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EVIDENCE PRESENTED BY A STUDY GROUP OF THE CENTRE  
FOR POLICY STUDIES TO THE INQUIRY SET UP BY  
THE PRIME MINISTER INTO THE VALUE OF PENSIONS.



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Printed by SSW Ltd., 19/21 Great Portland Street, London W1

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## FOREWORD

Widespread public concern at the economics and equity of the index-linked pensions and terminal gratuities granted to civil servants and other categories of public employees found expression in the Prime Minister's recent appointment of an independent inquiry into the real cost to the taxpayer of these pensions.

The Centre for Policy Studies welcomed the opportunity to present a reasoned comment. This study was compiled by a small study group chaired by John Chown, an international tax-consultant, well known for his writings in the financial press, and for occasional commentaries on aspects of government financial policies. In the course of the compilation, independent professionals, associations, and leading stockbrokers were consulted.

The study demonstrates that the cost of index-linked pensions to public employees has been seriously under-estimated by government departments concerned, thereby throwing heavy and unjustified burdens onto future taxpayers and ratepayers.

The group's report notes that figures prepared by the various arms of the civil service which have formed the basis of government policy so far, assess the proper contribution by civil servants to their index-linked pension as one sixth of their salary. This is based on the wholly unrealistic assumption of a 3% real return on investments, at a time when negative real return (non equity and government loans) is the order of the day. Realistic assumptions show the proportion of salary needed to finance fully-linked pensions to be as high as 50%.

The study demonstrates that this conclusion is borne out by experience in private industry and private pension provision.

In the light of these findings, the group reaffirms the recommendation of the 1976/77 Parliamentary Expenditure Committee that vital decisions affecting civil service pensions, a matter of substantial government expenditure, should not be the sole responsibility of the Government Actuary.

## INTRODUCTION

In presenting this evidence we contend that the only rational basis on which to compute the cost of providing an unfunded pension provision (or to calculate the capital value of pension entitlements) is to work on the assumption of a notional funded pension scheme. In effect, the Government Actuary Department figures <sup>1</sup> state that the cost of providing an indexed pension on the terms they define is 16.8% of salary. In arriving at this figure they have in effect assumed that the rate of return on the "notional pension fund" will exceed the rate of inflation by 3%.

We submit that the 3% figure is inaccurate and misleading. Specifically we contend that

- 1) The rate of return available on investments after inflation in recent years has been certainly no more than 1% and possibly negative.
- 2) The cost of providing for a given pension right is highly sensitive to this assumption. At a real rate of return of 1% the contribution required to provide an indexed-linked pension, would rise from 16.8% of salary to about 27% of salary. <sup>2</sup>

1. 'Civil Service Pay Research' The 1980 Review of the Adjustment for Differences in Superannuation Benefits. Report by the Government Actuary HMSO London 1980.
2. See similar argument by the Government Actuary in Annexe B. Public Accounts Committee: 6th Report to the House of Commons. Session 1977-78. HMSO London 1978.

3) This in turn very materially affects the deduction that should be made for the superior value of a civil servant's pension rights. On the extreme assumption that pensioners of analogue schemes do not receive any compensation for the actuarial deficiencies of their schemes, the figure to be deducted would rise from 3.8% to 11.7%. This last figure needs treating with considerable caution because certain assumptions implicit in the GAD Review are not available to the public.

We now have to examine these three factors in turn. We begin by looking at the relationship between the rate of return and the "value of civil service superannuation benefits". The only satisfactory way of making this comparison would be to ask the Government Actuary to re-run his figures on different assumptions. We recommend that the Committee ask this to be done. Meanwhile, Section A below gives our own calculations based on simplified figures. These figures should be treated with some caution until the more precise figures have been obtained, but we would be surprised if the orders of magnitude were materially wrong.

The rest of the calculation in paragraph 7.5 of the GAD Review needs an assumption made on the "value of average analogue superannuation benefits". Clearly if the notional pension fund is suffering from low rates of return, real life analogue schemes will be under the same disadvantage. Section B continues with the recalculation of paragraph 7.5 on the extreme assumption that analogue pensioners receive only the funded benefits for which they have subscribed. We accept that this is an unrealistic assumption, but emphasise that the Section A calculation is not affected by this factor.

Those from the private pensions industry will doubtless be providing the committee with more information on the actual treatment of private schemes, but it is a matter of observation that there have been cases of topping-up. Some information we have collected is given as Appendix A.

One member of the group is directly connected with the pensions industry, and we have all been professionally concerned with the impact of inflation on the economy, particularly on corporate investment. The pensions industry has, for perhaps obvious reasons, been reluctant to stimulate full public discussion of the problem of low and negative yields. As the National Association of Pension Funds said in their evidence to the Wilson Committee: "It does not worry us if there are negative rates of return for 2 or 3 years, perhaps 5 or 10, because our perspectives are 40 or 50 years long". But the Association went on to stress the importance of pension funds being able to match their assets against their liabilities, which, as they say, depends largely on the rates of return.<sup>1</sup> The Committee must decide for itself whether or not the quotation reveals a considered acceptance of the problems of a changing world. Certainly we feel that an independent view may be of value to the Committee.

Section C looks at the gap that would be thrown up if a private pension scheme funded on a 3% assumption under-performed that assumption. It shows the deficit that would arise (if properly calculated) on the retirement of each individual and therefore the number of years of final salary which would have to be put into the scheme to make good the deficiency. At a 1% return, the figure would be over three years final salary - a daunting prospect for many companies. Because of the way actuarial calculations are made, this figure is not thrown up automatically as a deficiency on the retirement of each individual. Nevertheless, the deficiency is there. Sooner or later a private pension fund, the earnings on which under-perform the assumptions, is going to be faced with a deficiency. The employer, if an investor-owned company, may be faced with a choice between letting down its pensioners or accepting such a drain on the company's own resources as will threaten the livelihood of its existing employees. We do not pursue this line of argument in detail, but the Committee should be aware of it.

1. See Evidence of National Association of Pension Funds to Committee to Review the Functioning of Financial Institutions. Evidence volume III HMSO London 1978 (p.175).

Finally in Section D, we look at our first question - what rate of return has in fact been earned. Over the last ten years there has been no investment medium which has produced a consistently positive return allowing for inflation. On what we regard as the best measure over this period (looking at the contributions paid by a civil servant retiring at the beginning of 1980 during the last ten years of his career) one finds that the median performing private pension fund has produced a return of minus 4%, while even the upper quartile performing fund earned only minus 2%.

It will be argued that the last 10 years are not typical, but it would be idle to suppose that the next 10 or 20 years will necessarily be radically different. During the previous 25 years (1946-1970) equity investment, though not fixed interest investment, does appear to have produced positive real returns. During the 1950s there was a sharp adjustment of stock exchange prices to post-war values and positive returns were available on stock exchange securities from about 1950 to 1970, but for much of that period private pension funds did not typically invest in equities. We have no systematic information on the performance of property portfolios. Doubtless the Committee will be seeking evidence on this point.

We would further, in this Introduction, wish to emphasise that we have no wish to criticise the Government Actuary as such, but we do wish to reiterate the recommendation made in The Expenditure Committee's Report on the Civil Service <sup>1</sup> that one way of easing the Actuary's task would be to spread the responsibility for the judgments being made. As that Report says, with reference to determining the value of civil service pensions:

"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 the system which sets him an impossible task."

1. Eleventh Report from the Expenditure Committee. Session 1976-77. The Civil Service. Vol.1 Report. London HMSO 1979, P.XXXIII.



As this Evidence has been prepared by a small group with limited resources it is possible that there will be some errors, but we do not believe that they will materially affect our arguments. Where necessary calculations have been run on a Rapidata remote terminal linked to a DEC processor.

## SECTION A

### CALCULATION OF THE COST OF PROVIDING AN INDEXED-LINKED PENSION

The Government Actuary's Review calculates the cost of providing a civil service non-industrial pension as being 16.8% of salary. This is equivalent to saying that such a sum (whether provided by employer or employee) paid into a notional pension fund, would provide an index-linked pension on retirement equivalent to half final salary and certain other benefits including a lump sum payment on retirement and a reduced pension for a surviving spouse. This calculation is based on a number of assumptions, one of which is that the rate of return on the notional pension fund will be 3% greater than the rate of inflation. The calculations are complex and an independent re-calculation (without access to the computer model), taking account even of those assumptions which are set out in the Review would be prohibitively time consuming.

We recommend that the Committee ask GAD to rework the figures on a range of alternative assumptions, but meanwhile we have used a simplified model to bring out the main point. There are approximations, but these will not affect the general picture presented.

We analyse the case of a "typical" civil servant who joins the pension scheme at age 25 and retires at 63. Column (2) of Table A1 shows the "career" pattern of his salary (taken from the Government Actuary's Review).<sup>1</sup> These figures leave both inflation and the general increase in earnings out of account and represent a comparison of what individuals of different ages, but on the same career path would be earning at the same point of time.

Earnings are further assumed to increase over the years at a rate of 1½% in addition to any increase resulting from general inflation. Column (3) of Table A1 therefore adds this percentage onto Column (2) to the actual salary pattern (in real terms) of the individual.

1. Review 1980 Appendix 5 Table (d) p.23.

TABLE A1

Career Pattern of Earnings

(1)	(2)	(3)
Age	Index Value (Career Path)	Corrected for General Level of Earnings
25	100	100
30	135	145.43
35	158	183.37
40	177	221.29
45	193	259.94
50	202	323.56
55	207	351.93
60	209	351.93
62	209	<u>362.57</u>
Total emoluments (38 years)		<u>9197.64</u>

Note : Calculations are based on annual figures - Intermediate index numbers were obtained by interpolation.

The next stage in our calculation was to assume that 1 percentage point of the salary index (Column (3)) was invested, and accumulated at 3% per annum. The total contributions (£91.98) prove to be worth £154.63 on retirement date.

The GAD Review assumes cost of pension at 16.8% of salary. The capital value of the notional pension fund (per £100 of base salary on joining the service), would therefore be £2,597.85. Final salary is £362.57, and after 38 years service, the pension would be 38/80 of this, or £172.22, with a lump sum of three times pension, or £516.66.

After deducting the lump sum the balance of the capital value (£2,081.19) is available to buy a pension of £172.22. On the assumptions, this figure would buy an annuity for 15.23 years. This is not quite in line with the life expectancy assumption, but the difference is probably accounted for by the fact that we have ignored the surviving spouse element, we have also of course left aside the complications of death in service, the proportions of unmarried pensions and any notional gain to the fund from those leaving the service. For the purpose of the rest of the calculation we use the 15.23 year figure - it is derived from the GAD data.

Column (2) of Table A2 shows how the value of the "notional pension fund" at the end of the 38 year period is affected by the "rate of return" assumption during the build-up period. Again the figure is per percentage point. Column (3) gives the cost of providing a 15.23 year annuity plus the lump sum assuming the same rate of return for the future. Dividing (3) by (2) therefore gives the percentage of salary that must be devoted to funding the pension, and this is given in Column (4).

TABLE A2

(1)	(2)	(3)	(4)
Real Rate of Return	Capital Value of 1% on retirement	Capital Cost of Providing Pension and Lump Sum.	Hence - Percentage Contributions Required.
3%	154.63	2597.85	16.80
2%	128.89	2758.95	21.41
1%	108.39	2938.78	27.11
0%	91.98	3139.98	34.14
- 1%	78.75	3365.73	42.74
- 2%	68.02	3619.59	53.21

## SECTION B

The figures in Paragraph 7.5 of the GAD Review can now be adjusted. A 1% assumption would involve increasing the value of civil service superannuation benefits to (100 + 27.1 - 1.4) or 125.71. The GAD calculation would then look like this.

For each £1000 of analogue money pay:-

	£
Pay in analogue scheme	1000
Average analogue employee contribution is 4.3 per cent. of pay and average civil servant's family benefit contribution allowed for in TMR is 1.5 per cent. of pay so average adjustment in calculation of TMR is $(4.3-1.5) \times \frac{1000}{100}$	28.0
Value of extra State scheme benefits allowed for in TMR is $0.4 \times 1000/100$	4.0
Adjusted rate for TMR is $1000 - 28.0 + 4.0$	976.0
Value of average analogue superannuation benefits is 12.2 per cent. of pay and average analogue employee contribution is 4.3 per cent. of pay so net value to employee of superannuation is $(12.2 - 4.3) \times \frac{1000}{100}$	79.0
Value of extra State scheme benefits, as allowed for in TMR	4.0
Total value of analogue pay plus superannuation	1083.0

Value of Civil Service superannuation benefits is 27.1 per cent. of pay and average family benefit contribution is 1.4 per cent. of pay so total value of civil servant's pay plus superannuation per 100 pay is  $(100 + 27.1 - 1.4) = 125.7$

Civil servant's pay giving same total value as analogue is

$$1083.0 \times \frac{100}{125.7} = 861.5$$

Deduction needed from TMR is

$$976.0 - 861.5 = 114.5$$

Deduction from TMR as a percentage of TMR is

$$\frac{114.5}{976.0} \times 100 = \underline{11.7 \text{ per cent}}$$

This compares with 3.8 per cent. in the GAD Review.

These figures do not of course allow for corresponding adjustments in analogue schemes which we cannot make without the details which are available to the GAD. So we have worked on the extreme assumption that analogue pensioners only receive the funded benefits for which they have subscribed. While accepting that this is an unrealistic assumption, it does not affect the main point which we are seeking to make.

## SECTION C

We accept therefore that we do have to consider what adjustments have to be made to analogue schemes, which will also suffer from low real rates of return. We are not submitting any detailed evidence on this point, but would like to draw the attention of the Committee to Table C1. This is a re-presentation of the calculations in Table A2. It shows the amount, expressed in terms of number of years final salary, by which an analogue pension fund, funded on the GAD assumptions would have to be "topped up". In the long run can a private pensioner expect companies to contribute on this scale? How do we quantify the difference between a hope and a guarantee?

TABLE C1

### DEFICIENCY OF NOTIONAL PENSION FUND

RETURN	FUND ACCUMULATED	FUND REQUIRED	DEFICIENCY	YEARS FINAL SALARY
3%	2598	2598	-	-
2%	2165	2759	594	1.6
1%	1821	2939	1118	3.1
0%	1545	3140	1595	4.4
- 1%	1323	3366	2043	5.6
- 2%	1143	3620	2477	6.8

## SECTION D

The GAD Reviews have said surprisingly little to justify the 3% assumption. Paragraph 6.3 of the 1979 Review<sup>1</sup> says:-

"Appendix 6 sets out in graphical form the yields net of price and earnings increases available on equity investments, increases in real earnings and interest rates, over the period 1950-78. I also took account of the views of the Treasury whom I consulted."

It should therefore have been instructive to look at Appendix 6. It was not. The "equity" data is put together in the unhelpful form of a graph of rates of change. The only figures given are a 1950-1978 average for returns 9.8% per annum net of price increases and 7.5% per annum net of earnings increases. These figures are subject to two criticisms. First, they are based on an untypical base year, and second, they appear to be miscalculated. The Treasury Bill and Consol rates of interest are shown as a graph not corrected for RPI (the Consol figures take no account of capital loss) and are therefore meaningless for the purpose of our exercise.

The first column of our Table D1 shows the effects of buying 3 month Treasury Bills and reinvesting at the end of each quarter. The third shows the roll-up corrected for the price index. Such an investor kept ahead for most of the 1960's but went badly into reverse in the 1970's: the "year on year" return was consistently negative - and during 1975 was "double digit negative". During the last 10 years the real yield has averaged MINUS 2.8%. (De Zoete and Bevan figures based on a similar calculation show an average of MINUS 0.8% from 1950-78.)

1. 'Civil Service Pay Research.' The 1979 Review of the Adjustment for Differences in Superannuation Benefits. Report by the Government Actuary. HMSO London 1979.



TABLE D1

REAL RETURNS ON U.K. TREASURY BILLS

31 March	ROLL UP ANNUAL	PRICE INDEX	REAL ROLL UP	YEAR ON YEAR CHANGE
	(1)	(2)	(3)	(4)
1962	100.0	38.7	100.0	
1963	103.8	40.0	100.4	0.4
1964	107.8	40.6	102.7	2.3
1965	113.5	42.4	103.6	0.9
1966	120.1	44.2	105.1	1.5
1967	127.8	45.8	107.9	2.6
1968	135.8	47.3	111.1	2.9
1969	145.6	50.1	112.4	1.2
1970	157.1	52.7	115.4	2.6
1971	168.1	57.2	113.7	-1.4
1972	176.6	61.8	110.6	-2.8
1973	188.4	66.7	109.3	-1.2
1974	208.5	75.2	107.3	-1.8
1975	232.2	90.5	99.3	-7.5
1976	256.1	110.8	89.4	-9.9
1977	287.3	129.2	86.0	-3.8
1978	306.0	141.4	83.7	-2.7
1979	337.8	155.0	84.3	0.7
1980	381.6	185.4	79.7	-5.5

Source: International Financial Statistics - our computations

## EQUITY INVESTMENT

The investor has fared better in equities. The most comprehensive statistics generally available are those published annually by de Zoete and Bevan "Equity and Fixed Interest Investment from 1919". The table on Page 16 of the 1979 edition shows the growth in value of a fund of £1,000 invested in their equity index on 1st January 1946 assuming gross income reinvested. We have adjusted these to real terms from the price indices given by them.

TABLE D2

	EQUITY FUND	PRICES	"REAL" FUND (INDEX)
1st January 1951	£1158	140	100
1961	£5384	202.6	321.3
1979	£23,473	828.5	342.5

The average real return over the 28 year period chosen by GAD was therefore 4.5%. This is positive, it is over 3%, but it is not 9.8%.

We look at their 1980 figures in more detail below, but meanwhile the discrepancy is remarkable and calls for an explanation. The GAD does not say which index was used: an index such as they imply would leave the investor not with £23,000 but with £94,000!

An alternative explanation of the discrepancy has been put forward. If one adds up the percentage change each year and divides by 28, the answer would be about what GAD gives - but simply adding up percentages notoriously gives a spurious answer, and we find it difficult to believe that a qualified actuary would fall into such an elementary trap. (10% plus 10% is not 20% but 21%; 10% minus 10% is not zero but minus 1%).

Consider a simple example. Assume you bought shares 2 years ago for £100: in the first year they went up 50%, in the second year they fall 40%. Are you better or worse off?

TABLE D3

	VALUE AT START	% CHANGE	VALUE AT END
YEAR 1	£100	+50	£150
YEAR 2	£150	-40	£ 90

If you add up the percentage change and divide by two you might conclude that the average percentage change is 5% up even though the actual loss on the exercise is £10.

If we look more closely at the figures we find that from 1950-60 equity prices recovered from their wartime torpor. The indices rose sharply, and even allowing for inflation, the average increase in the value of the fund over these 10 years was 12.4% per annum. These figures distort the average. During the following 18 years from 1961 to 1978, the average real return on equities was only 0.36% per annum. (A more realistic measure of current performance is discussed below).

What evidence is there that pension funds have actually earned 3% real in the post-war period?

De Zoete & Bevan's Annual Review 1980 shows the growth record (in money terms) of £1000 invested on 1st January 1946 in equities, Consols and in Treasury Bills with gross income reinvested. Table D4 shows the overall results on 1st January 1980.

TABLE D4

VALUE OF £1000 OVER 35 YEARS

1st January 1980 value	<u>EQUITIES</u>	<u>CONSOLS</u>	<u>TREASURY BILLS</u>
MONEY VALUE	£25,081	£2,239	£5,761
PRICE INDEX (1946 = 100)	870	870	870
REAL VALUE	£2,883	£257	£662
COMPOUND GROWTH	3.1%	(3.8%)	(1.1%)

The figures, as such, are not very significant. We can use the data to work out the performance of a "notional pension fund" over a 35-year period.

What we did was to treat the de Zoete & Bevan equity fund as a "unit trust", and to assume that the "notional pension fund" invested contributions in "units" each year.

We took the case of the typical civil servant of Table A1, and assumed that he joined the service, aged 25, at the beginning of 1946. He would now be 59. If £100 had been invested for him in 1946, and if the real investment had increased in accordance with the salary index, total contributions (in 1946 pounds) would be £8,254 and they would have a present value (in 1946 pounds) of £11,180.

This is the equivalent of an average rate of return, over the whole 35-year period, of 1.95% per annum. This is the nearest we can get to confirming the optimistic long term assumptions of the GAD.

It may be useful to break down this return into periods. The figures are:-

TABLE D5

	1980 VALUE (1946 POUNDS) OF CONTRIBUTIONS	RETURN ON INVESTMENT (TO 1980)
CONTRIBUTIONS MADE		
1946-60 (15 YEARS)	5,946	3.25%
1961-70 (10 YEARS)	2,128	(1.25%)
1971-80 (10 YEARS)	<u>3,106</u>	(0.6%)
	<u>11,180</u>	

The (relatively) favourable result thus derives from the investment made before 1961. Which period is typical - the earlier 15 years or the later 20 years? Is it significant that positive returns on equities were achieved only on investments made in a period when pension funds did not typically invest in equities?

Under this "weighted" procedure, the starting date does not have a disproportionate influence on the outcome. The finishing date still does. A calculation made up to 1976 would have shown negative returns to the equity investor.

We now analyse what rates of return have historically been available on "real" pension funds. Two firms, Bacon & Woodrow, Consulting Actuaries, and Wood Mackenzie and Co., Members of the Stock Exchange, prepare comprehensive reports on the comparative performance of pension funds. In both cases, the main objective is to provide a basis for comparison against which the performance of an individual fund can be judged. The figures are given in "money" terms, although data on price indices is included. For our purposes we have deflated certain of their figures by the retail price index to give figures for achieved real deals.

The data which we have presented is subject to the limitations set out in the two firms' reports. We recommend that the Committee should seek evidence directly from them (if it has not already been offered) to guide its judgment on the validity of the figures.

The pension fund is by its nature a growing fund and any performance calculation has to take account of the continuous injection of new money. There are differences of opinion among investment analysts and actuaries on the most appropriate way of doing this. We do not think these differences would materially affect the general conclusions.

A serious gap in the Bacon & Woodrow figures from our point of view is that they do not include information for direct real property investment by pension funds. It may be argued that pension funds have found property a better hedge against inflation than marketable securities. <sup>1</sup>

Our figures for real returns have been calculated from those given by the two firms, and are our responsibility not theirs. We have also drawn selectively on the large volume of material

1. The Wood Mackenzie reports do include this information but their figures cover only the last 5 years. See also Evidence of National Association of Pension Funds to Committee to Review The Functioning of Financial Institutions. Evidence. volume.III. HMSO London 1978 Table 14

presented, but this selection has been to avoid an unnecessary mass of data rather than to support a particular conclusion. The Bacon & Woodrow figures cover a period of 10 years. This is admittedly short in relation to the time span we are considering, but it is long enough to draw some useful conclusion. The Wood Mackenzie figures only go back for a period of five years. We therefore do not use them except in Table D7, which confirmed that their conclusions do not differ significantly from those of Bacon & Woodrow.

Table D6 (see next page) simply shows the year on year rate returns for each of the ten years. These are Bacon & Woodrow's figures, adjusted by us for movements in the retail price index. The figures in the first part of the Table are for three different yardsticks of U.K. investment performance plus the U.S. Standard and Poor's index adjusted for exchange rate movements. The second part shows the performances of actual pension funds studied by Bacon & Woodrow, the best performing, the upper quartile, the median, the lower quartile and the worst performing. It does not, of course, follow that the same fund will be (e.g.) the upper quartile fund in each year.

It will be seen at a glance that there are enormous variations from year to year. In particular the ups and downs of the stock exchange are vividly brought out. We can draw no particular valid conclusions from these figures as such.

Both sources include cumulative tables of the average annual performance from any starting date covered until the end of 1979. Examples are given in Table D7. (In this case, of course, the upper quartile figure is based on the overall performance of a particular fund over the whole period and is not an accumulation of the ten separate upper quartile figures.) It will be seen that over the 10 year period returns of actual pension funds ranged from minus 5.4% to minus 2.2% with a median of minus 3.6%.

TABLE D6

(A)

	1970	1971	1971	1971	1973	1974	1975	1976	1977	1978	1979
	%	%	%	%	%	%	%	%	%	%	%
FT-Actuaries All Share Index	(3.4)	47.3	16.3	(28.7)	(51.7)	151.4	2	48.9	8.4	10.3	
Real return	(11.0)	36.1	8.0	(36.3)	(59.7)	103.7	(12.5)	35.5	(0.8)	(6.8)	
FT-Actuaries over 15 Year											
Gilt Index	2.4	35.4	(9.9)	(12.6)	(22.6)	39.3	13.3	50.2	(2.6)	4.5	
Real return	(5.6)	25.1	(16.3)	(22.0)	(35.5)	12.9	(2.8)	36.7	(10.9)	(11.7)	
3 month Interbank Cash											
Deposit	8.5	6.6	6.7	10.3	14.9	11.1	11.2	9.5	8.5	13.8	
Real return	0.0	(1.5)	(0.9)	(1.5)	(4.2)	(10.0)	(4.6)	(0.4)	(0.7)	(3.9)	
S&P Composite Index (Adjusted)	(7.1)	8.7	25.2	(13.8)	(2.4)	49.3	29.7	(26.2)	6.5	(24.4)	
Real return	(14.4)	0.5	16.3	(23.0)	(18.6)	21.0	11.2	(32.9)	(2.6)	(36.2)	
Retail Prices Index	8.5	8.2	7.7	12.0	19.9	23.4	16.6	9.9	9.3	18.4	
Earnings Index	14.2	8.9	15.0	7.6*	33.5*	20.7	12.2	10.2	12.4	20.5	

\* These figures reflect the temporary reductions in earnings while three-day working and other restrictions were in operation.



(B)

	1970	1971	1972	1973	1974	1975	1976	1976	1978	1979
	%	%	%	%	%	%	%	%	%	%
Maximum	4.5	50.6	21.3	(10.3)	1.4	103.6	11.1	65.1	12.2	18.5
Upper Quartile	1.1	41.3	16.5	(20.2)	(21.3)	78.7	6.3	44.5	6.7	8.4
Median	.7	37.7	13.5	(21.8)	(30.7)	65.9	3.7	41.2	5.2	6.6
Lower Quartile	(2.8)	36.2	11.4	(24.8)	(34.9)	51.8	1.8	35.2	3.8	4.8
Minimum	(5.9)	25.5	5.6	(29.4)	(47.2)	11.7	(4.1)	17.0	(1.8)	(2.9)

The last two columns of Table D7 are based on the performance of the last five years - i.e. since the low point of the stock market. As one would expect for this period real returns (for all but the bottom performing funds) were positive, although (again as one would expect), even the best performing pension fund did not match the performance of the All Share index. Wood Mackenzie figures are available for this period. There is no material difference in the picture they present.

All period averages in both reports are based on the correct method of calculating the cumulative growth over a period, and then working out the steady annual percentage rate of change that would have been needed to achieve the same growth. The arithmetic mean method apparently used by the GAD in Appendix 6 of the 1979 Review would give a totally erroneous answer.

Averages over a 10 year period would give a better answer than taking annual figures. There are still two criticisms. One is that the time period is too short. This is inevitable given the data available. We have already examined some longer term figures. The other is that so much depends on the state of the stock exchange cycle at the beginning and is clearly brought out by our respective ten and five year figures in Table D7. We need therefore to look at the figures a little more closely.

Table D8 shows the average annual rate of return between any pair of years in the decade. (These are based on the median performing pension fund in each year and have been calculated by us by accumulating these. They do not therefore represent the actual performance of any particular pension fund over the whole period, but should be a good enough proxy for a typical performer. It will be seen that the five year period from the beginning of 1975 (the stock market low) is the longest period of continuous positive yields and that only one-third of the figures in the Table are positive.

Our last look at the figures is perhaps the most realistic. It assumes that our hypothetical civil servant actually has his pension contribution invested in the median pension fund. This takes account of the fact that a pension fund is a growing fund. The contribution he made 10 years ago is valued on the basis of the average rate of return over the ten year period and so on. Column (3) of Table D9 shows how the value builds up. We then calculated by success of interaction the steady rate of return that would have been needed to produce the same value. We conclude that this would be a real rate of minus 4.145% - the calculations are shown in Columns (4) and (5). This figure minus 4% is, we suggest, the fairest measure of average returns available to a pension fund over the decade.

Table D10 repeats the calculations assuming that the investment was made by the upper quartile of performing pension fund in each year. Naturally this shows a better return - but still only minus 1.9%. However one looks at it the real returns available to pension funds over the past decade (which may we admit be exceptional) are nearer minus 3% per annum, rather than the positive 3% assumed in the GAD Reviews.

TABLE D7

## YARDSTICKS OF PENSION FUND PERFORMANCE

## AVERAGE PERCENTAGE RETURN PER ANNUM

	<u>TEN YEARS 1970-1979</u>		<u>FIVE YEARS 1975-1979</u>	
	NOMINAL RETURN	REAL RETURN		
FT ACTUARIES ALL SHARE	10.0	(2.9)	35.5	17.4
FT ACTUARIES OVER 15 YEAR GILT	7.4	(5.2)	19.3	3.4
3 MONTH INTERBANK CASH DEPOSIT	10.1	(2.8)	10.8	(4.0)
S & P COMPOSITE INDEX (ADJUSTED)	2.0	(10.0)	2.8	(10.9)
RETAIL PRICE INDEX	13.3			
(EARNINGS INDEX)	15.3			
<u>BACON &amp; WOODROW</u>				
(TOTAL ASSETS)				
MAXIMUM	10.8	(2.2)	30.7	13.3
UPPER QUARTILE	10.0	(2.9)	24.7	8.1
MEDIAN	9.2	(3.6)	22.2	5.9
LOWER QUARTILE	8.7	(4.1)	19.7	3.7
MINIMUM	7.3	(5.3)	9.4	(5.2)
<u>WOOD MACKENZIE</u>				
MAXIMUM			31.0	13.5
UPPER QUARTILE			25.8	9.0
MEDIAN			23.9	7.4
LOWER QUARTILE			21.8	5.6
MINIMUM			11.3	(3.8)

TABLE D8

REAL RETURNS ON MEDIAN PENSION FUND

	1970	1971	1972	1973	1974	1975	1976	1977	1978	1979
NOMINAL										
RETURNS	0.7	37.7	13.5	(21.8)	(30.7)	65.9	3.7	41.2	5.2	6.6
PRICE										
INDEX	8.5	8.2	7.7	12.0	19.9	23.4	16.6	9.9	9.3	18.4
REAL										
RETURNS	(7.2)	27.26	5.39	(30.18)	(42.2)	34.4	(11.06)	28.48	(3.75)	(9.97)

REAL RETURNS ANNUALISED

FINISH

<u>YEAR</u>	1970	1971	1972	1973	1974	1975	1976	1977	1978	1979
START										
YEAR										
1970	(7.2)	16.7	12.8	0.0	(10.4)	(4.1)	(5.1)	(1.5)	(1.7)	(2.6)
1971	-	27.3	15.8	(2.2)	(14.2)	(6.2)	(7.0)	(2.6)	(2.7)	(3.6)
1972	-	-	5.4	(14.2)	(24.8)	(13.0)	(12.6)	(6.8)	(6.4)	(6.9)
1973	-	-	-	(30.2)	(36.5)	(18.4)	(16.7)	(9.1)	(8.2)	(5.8)
1974	-	-	-	-	(42.2)	(11.8)	(11.6)	(2.9)	(3.1)	(4.3)
1975	-	-	-	-	-	34.4	9.3	15.4	10.3	5.9
1976	-	-	-	-	-	-	(11.1)	6.9	3.2	(0.2)
1977	-	-	-	-	-	-	-	28.5	11.2	3.6
1978	-	-	-	-	-	-	-	-	(3.8)	(6.9)
1979	-	-	-	-	-	-	-	-	-	(10.0)

TABLE D9

	INDEX	RETURN	FUTURE VALUE	RETURN	<u>FUTURE VALUE</u>
	(1)	(2)	(3)	(4)	(5)
29	311.03	(2.6)	239.00	(4.145)	203.68
30	317.24	(3.6)	228.07	(4.145)	216.73
31	323.56	(6.9)	182.62	(4.145)	230.61
32	329.05	(5.8)	216.58	(4.145)	244.66
33	334.63	(4.3)	257.06	(4.145)	259.57
34	340.30	(5.9)	453.25	(4.145)	275.38
35	346.07	(0.2)	343.31	(4.145)	292.16
36	351.93	(3.6)	391.32	(4.145)	309.96
37	357.21	(6.9)	309.62	(4.145)	328.21
38	362.57	(10.0)	<u>326.31</u>	(4.145)	<u>347.50</u>
			2708.14		2708.49
			=====		=====

TABLE D10

UPPER QUARTILE PENSION FUND

29	311.03	(2.9)	231.74	(1.9)	256.74
30	317.24	(2.5)	252.59	(1.9)	266.93
31	323.56	(6.3)	192.25	(1.9)	277.53
32	329.05	(7.8)	186.37	(1.9)	287.70
33	334.63	(3.2)	275.30	(1.9)	298.24
34	340.30	8.1	502.33	(1.9)	309.18
35	346.07	0.6	354.45	(1.9)	320.51
36	351.93	4.7	403.92	(1.9)	332.25
37	357.21	(5.7)	317.65	(1.9)	343.77
38	362.57	(8.5)	<u>331.75</u>	(1.9)	<u>355.68</u>
			3048.35		3048.52
			=====		=====

## APPENDIX A

Examples of the "topping-up" of pension funds to supply deficiencies in the funding.

These were taken from a random sample of the reports and accounts of some 30 pension funds covering companies of varying sizes and interests. Of these 30, 15 yielded any actuarial information and 6 of the 15 showed a deficiency of some kind. Details were as follows:

1. Value of Pension Fund £11.15 million. SIC 2310; 8101. Annual Report of 1977. The actuary's valuation of 6/4/76 disclosed a deficit of £5,385,000 compared with a deficit of £874,000 at the end of the previous year. The company decided to increase their contribution to eliminate this deficit and from April 1977 would be paying an extra £634,000 a year to the Pension Fund.

The deficiency was said to be due mainly to inflation.

2. Value of Pension Fund £7.5 million. SIC 8620. Annual Report of 1979. Actuarial recommendations included a new series of special contributions to be made by the company to satisfy the actuarial requirements of the Fund, i.e. £365,000 in 1977 and £295,000 a year in each of the years 1977-1981.
3. Value of Pension Fund £17.25 million. Number of members 11,739. SIC 8720. Annual Report of 1979. The excess of liabilities over assets was stated to be £3,155,000 which was to be met by an additional contribution of  $\frac{1}{2}\%$  from the members, bringing their contribution from  $6\frac{1}{4}\%$  to  $6\frac{3}{4}\%$ . The result of this should be an excess of assets of £243,000, to be carried forward to the next valuation as a reserve.

These liabilities are said to be due to a reduction in the real rate of return.

4. Value of Pension Fund £51.5 million. Number of members 20,000. SIC 3800. Annual Report of 1978. The actuaries recommend that to meet the balance of the cost of the pension the company's contribution must go up from 7.30% to 8.50%, the employees' contribution remaining at 4.50%. This should leave a small surplus of £30,000 in the Fund.
  
5. Value of Pension Fund £33.5 million. SIC 8201. Annual Report of 1977. On actuarial recommendation and to provide for a 15% increase in pensions from 18/10/76 the company has paid a special contribution of £1.35 million to the Pension Fund. This should fully cover the additional liabilities.
  
6. Full details of Pension Fund not given. SIC 8213; 8940. Annual Report of 1975. In order to meet the liabilities of £869,915 the company agreed to make additional annual contributions of £122,000 for 9 years from 1/1/76.