuaries to sharpen their thinking. This line of thinking may be thought too subjective, but then so is the formulation of very many assumptions in pension scheme work. At this point I am very tempted to be cowardly, but I feel that I ought to make my recommendation. I would favour an annuity loading of the order of 20% for the element of pensions which is index-linked.

If the Government Actuary adopted my assumptions and approach it is clear that the Deduction would work out considerably greater than the figure he produced in this 1980 review. Personally, I think the answer would have been eminently more reasonable and would have had a much greater chance of receiving general public acceptance. It would have been a reasonable compromise between the entrenched and emotionally held views of many Civil Servants on the one hand and many private sector citizens on the other. There is no doubt that the standing of actuaries has suffered as a result of this public debate and this is unfortunate. However, it is all very well to be wise after the event and as I said at the beginning, the Government Actuary has been set an impossible task; I am sure nobody here underestimates the difficulty of his position.

**The author:** On reading the transcript and written contributions, little further reply appears to be needed beyond that given at the meeting. However, I would like to assure Mr Smith that the disclaimer in the last sentence of § 24 of the paper is general, and is not aimed at any particular schemes.

It is appreciated that the standardized contribution used for comparison differs from those actually in payment in various schemes, but it is essential to have a common standard of comparison. The actual contributions will vary widely because of the history of the various schemes. They may depend on when the actuary last changed his basis.

Turning to the written contributions, Mr Arthur found § 27 of the paper unclear. The point is that part of occupational pensions, represented by the G.M.P., will in future receive cost of living increases paid for by the State. If there were no contracting out, and no G.M.P., employers would have to provide whatever increases they could on this tranche of pension, and in most private sector cases this would amount to less than full compensation for the cost of living. But it makes no difference to public service pensions, which receive cost of living increases in any case. So the effect of introducing G.M.P. is to narrow the gap between the Civil Service and private sector pensions.

Several contributors referred to withdrawal rates and the allowance for benefits on early leaving. I went as far as I could to recognize the point by using higher withdrawal rates than I would in a normal valuation; as high as could be justified by reference to Civil Service data. If this does not fully meet the points made, then I don't think that it is possible to do so within the limits of the pension assessment. What we are talking about is the ability to leave a job without too great a pension loss. A civil servant leaving for the private sector will give up the index link on his future accruals of pension; his past service pension, on which he may retain it, is unlikely to cover more than 5 or 10 years' service, because most turnover is at the younger ages. So there is still a pension loss, even though it may not appear in quite the same form as it does when someone leaves a private sector scheme.

If, in spite of the more favourable pension treatment for leavers, turnover rates are lower in the Civil Service than in the private sector, this suggests that the claimed pension advantage on leaving does not in practice have much value. Perhaps it is no accident that withdrawal benefits are worse where the rate of turnover is high!

Moreover, to use different service tables for valuing the Civil Service and analogue schemes would mean that we were not comparing like with like.

Mr Long and Mr Green (in his written contribution) commented that the Deduction does not allow for experience since the previous Deduction was fixed, although the total contribution to a pension fund does so. There are two points here. One is that the system, taken as a whole, has the effect of charging to Civil Service employees a contribution which in the private sector is paid by the employer. There are problems of equity in making retrospective charges to employees.

Secondly, there is the problem of assessing a retrospective charge when no fund has been kept. Apart from the problems of equity referred to above, I would not argue that it is wrong in principle to make a retrospective charge—whether to do so is a matter for consideration in the light of all the circumstances—but in practice it is not possible and we have to do the best we can without. Mr Green's suggestion that we should rework the earlier calculations using the assumptions now made for the future does not appear to fill the bill, because the long-term assumptions might not have been changed. Even if they have been, that does not mean that the new assumptions would have been considered appropriate at an earlier date; the change is not directly related to actual experience in the meantime.

Mr Colbran referred to those who were already in middle life when index-linking was introduced. This raises a general point; a system which charges active staff year by year for their prospective pension rights cannot easily accommodate any retrospective increases in benefits. Pension increases, whether indexed, as in the public sector or discretionary as in the private sector, usually amount to retrospective benefit increases and other scheme improvements can, on occasion, include a retrospective element. The only solution is to charge for retrospection as it is given; this principle was followed in the Civil Service when the widow's benefit fraction was improved 10 years ago, but it can hardly be applied to post-retirement increases.

I am not clear whether Mr Shucksmith's distinction between the mean expected resource cost of benefits and the recommended funding rate corresponds to Dr Kay's distinction between cost and value, but it seems to be cognate. For the reasons given at the meeting, I am chary of departing from a cost-centred approach to the comparison, but would agree that this question needs an airing in relation to the pay comparisons as a whole.

Referring further to Mr Shucksmith's contribution, my methods were intended to give an adequate discount for uncertainty. It is bound to be a matter of opinion whether the discount was in fact adequate, but in principle I am sure that we should allow for the increases which scheme members presently in active service are likely to get after their retirement, with discounts for uncertainty where appropriate. Increases should not be excluded from the comparison merely because there is no legal entitlement to them, if they are in fact likely to be given.

I do not agree with Mr MacLeod's suggestion that, if the actuarial assumptions are fulfilled, the long-term outlook would improve and therefore the Deduction would be reduced. Improving experience would not necessarily lead to a weakening of the basis, which ought not to be based on short-term considerations.