

PENSION FUND LIABILITIES AND ASSET MATCHING

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INTRODUCTION

1.1. The concept of matching assets and liabilities has for many years been recognized as a crucial aspect of our professional work. Its importance is emphasized in the Institute's guidance notes entitled "Actuaries and Long-Term Insurance Business" and in many papers published in the Journal.

1.2. A particular form of matching, namely immunization, was developed by F. M. Redington in his paper "Review of the Principles of Life-Office Valuations" (*J.I.A.* 78, 286). Immunization signifies the investment of assets in such a way that the existing business is immune to a change in the rate of interest. One of the consequences of immunization is that the mean term of the asset-maturity dates is appreciably longer than the mean term of the value of the asset-proceeds and of the liability-outgo; and, at other than low rates of interest, a perpetuity can be too short to immunize a long-term contractual liability.

1.3. The mean term of the liability-outgo of pension funds is generally longer than that of the business on a life office's books and, even if no specific attempt is made to achieve a measure of immunization, it is often suggested that the general policy for a pension fund should be to invest in long-term assets.

1.4. However, the liabilities of the majority of pension funds are to a large extent 'real' liabilities (for example, dependent on future pensionable salaries) whilst the contractual liabilities under life office contracts are fixed in money terms. Is the same long-term investment philosophy necessarily appropriate to both pension funds and long-term insurance business? And can conflicts of interest arise between the asset needs of pension funds and those of pension contracts issued by life offices to correspond with the funds' liabilities? The purpose of this paper is to examine these issues and to discuss certain other implications of the problem of providing benefits in real terms.

ASSET TERMS

The interaction of earnings and yields

2.1. It is customary in valuing, and assessing funding rates for, final-salary pension plans to assume a close relationship between the overall rate of investment return ($=i$) and the rate of earnings inflation ($=e$). In recent years it has become general practice to assume a small positive real rate of return. For example ($i-e$) is now often taken in the range $\cdot005$ to $\cdot015$ for earnings-related benefits.

2.2. Using such an assumption, what is the effect of a change in the rate of interest? Let us assume that all scheme benefits, including pensions in payment and paid-up benefits on withdrawal, are inflation-proofed on an earnings basis. In these conditions, and so long as the same differential between investment returns and earnings increases continues to apply, the value of the benefits can be assumed to be unaltered by a change in the rate of interest since the effect of that change will be counterbalanced by the change in the earnings rate (ignoring the effect of marginal differences between $(1+e+t)/(1+i+t)$ and $(1+e)/(1+i)$ where t is the change in rate). Likewise, in such conditions, the value of future earnings-related contributions will not be affected. To immunize the liability the value of the assets should therefore be insensitive to interest rate changes. There is only one asset term satisfying this condition and that is zero. An immunization approach (whether in relation to paid-up benefits or allowing for continuing contributions) therefore implies assets held in the form of cash on deposit.

2.3. In practice few, if any, schemes revalue pension payments and paid-up pensions by an earnings index but many public sector schemes provide increases linked to a cost-of-living index on a prices basis. Again, so long as a constant difference is deemed appropriate between i and the rate of price increases, the value of the liability will be insensitive to interest rate fluctuations and immunization will imply dead short investment.

2.4. In the private sector a commitment to inflation proofing rarely applies. Ignoring for the moment the effect of withdrawals, and assuming that pensions in payment are of a level amount in money terms (or are entitled to a fixed rate of revaluation), then on a change in the rate of interest the value of the liability of a final-salary pension plan will change in respect of the period in possession only. In this situation the mean term of the value of the asset-proceeds will need to be maintained in line with, but no longer than, the mean term of the value of the liability-outgo for immediate annuities if the fund is to be immunized. The effect of lump sum benefits on retirement will usually be to shorten the asset term requirements, depending on the basis for determining such benefits.

2.5. An allowance for withdrawals changes the picture somewhat. Even if $(i-e)$ remains unaltered, changes in the absolute values of i and e will affect the liability if withdrawal rates are incorporated into the structure. For example, an increase in the rate of interest from i to $(i+0.01)$ will reduce the liability for the period before retirement (apart from reducing the value of the liability for the period in possession) by a larger amount than the increase in liability arising from an increase in earnings from e to $(e+0.01)$. This is because the change in the earnings assumption has no impact on paid-up benefits for the period after withdrawal, and an interest 'surplus' on such benefits is generated by the new conditions. In these circumstances the asset-matching term will be longer than that arising in § 2.4, depending on the rates of withdrawal.

Changing real rates of return

2.6. The propriety of assuming that $(i-e)$ remains constant may be questioned,

for experience over recent years suggests that the higher the rate of earnings inflation, the lower the likely real rate of return (see Appendix 1). If it is assumed that, on an increase in i , there will be a larger increase in e (i.e. a decrease in the real rate of return), the overall effect will be to add to the value of the liability if scheme benefits are as described in §2.2. Conversely, on a reduction in i associated with a larger reduction in e (i.e. an increase in the real rate of return) the value of the liability will decline. To immunize the fund against such changes, a negative asset term would, in theory, be needed.

2.7. If pensions in payment and withdrawal benefits are not inflation-proofed, the overall effect of a reduction in the real rate of return as i increases will depend on the extent to which the reduction in $(i-e)$ on the inflation-proofed benefits is offset by the increase in i on the non-inflation-proofed benefits. The overall result will, however, be to shorten the mean terms of the values of the asset-proceeds below those implicit in §§2.4 and 2.5.

2.8. It is only if there is an increase in real rates of return as interest rates rise or a reduction in real rates of return as interest rates decline that the asset terms for immunization purposes will be longer than those referred to above. This scenario is not, however, in general supported by past experience.

Conclusions as to asset term

2.9. The preceding sections suggest that the greater the degree of commitment to inflation proofing, the shorter should be the asset term for immunization purposes. This may seem a paradoxical conclusion bearing in mind the very long-term nature of most pension funds and our instinct to match like with like. The answer lies in the distinction between liabilities in real terms and those which are of fixed amount. When liabilities are fixed in amount it is appropriate to match them by assets, of suitable term, under which the proceeds are also of predetermined amount. But once the commitment is expressed in real terms the liability-outgo becomes an unknown and variable item and asset proceeds predetermined for many years ahead are not necessarily appropriate; they do not match like with like.

ASSET TYPES

Implications for various forms of investment

3.1. The above analysis has obvious implications as regards long-term fixed-interest investment. Are equities and properties—with their even longer implicit terms—also unsuitable? To the extent that changes in interest rates have a direct influence on prices of equities and properties (e.g., in relation to a given level of dividend or rent), similar implications as regards asset terms will apply to these forms of investment as to fixed-interest securities.

3.2. However, market values of equities and properties represent a hybrid of financial and inflationary elements. It can be argued that the effect of a change in interest rates should, at least in part, be counterbalanced by a corresponding

change in growth prospects (and in the anticipated rate of inflation). The sensitivity of asset values of equities and properties to changes in interest rates should, therefore, tend to be relatively smaller than for long-term fixed-interest securities. To this extent equities and properties could come closer to meeting the requirements mentioned in section 2 above.

3.3. This rationale is not, however, borne out in practice. As will be seen from Appendix 2 the percentage change in the value of equities has in most years been greater than that in respect of fixed-interest securities. Indeed there have been several years in which an increase in interest rates has been accompanied by an increase in the value of equities, rather than by a decline, or little change, in such value.

3.4. It is likewise difficult to draw any firm conclusions as to the propriety of property investment for purposes of immunizing pension fund liabilities. There is no generally acceptable index available for comparison. But from the values quoted by leading property unit trusts and by life office managed property funds there is little doubt that property investment has produced a much more stable pattern of asset values over recent years than has investment in either equities or long-term fixed-interest securities. To this extent property investment has come closest, apart from cash on deposit, to satisfying the immunization conditions discussed in section 2.

Conclusions as to type of asset

3.5. Diversification by type of asset, as well as diversification within each type, is a necessary and vital ingredient of pension fund investment if only because of the uncertainties attaching to any one form of investment and the need to spread risk. Whatever the theoretical implications of immunization, it will be appropriate to invest in a mix of equities, properties, cash on deposit and fixed-interest securities (and, possibly, in overseas currencies and assets); and the timing of purchase of different types of asset will usually be of far more importance than the selection of different securities within each class.

3.6. The case for investing in equities and properties is not because they are implicitly long-term assets. It rests fundamentally on the need to match real liabilities with assets of a similar nature. However, it has to be accepted that, in practice, the sensitivity of asset values, except perhaps for properties, has hardly been in harmony with the immunization needs developed above.

3.7. Cash on deposit, or investment in short-term fixed-interest securities, may not only closely meet the asset term requirements referred to, but also provide some protection against liabilities expressed in real terms. Such protection can arise because levels of inflation tend to be reflected in lending rates; and retention of cash on deposit or continued investment in short-term government securities may approximate to index-linked investment. But the possible attractions of such investments are tempered by the fact that short-term rates are particularly sensitive to political and other influences, including rates of interest in other countries.

3.8. Whilst the annual return on Treasury Bills was in excess of the annual increase in prices over the period 1956 to 1969, the converse has applied subsequently; and such return has exceeded the annual increase in earnings on few occasions since 1946 (see Appendix 1). Nevertheless, it is of interest to note that over the last 30 years investment in Treasury Bills would have produced a better overall return than investment in long-term Government Stock (see Appendix 2, though a comparison based on long-term investment wholly in Consols, is a rather harsh standard). Over the last 10 years, Treasury Bills have also compared favourably with equities. However, these results have to be judged against the background of a period of mainly rising interest rates.

3.9. The propriety of long-term fixed-interest securities for final salary pension plans is more open to question. Such assets neither satisfy the asset term requirements developed above nor do they match, except fortuitously, the 'real' nature of the liabilities. It may be argued that the rate of interest available on purchase at any time allows for expected future rates of inflation; but we can hardly have any firm base for assessing inflation rates over periods of 15 years or more. The worth of the future asset proceeds is subject to an increasing funnel of doubt, and fairness between borrowers and lenders is unlikely to be achieved.

3.10. The above suggests that long-term fixed-interest securities ought not to be regarded as a natural investment haven in respect of benefits payable in real terms and that any wide-ranging investment programme involving such securities represents a greater departure from an appropriate asset-matching pattern for a final-salary pension plan than might generally have been supposed. Such a departure might well be made, for example, if the view is strongly held that interest rates are likely to fall, for to follow the theory slavishly would immunize the fund from profit as well as loss.

3.11. There is also the problem of cover for liabilities in respect of pensions in payment and preserved benefits for early leavers. Consideration of these groups of beneficiary highlights a dilemma in asset-matching for pension funds. It is suggested in section 4 that a more flexible approach ought to be adopted for such beneficiaries; and the implication of a more active strategy could be a shift away from long-term fixed-interest assets to short-term holdings, equities and properties. On the other hand if a fund is running-down the emphasis will change from liabilities in real terms to liabilities fixed in money terms. In the latter circumstances, fixed-interest investment would become more and more appropriate. Moreover, in the case of a pension plan which is contracted-out of the earnings-related component of the State scheme, it is necessary to have regard to any mis-match of investments to the Market Level Indicator (see Institute's guidance notes regarding certificates for the Occupational Pensions Board). Proper steering of the asset mix is therefore needed.

3.12. A lack of long-term fixed-interest assets could leave a fund in a vulnerable position if it were to wind-up in unforeseen circumstances at a time when interest rates were at a low level and contractual benefits had to be purchased in the market (thereby absorbing a higher proportion of the fund in meeting priority

benefits for pensioners). However, to the extent that low interest rates should imply low inflation, there could be less need for 'surplus' assets for members who had not retired. Moreover some cushion might be available if, and to the extent that, lower interest rates had, in practice, led to some rise in equity and property values.

Index-linked assets

3.13. In view of all the difficulties facing private sector employers in maintaining benefits in real terms, at least for beneficiaries who are no longer in employment, it may be felt that there is a strong case for the government's issuing index-linked gilts to approved pension funds. The implications of any such issue could be far reaching and the considerations warrant a separate paper. However the following general observations are pertinent.

3.14. It is not difficult to envisage circumstances in which the demand for index-linked gilts could be such as to make other forms of saving increasingly unviable. In this event the direction of moneys available for investment by pension funds and life offices would come more and more in the hands of the authorities. The danger is that an economic system might eventually ensue in which there would be limited scope for private sector activity. Moreover the partnership between State and occupational pension schemes, which has been so carefully nurtured through contracting-out and in other ways, could be undermined. Unless, therefore, a stage is reached where there is a complete lack of confidence in the long-term ability of the private sector to adjust prices and rents in line with rising costs, there would seem to be no reason to despair of the suitability of equities and properties as suitable investment media for pension funds.

3.15. A possibly more attractive alternative to index-linked gilts might be inflation-proof bonds issued by companies on the lines discussed in "The Opportunities for Capital Investment" by C.G. Lewin (*J.I.A.* 108, 19).

3.16. It is worth noting that certain tax and other changes would be needed in respect of life offices writing more than one class of business if any issue of index-linked gilts were to be available to approved pension schemes but not other business.

FUNDING IMPLICATIONS

Pensioners and early leavers

4.1. There seems to be increasing sensitivity to the fact that a pension fund is not fulfilling its proper function if it does not maintain the value of the benefits it purports to pay. Nevertheless a commitment to indexation of benefits for pensioners and early leavers is an unacceptable risk to the vast majority of private sector employers because:

4.1.1. Advance funding cannot guarantee adequacy of resources for indexa-

tion, the future relationship between rates of inflation and overall rates of investment return being uncertain.

4.1.2. Reliance on a pay-as-you-go system could lead to an intolerable burden on the employing company, particularly if the business were to run down; and the security of the benefits for those still in employment, and possibly the solvency of the employer, could ultimately be jeopardized.

4.2. The propriety of avoiding a commitment to indexation should not, however, inhibit consideration of possible action to mitigate the effects of inflation on pensions in payment and on preserved benefits for early leavers; and periodic augmentations (at least of pensions in payment) are normally made by many large groups. In other cases, however, action is frequently stifled by fear of heavy cost. The cost aspects have often been assessed somewhat unrealistically by valuing various rates of escalation at one rate of interest, without allowing for potential changes in investment returns at such higher escalation rates. If we feel it is appropriate to assume a small differential between rates of interest and rates of salary accrual during the period to retirement, why should we not make reasonably consistent assumptions (based, perhaps, on a slightly higher assumed real rate of return, relative to price inflation) for the years after retirement or leaving?

4.3. In practice interest surpluses on reserves for pensions in payment and for paid-up benefits are not often assessed and are frequently absorbed in reducing strains caused by pay increases to, or benefit improvements for, members in service. Any such cross-subsidies ought to be identified in funding reviews for it is doubtful whether the position is understood by other than a small minority of those whom we advise.

4.4. It has to be recognized that to be more explicit and to assess funding rates by using comparatively low rates of interest in valuing benefits for pensioners (and, possibly, early leavers), could cause difficulties for many employers, particularly in the current economic climate. Nevertheless I believe that we should begin to sow the seeds of change so that, if only gradually through adjustment of contribution rates, the foundations for more equitable treatment as between different classes of beneficiary may be laid. Finance for benefit improvements will, I think, need to be concentrated, at least for a while, relatively less on members in service and more on protection of benefits for those no longer employed, if occupational pension plans are to remain credible. Suggestions on similar lines were made, and developed in more detail, by D. E. Boden and T. D. Kingston in their paper on 'The Effect of Inflation on Pension Schemes and their Funding' (*T.F.A.* 36, 399).

Limiting contributions

4.5. The wisdom of making a systematic attempt to maintain benefits in real terms and to fund in advance, particularly during periods of high inflation, may be questioned. In the event many employers effectively operate on a hybrid basis since, although benefits for members in service are funded in advance, periodic

increases in pensions in payment are often met from revenue or through terminal funding. Whilst such a procedure may not be unreasonable, at least during periods of economic uncertainty, there can be rising cost implications which need to be identified. A degree of advance funding for pension augmentations is therefore normally to be recommended.

4.6. However, persistent negative real rates of return dilute the strength of existing assets; and it is salutary to bear in mind the ultimate *pay-as-you-go* relationship between total pensions outlay and the salary roll. If the pensions escalate at the same rate as the salaries of the employed members then, so long as the ratio as between employees and pensioners does not change, the *pay-as-you-go* cost as a percentage of salaries is stationary. In practice such ratio will change, as recent redundancies in manufacturing industry have so forcibly reminded us. Nevertheless an ultimate *pay-as-you-go* rate can usually be assessed and, at least for larger groups, used as a measure of an upper limit for contribution purposes, subject to regular monitoring of the ratio of active members to others. As R. E. Macdonald commented in his Presidential Address to the Faculty in 1977 (*T.F.A.* 36, 1), "In the highly unstable environment of high inflation when security of employment is itself very doubtful, to add to an employer's financial problems by demanding that he keeps the pension funding topped up to a level of accrued pension which is rapidly being overtaken by further escalation is tantamount to losing a sense of proportion. It seems more sensible to advance the pensioners and mark time on the funding".

4.7. The ratio of active members of occupational pension schemes in the private sector to the number of pensioners under such schemes, including widow pensioners, is expected to decline to around 3:1 by the end of the century (see Tables 5.8 and 5.9 of Appendix 5 of the Report of the Committee to Review the Functioning of Financial Institutions, Cmnd. 7937). It would appear, therefore, that for many of the larger (contracted-out) private sector schemes a limiting contribution rate in the range of 20% to 30% of payroll (depending also on the levels of withdrawal and death-in-service benefits) could be assumed.

LIFE OFFICE CONTRACTS

The nature of the liabilities and the asset implications

5.1. Premiums under a life office pension scheme contract may be treated as pension annuity business for tax purposes if the contract is so framed that the liabilities undertaken by the life office "correspond with liabilities against which the contract is intended to secure the fund" (section 323 (4) of the Income and Corporation Taxes Act, 1970). Nevertheless, in practice, precise correspondence is impossible to achieve except in relation to money-purchase schemes. The liability of a life office must be limited to the benefits resulting from the premiums which have been paid and, though the contributions will normally be salary-related and varied from time to time under actuarial guidance, there can be no guarantee that the policy proceeds will ultimately suffice to meet the benefits

arising under a final salary type scheme. The essential difference is that whereas the liabilities of a final pay plan emerge in real terms, those undertaken by a life office are expressed in terms of monetary amounts.

5.2. Group pension contracts issued by United Kingdom life offices fall into three main categories:

5.2.1. Investment-linked (managed fund) business. No guarantees are provided by the life office in respect of either investment income or the capital value of the assets of the investment-linked funds. No constraints, therefore, arise as regards either the term or the type of asset in relation to the life office's liabilities; and the office is free to pursue whatever investment strategy is felt appropriate to meet the needs of the employer's pension fund.

5.2.2. With-profit contracts in either deferred annuity or deposit administration form. The level of the guaranteed benefits, and the quantum of bonuses, varies considerably as between offices. The higher the level of the guaranteed benefits, the more appropriate will it be to match the liabilities by assets of suitable term and type.

5.2.3. Non-profit contracts. These are now rarely issued in respect of active pension schemes. However, non-profit liabilities continue to arise as a result of immediate annuities issued when members retire (e.g., in conjunction with investment-linked and deposit administration type contracts). Such liabilities may also occur in relation to any paid-up benefits which are fully secured for members on changing jobs or on the winding-up of a scheme. Close matching of non-profit liabilities both by term and type of asset will normally be necessary and desirable.

5.3. What does such matching entail? Because a life office's liabilities are expressed in monetary amounts, asset terms broadly meeting the requirements outlined in §1.2 will be needed; and for with-profit or non-profit pension contracts this will usually imply a quantum of long-term fixed-interest securities. The greater the element of the guaranteed rates, the more appropriate will it be to match the liabilities with such fixed-interest assets.

5.4. The conflict between the short-term asset implications developed in section 2 for final-pay pension plans and the long-term asset needs of certain life office contracts is thus apparent. To maximize investment freedom, and the opportunity to meet liabilities in real terms under final-pay plans, offices need to keep guarantees to a comparatively low level.

Valuation of liability-outgo in changing conditions

5.5. Methods of valuation for various classes of group business, having regard to the proposed rules for valuing long-term business liabilities, are discussed in the recent report of the joint working party of the Institute and Faculty. It is proposed to comment here on one area in particular, namely the pattern of liability-outgo under life office (non-managed fund) contracts and the consequences for valuation of the business.

5.6. It is salutary to consider, first, deposit administration type contracts. The

usual practice is to take the valuation liability as the amount of the accumulated (unallocated) fund. This is equivalent to assuming that such amount will increase in future at the guaranteed rate of interest and then valuing the enhanced amounts at such guaranteed rate; or, on a bonus reserve approach, that future accrual will be at a higher rate of interest, including allowance for future bonuses, and that valuation of the accumulated amounts is at that higher rate of interest. In either case the result is independent of the incidence of liability outgo, which may not therefore be recorded by the office.

5.7. But is such an approach adequate in extreme valuation conditions? For example, if interest rates are very high and asset values are extremely low, an unadjusted valuation liability taken as the amount of the accumulated fund would be unnecessarily stringent and might appear to endanger solvency if the deposit administration business represented a high proportion of the office's total business. At the other extreme of low interest rates and high asset values such a valuation amount could give a false appearance of solvency, particularly if interest rates had fallen below rates guaranteed in the policies. Thus, though there may be no allocation of money to individual members until such time as benefits are purchased outright (on retirement or withdrawal) it is desirable for the office to develop an internal system under which the pattern of liability outgo can be assessed and an appropriately adjusted figure produced for the valuation liability. Normally that pattern will be determined in relation to the incidence of retirement benefits for the scheme members. Care is therefore needed in deciding on the valuation basis. These aspects are discussed in more detail in section 20 of the working party's report.

5.8. It may be thought that no special steps need be taken in relation to deferred annuity contracts where contributions are allocated to individual members throughout. Such allocations can produce a false sense of security. The crucial question is whether the pattern of potential liability-outgo produced by the allocations is realistic having regard to the actual benefit payments which will emerge as a result of the rules of the scheme and of the policy provisions relating thereto. In certain circumstances (e.g., on winding-up) reallocations may be necessary, implying a change in the mean term of the liabilities on the office's books. The allocation method therefore needs to be examined to ensure that it produces a reasonable pattern for the liability-outgo (see section 13 of the working party's report).

Deposit administration—separation by scheme year

5.9. It is a common practice under deposit administration contracts to record separately the amounts received for investment in each policy year. Such amounts would usually be net of administration service charges, premiums for death-in-service benefits and any refunds of contributions. The costs of retirement benefits and of any fully secured paid-up pensions would then be met either from the earliest available scheme years for which amounts remained on deposit or, working in the reverse direction, from the most recent years' deposits.

The effect of the former arrangement is to shorten the duration for purposes of interest and bonus accrual under the contract and may be preferred if the office declares terminal bonuses on retirements and does not wish to defer such bonuses unduly. On the alternative approach the earliest years' deposits can remain undisturbed indefinitely (unless some arrangements are made to roll-over such deposits after a predetermined period); this approach may be used, for example, if it is intended to harmonise bonuses with the trend of the longer term investment results emerging from investment in equities and properties.

5.10. In neither case does the pattern of accumulating balances necessarily provide a realistic guide as to the appropriate overall asset term. Once again it is necessary to consider the incidence of liability-outgo as discussed in § 5.7. An appropriate asset term structure then needs to be determined to meet such liability-outgo and not to match the investment-year pattern produced by the system for crediting deposits with interest and bonuses. The asset term should not be determined primarily by the bonus system.

Pensioners and early leavers

5.11. The propriety of reducing the level of guarantees could also be extended to pensioners and early leavers in respect of a continuing pension plan. If, as suggested in section 4, a more explicit attempt is made to maintain benefits in real terms there is less need to cover paid-up benefits for early leavers by deferred annuities and pensions in payment by immediate annuities. In particular there would seem to be scope for further development of with-profit contracts not only for paid-up benefits during deferment (where with-profit facilities already exist in some cases) but also in possession (where few with-profit arrangements are available). In these circumstances the reduction in the level of the guarantee would permit more investment freedom and be more likely to meet the real needs of the employer's pension plan. Alternatively pension payments could be left to emerge as continuing payments of the pension plan with the life office acting as paying agent.

Guaranteed bulk transfer values

5.12. The dangers of combining guaranteed surrender values in life assurance contracts which also include long-term guarantees became all too apparent in the case of certain life offices a few years ago. Yet on the pensions side various forms of deposit administration-type contracts are issued by life offices, in the U.K. and overseas, with both the above types of guarantee. With the uncontrollable growth inherent in most pension schemes, the potential dangers of guaranteed bulk transfer values should be obvious. In particular, if at a valuation date interest rates are high and asset values are low, guaranteed amounts could inhibit an office's room for manoeuvre in valuing the liabilities, which will normally be spread as discussed earlier. If, therefore, an office is to pursue a wide-ranging investment policy, it would seem desirable to drop guaranteed bulk transfer values from new contracts and from existing contracts when current guarantees

expire. Nevertheless the right to such a transfer value (albeit with some provision for deferring or spreading the payment, in case there are liquidity problems) should remain. There is much less objection to guaranteed bases of calculation (as distinct from guaranteed amounts); and at least the bases of calculation which the office uses could be published from time to time.

CONCLUSION

6.1. My purpose has been to try to put the propriety of fixed-interest investment and associated matters into perspective. Inevitably the theory is tempered by practical considerations. There are three main themes of this paper, each subject to qualification:

6.1.1. Long-term fixed interest assets are incompatible with an immunization concept in respect of benefits payable in real terms. Nevertheless such assets are worth considering if favourable investment opportunities arise (e.g. during periods of declining interest rates) and for purposes of marketability or diversification of asset risk within the portfolio as a whole—provided the mismatch implications are not overlooked.

6.1.2. More systematic attempts should be made to protect the real worth of benefits for pensioners and early leavers and to identify any cross-subsidies which are implicit in funding arrangements; but this is not to suggest that any commitment to index-linking can be given in respect of members no longer in employment.

6.1.3. The lower the level of guarantee under life office pension contracts, the greater will be the office's investment freedom and hence the likelihood of meeting the real needs of pension funds. However, guarantees are still needed to underpin liabilities in fixed money terms, particularly for funds which are running down or winding-up; and the identification of a realistic pattern of liability-outgo under life office pension contracts should not be overlooked when valuing the business.

6.2. These themes are linked in as much as they each imply some departure from the security of fixed money arrangements. Any such departure will need careful steering and may be inadvisable if there are doubts as to the viability of the employing company. However, the concept of security is itself illusory and is not free from risk since the certainty implicit in amounts fixed in money terms is undermined by the uncertainty of inflation. The difficulty of reconciling these varying degrees of risk and achieving the most satisfactory balance emphasizes the importance of ensuring that employers have a proper understanding of the nature of pension fund financing and of potential changes, in real terms, in contribution outlay.

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APPENDIX 1

Year	Percentage Increase in Earnings %	Prices %	Annual Return on Treasury Bills %	Consols Yield on 1 January in following year %
1946	---	4.5	0.5	2.5
1947	6.1	6.0	0.5	3.0
1948	7.8	4.9	0.5	3.1
1949	3.4	3.1	0.5	3.5
1950	5.5	6.7	0.5	3.5
1951	10.4	9.1	0.5	4.0
1952	7.4	5.8	2.1	4.2
1953	6.1	2.4	2.4	3.9
1954	7.9	3.0	1.9	3.8
1955	9.1	4.9	3.5	4.4
1956	6.8	4.5	5.0	4.7
1957	5.6	3.4	5.0	5.3
1958	2.1	1.8	5.1	4.8
1959	5.5	0.8	3.4	5.0
1960	7.2	2.2	5.0	5.6
1961	5.5	3.9	5.1	6.5
1962	3.4	3.0	4.5	5.6
1963	5.6	2.7	3.8	5.7
1964	7.6	4.0	4.4	6.3
1965	7.6	4.3	6.3	6.5
1966	4.3	3.2	6.1	6.6
1967	5.8	2.4	5.9	7.0
1968	8.1	5.9	7.4	7.9
1969	8.2	4.7	7.9	8.7
1970	13.6	7.9	7.5	9.8
1971	9.5	9.0	6.2	8.5
1972	15.5	7.7	5.4	9.9
1973	12.5	10.6	9.0	12.3
1974	25.4	19.1	12.6	17.1
1975	21.6	24.9	10.8	14.7
1976	12.4	15.1	11.3	14.4
1977	8.8	12.1	9.4	10.5
1978	13.8	8.4	8.1	12.4
1979	18.6	17.5	13.5	12.8

Source:

Earnings—based on index in the final quarter of the year published in the *Employment Gazette* (new series, since 1976), in *Economic Trends, Annual Supplement* (old series, 1963–1976) and in *British Labour Statistics* (up to 1963).

Prices—based on change in index of retail prices during the calendar year.

Treasury Bills— the annual return is based on four consecutive investments in 91-day Bills in each calendar year at the average rate of discount applicable at each quarterly tender (as published in de Zoete & Bevan annual study).

Consols Yield—based on the price of 2½% Consols until 1 January 1979 and on prices of 4% Consols and 2½% Treasury thereafter (as published in de Zoete & Bevan annual study).

APPENDIX 2

FUND GROWTH

Progress of Equity, Consols and Treasury Bill Funds.
Original investment of £1,000 on 1 January 1946: gross income reinvested.

Year	Equities		Consols		Treasury Bills	
	Value of Fund on 1 January £	Gross Income during year £	Value of Fund on 1 January £	Gross Income during year £	Value of Fund on 1 January £	
1946	1,000	40	1,000	27	1,000	
1947	1,179+ 17.9%	47	1,108+ 10.8%	28	1,005+ 0.5%	
1948	1,152- 2.3%	45	950- 14.3%	29	1,010+ 0.5%	
1949	1,109- 3.7%	50	957+ 0.7%	30	1,015+ 0.5%	
1950	1,045- 5.8%	55	872- 8.9%	31	1,021+ 0.6%	
1951	1,158+ 10.8%	65	907+ 4.0%	32	1,026+ 0.5%	
1952	1,257+ 8.5%	72	821- 9.5%	33	1,031+ 0.5%	
1953	1,255- 0.2%	80	814- 0.9%	35	1,053+ 2.1%	
1954	1,559+ 24.2%	97	928+ 14.0%	36	1,078+ 2.4%	
1955	2,317+ 48.6%	118	985+ 6.1%	38	1,098+ 1.9%	
1956	2,570+ 10.9%	127	885- 10.2%	39	1,136+ 3.5%	
1957	2,338- 9.0%	138	858- 3.1%	41	1,193+ 5.0%	
1958	2,313- 1.1%	155	806- 6.1%	43	1,253+ 5.0%	
1959	3,418+ 47.8%	184	943+ 17.0%	45	1,317+ 5.1%	
1960	5,293+ 54.9%	230	952+ 1.0%	48	1,362+ 3.4%	
1961	5,384+ 1.7%	249	885- 7.0%	50	1,431+ 5.1%	
1962	5,474+ 1.7%	263	815- 7.9%	54	1,505+ 5.2%	
1963	5,495+ 0.4%	286	1,019+ 25.0%	57	1,572+ 4.5%	
1964	7,246+ 31.9%	344	1,041+ 2.2%	60	1,632+ 3.8%	
1965	6,952- 4.1%	407	1,008- 3.2%	64	1,703+ 4.4%	
1966	7,500+ 7.9%	437	1,048+ 4.0%	68	1,811+ 6.3%	
1967	7,036- 6.2%	449	1,084+ 3.4%	72	1,921+ 6.1%	
1968	9,515+ 35.2%	449	1,098+ 1.3%	77	2,035+ 5.9%	
1969	13,184+ 38.6%	505	1,042- 5.1%	84	2,186+ 7.4%	
1970	11,297- 14.3%	538	1,036- 0.6%	91	2,359+ 7.9%	
1971	10,347- 8.4%	514	1,020- 1.5%	100	2,535+ 7.5%	
1972	14,758+ 42.6%	550	1,277+ 25.2%	108	2,692+ 6.2%	
1973	15,723+ 6.5%	605	1,206- 5.6%	119	2,838+ 5.4%	
1974	11,768- 25.2%	688	1,088- 9.8%	133	3,094+ 9.0%	
1975	6,186- 47.4%	828	914- 16.0%	156	3,482+ 12.5%	
1976	15,906+ 157.1%	951	1,219+ 33.4%	179	3,857+ 10.8%	
1977	16,413+ 3.2%	1,153	1,425+ 16.9%	205	4,294+ 11.3%	
1978	23,473+ 43.0%	1,409	2,163+ 51.8%	226	4,699+ 9.4%	
1979	25,605+ 9.1%	1,689	2,055- 5.0%	255	5,078+ 8.1%	
1980	25,081- 2.0%		2,239+ 8.9%		5,761+ 13.5%	

In the above Table the Equity Fund gave the best performance in 16 years. Consols in 4 years and Treasury Bills in 14 years. Had investment been in the most beneficial fund in each calendar year, then £1,000 invested on 1 January 1946 would have accumulated by 1 January 1980 to £379,000.

Average Overall Returns per annum
Investment made at beginning of period: gross income reinvested

<i>Period of Investment</i>	<i>Equities</i> %	<i>Consols</i> %	<i>Treasury</i> <i>Bills</i> %
1 January 1946 to 1 January 1951	3.0	-2.0	0.5
1 January 1951 to 1 January 1956	17.3	-0.5	2.0
1 January 1956 to 1 January 1961	15.9	Nil	4.7
1 January 1961 to 1 January 1966	6.9	3.4	4.8
1 January 1966 to 1 January 1971	6.6	-0.5	7.0
1 January 1971 to 1 January 1976	9.0	3.6	8.8
1 January 1975 to 1 January 1980	32.3	19.6	10.6
1 January 1946 to 1 January 1956	9.9	-1.2	1.3
1 January 1956 to 1 January 1966	11.3	1.7	4.8
1 January 1966 to 1 January 1976	7.8	1.5	7.9
1 January 1970 to 1 January 1980	8.3	8.0	9.4
1 January 1946 to 1 January 1980	9.9	2.4	5.3

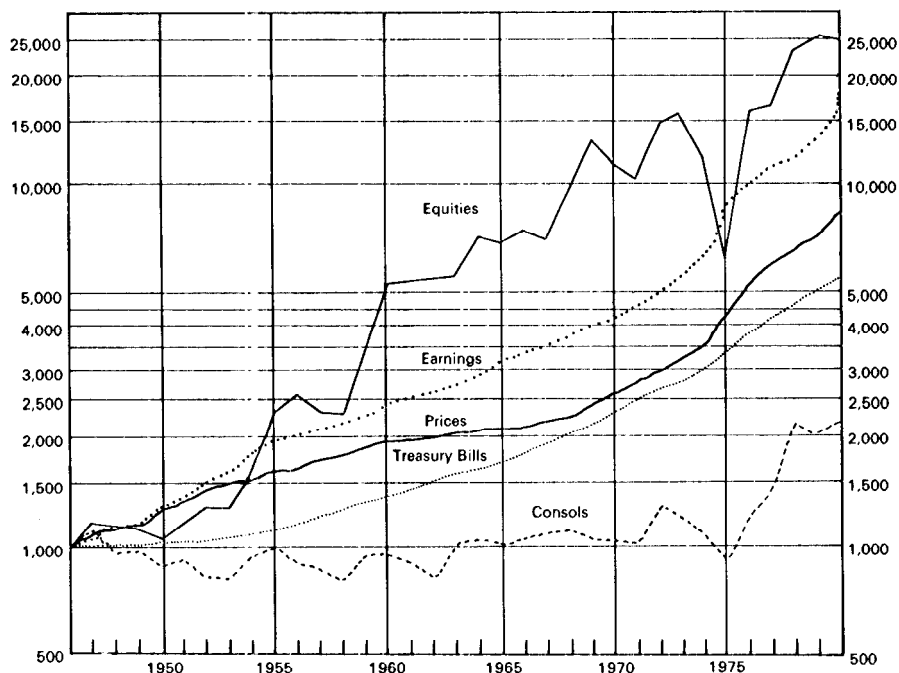
Explanatory Notes:

1. No allowance has been made for expenses of dealing.
2. Where rights issues have been made, it has been assumed that the Equity Fund has sold its rights, and cash sums so realized have been retained for reinvestment at the end of the calendar year.
3. Capitalization issues and share sub-divisions have been allowed for.
4. It is assumed that gross income is reinvested at the end of each calendar year.
5. Income throughout is without deduction for tax.
6. It is assumed that the Treasury Bill Fund is reinvested every quarter in 91-day Bills at the average rate of discount applicable at the tender.

Source: de Zoete & Bevan annual study.

APPENDIX 3

Comparison of Earnings and Price Indices and of Fund Growth



This illustration is derived from the figures in Appendices 1 and 2. The graphs for earnings and prices have been superimposed on the fund growth illustration in the de Zoete and Bevan annual study to give an indication of the trend of inflation relative to overall investment returns.

APPENDIX 4

Pattern of Asset Holdings at end 1978 (Market Values)

	<i>Insurance Cos.</i>		<i>Pension Funds</i>		
	<i>Long-Term Funds %</i>	<i>Private Sector %</i>	<i>Local Authority %</i>	<i>Other Public Sector %</i>	<i>Combined Private & Public Sector %</i>
Cash and other short term assets	4	5	4	5	5
Public sector securities	27	22	30	16	22
Loan capital and preference shares	6 } 41	4 } 27	2 } 32	1 } 24	2 } 27
Mortgages and loans	8	1	—	7	3
Ordinary shares*	32	50	57	47	50
Property*	22	16	7	23	17
Other investments	1	2	—	1	1
	100	100	100	100	100

* Including unit trust holdings.

Source: Report of Committee to Review the Functioning of Financial Institutions (Cmnd 7937).