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ACTUARIES, PENSION FUNDS AND INVESTMENT

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ABSTRACT

The authors discuss the investment of pension and other institutional funds, stressing a theme of *investing to meet liabilities*. Their aim is to stimulate debate by actuaries and the investment community, leading to the development of better approaches to pension fund investment and its monitoring.

The first part of the paper considers the matching of assets to liabilities, concentrating on a major principle applicable to actuarial valuations where assets and liabilities are mismatched.

The paper goes on to consider principles of institutional investment and includes discussions of the meaning and measurement of risk, the setting of investment objectives, decision-making, asset allocation and investment performance monitoring.

KEYWORDS

Investment; Matching; Pension Schemes; Risk

The ability to determine the optimum portfolio of risky assets without having to know anything about the investor *has a special name. It is called the separation theorem.* (Our emphasis.)

Edwin J. Elton & Martin J. Gruber[1]

1. INTRODUCTION

1.1 The quotation above is taken from a standard textbook on Modern Portfolio Theory. It encapsulates neatly much of what is wrong about the present investment approach to institutional funds.

1.2 Our purpose in this paper is to present a rational and actuarial approach to thinking about pension fund investment and its related objectives, decisions and monitoring: to reconsider some of the fundamental principles of actuarial valuations against this background; to stimulate informed and critical debate and thought about these matters, both within our profession and outside; to lay to rest a number of well-entrenched myths; and to focus yet more attention on the issue of investing *to meet liabilities*.

1.3 On the way we set out a number of guiding principles and make a number of bold assertions. We expect several of our views to appear to many to be controversial, paradoxical or even just plain wrong. Yet in many cases they are no more than a restatement, in a different guise, of what has been accepted actuarial wisdom for decades. We are confident that they will eventually come to be accepted as the truisms they are.

1.4 Of particular concern to us is what we regard as the under-managed—in the broad sense—state of United Kingdom pension portfolios. U.K. private and public sector pension fund assets, excluding insurance companies' pensions business, amounted at 31 December 1988 to about £236 billion, equivalent to about *66% of the total market capitalisation* of the U.K. stock market (£357·8 billion). These U.K. pension funds between them own about *33% of the stock of the companies quoted there*. Yet we doubt if the management resources devoted to managing those assets amount to *1%* of the resources devoted to managing the companies that the funds own and in theory control. In particular, scant, if any, attention is paid to how the assets relate to the liabilities that they are held to meet; yet these liabilities represent the sole rationale for accumulating the assets in the first place.

1.5 We therefore have a state of affairs where there are well-understood and accepted actuarial principles on the relationship between assets and liabilities; actuaries are centrally involved in advising on the management and investment of pension funds; yet these principles appear hardly to be applied in practice, and the actuaries themselves, with some notable exceptions, have so far made little attempt to apply and to introduce them to the outside world. Even where actuaries have been involved in recent developments of asset allocation systems, the specifically actuarial element has usually been ignored. We want to change this state of affairs.

1.6 Our paper is addressed not just to our professional colleagues, but to the institutional investment community at large. We criticise several aspects of its current thinking, and we look to actuaries to lead the way in eliminating these misapprehensions, whilst establishing over the years to come a sounder, more robust conceptual framework.

1.7 We have deliberately not written a technical paper. We are concerned with the principles, and in particular we are concerned to have these principles debated, refined and accepted—and brought into day-to-day practice. We are not—here—concerned with the detailed techniques that actuaries will bring to bear to implement them. Different actuaries should and will approach the practical problems in different ways, with all the imagination and resourcefulness for which our profession is noted.

1.8 The context for this paper is the investment of pension funds, but many of the principles discussed have a broader applicability, particularly to life offices' with-profits funds.

2. THE MAIN GUIDING PRINCIPLE

2.1 The starting point for this paper was a paper presented by one of us (T. G. Arthur) to the International Association of Consulting Actuaries in Munich in June 1988. That paper was written in part for the benefit of actuaries working outside the U.K., many of whom have little or no contact with the asset side of asset/liability investigations. Virtually all U.K. actuaries working on pension

funds accept that it is not correct to view liabilities independently of assets and that assets as well as liabilities are in effect future cash flows and should be evaluated as such.

2.2 However, the paper went on to argue that a *relative change in the market values of major asset classes, to the extent they are differently matched or mismatched to the liabilities, should be reflected in the actuarial valuation of assets.* The argument was essentially an assertion, supported by an illustrative example, of the trouble which would result from ignoring it; the appropriate section of that paper is repeated in the Appendix.

2.3 The paper also argued that rates of return over short periods, calculated from market value to market value, have little relevance as indicators of long-term investment management skills. (To anticipate a detailed point, it is immaterial whether time-weighted or money-weighted returns are used.)

2.4 Actuaries familiar with these issues will already see a glimmer of something very radical in the previous two paragraphs; in effect and *in extremis* we are saying that changes in market values *matter in actuarial terms but do not matter in investment monitoring terms*—the converse of conventional wisdom.

2.5 We believe that the first sentence of § 2.2 is important and precise enough to carry a name, which we will call in this paper the Main Guiding Principle. Though perhaps novel in this form, the Main Guiding Principle merely reaffirms an earlier fundamental principle, namely that if you are mismatched and you get your forecasts wrong then you have to pay the penalty. However, current wisdom seems to have forgotten it.

2.6 The Principle is of wide application and it is developed in Sections 3 to 8. Sections 9 and 10 deal respectively with risk and with performance measurement, and Sections 11 to 14 with the broad principles of investing pension funds, in particular with the asset allocation process.

3. MATCHING BY DURATION

3.1 The Main Guiding Principle has wide application. It is developed by starting with a highly restricted set of circumstances and gradually removing the restrictions. The easiest place to start is in the once familiar area of duration-matching, applied to fixed monetary liabilities and assets.

3.2 First, let us remind ourselves of the justification for valuing assets by looking at the cash flows they produce, rather than at, say, book values or market values. Let us assume that a very simple pension scheme has only one liability, to pay £1,000 in precisely 20 years time, and that there exists an asset which can match it exactly, a couponless gilt of 20-years maturity. The scheme holds a sufficient quantity of this asset (and intends to continue to hold it to settle its liability) and there is no other source of funds to meet the liability (no other assets, no future contributions, etc.).

3.3 We can quickly dismiss all valuations which fail to produce equal values of assets and of liabilities. The normal approach would be to value the liability by

present value techniques and to use the same techniques including the same discount (interest) rate, to place the same value on the assets. However, the essential point is that equality of assets and liabilities arises because *their cash flows are identical.*

3.4 Thus this simple example justifies the valuation of assets by discounted cash flow (although other consistent methods could be chosen). We have no quarrel with such a method and indeed our general position is that we fully support a DCF (discounted cash flow) approach to asset valuation. However, this leaves the fundamental question to be answered of *which cash flow*, i.e. *which types of receipt*, of *what amounts* and *when.*

3.5 Moving on, let us now assume that the scheme's liability is no longer 20 years into the future; it is due next month. At present the scheme still holds the 20-year couponless gilt (in sufficient quantity); it realises that the asset must shortly be sold for cash, but it believes that interest rates will fall sharply in the next week or two and wants to profit from the resulting increase in the market value of the gilt. How many actuaries would now value the cash flow from the existing asset held to maturity? We assert 'few' and we hope 'none'! The asset *must* be sold, almost immediately, and its future cash flow is of no concern. Most actuaries would take, for their asset value, the *market value* of the gilt; if the same actuarial valuation is repeated a few days hence, and the market value of the gilt has changed, the change in market value will be fully reflected in the valuation result.

3.6 Implicitly these actuaries are switching the actual asset into a matched asset before evaluating it. This is the essence of the Main Guiding Principle.

3.7 Running ahead of ourselves a little, the same is done every day of the week by actuaries who value pension schemes when they notionally switch the actual assets, for valuation purposes, into a model portfolio of (say) 70% equities and 30% gilts, whatever the actual portfolio. In essence, and however the process is rationalised at the time, their position is that *ultimately* the cash flow of the liabilities will demand a corresponding cash flow from the assets, i.e. a switch to a matched position. To maintain consistency this is assumed to happen and, when it does, to take place on current market terms.

3.8 Returning to our simple example, let us now go on to assume that the liability is due in 10 years time rather than immediately or in 20 years time, and that the asset remains the 20-year couponless gilt. Again there is no choice but to sell the asset—the question is when, and the answer is at some time in the next 10 years.

3.9 We now have another dimension, however, in that we do not know the selling price unless the asset is sold now, and the trustees have told us they have no intention of selling it now. This means that we have a range of possibilities dictated by the future prices of our asset, and any good actuary would show such a range, preferably with some sort of sensitivity analysis. *Assuming this is done*, there is nothing wrong with using a DCF technique on the existing asset held to maturity even though it is recognised that sale before maturity remains certain. The range of possible market values at the liability payment date 10 years hence

represents reality, and the varying values of the maturity proceeds discounted to that date under varying rates of interest can serve, under the valuation model, as the proxies for this range.

3.10 If the only available assets are cash and the 20-year gilt, then this approach may be as good as any other. But, if a *matching asset* is available (now a *10-year* couponless gilt), then there is a better way. This is to switch notionally into the matched asset and to value the cash flow (maturity proceeds) from that asset.

Quality of Information

3.11 Why is this a better way? After all, the trustees have told us they will not sell the overlong asset (yet). Surely it is more realistic to proceed as before. We still need a range of results whatever we do.

3.12 The main reason for the superiority of the notional switch is that the matched asset provides some firm economic data about our range of results and about our sensitivity analysis which we would be foolish to ignore. In particular, we should expect that a superior valuation model results from our notional switch, because if we say that it does not then we are *implicitly taking an investment view that the market is wrong.*

3.13 The point is that if the market is right, the best model for the sale proceeds, 10 years hence, of the overlong gilt is precisely the maturity proceeds of the matched 10-year gilt brought by a switch of assets now. If we say this is not so, then we are saying that an investment opportunity exists in the current values of the two respective gilts, and we suggest that this is not our job *when constructing valuation models.*

3.14 This point is important; it is made again in different guises and on an independent and more generalised approach in the next two sections.

3.15 It follows that if the *relative* market values of the two assets should change, our recommended valuation technique will reflect this change in its asset valuation, via the notional switch.

4. MATCHING BY TYPE

4.1 Let us now take matching by type. In other words, let us assume, for example, that duration-matching is exact but that we now have a *Retail Price Index-linked* liability, with a *fixed* monetary asset presently held to meet it. It is no longer the case that this asset must necessarily be sold in advance, since it is already of the right duration and its maturity proceeds can pay some or all of our RPI-linked liability. The question is, how much?

4.2 To answer that, we need a valuation model with the usual gamut of assumptions about interest rates and RPI inflation, including an appropriate range with a sensitivity analysis and so on. Let us suppose that within this range of assumptions we are focusing on a particular valuation (i.e. the result of a particular set of assumptions) under which the result obtained by using a DCF

valuation approach applied to the *existing* asset is the same as the result obtained by instead switching on the valuation date into the fully matched index-linked gilt.

4.3 Suppose we are then asked to carry out another valuation a month later, after the price of the conventional gilt has fallen, i.e. interest rates have risen. If we did not have the benefit of our index-linked gilt yardstick we would have to decide whether the rise in interest rates was a rise in *real* rates, without a commensurate rise in anticipated inflation, or was instead a rise in *nominal* rates, with anticipated inflation rising correspondingly. If the former, then our benefit and asset cash flows are unaltered, and the valuation result is unchanged. If the latter, then our benefit cash flow is now larger and our result is a worsening of the position.

4.4 Again, we would be foolish to ignore the evidence provided by our fully matched index-linked gilt. If its price has fallen with the ordinary gilt, then the market is saying the change is in real and in nominal rates, but if it has not, then the change is pointing to higher inflation and to larger benefit outgo.

4.5 All this is automatically taken care of by the 'switch to a matched asset' technique. If we do not follow this approach, and thus in the second case we say that the relative market value change should not affect our result, then however we make our calculations we are saying that *the market is wrong*, and that the conventional gilt is standing cheap relative to the index-linked gilt. That is not an *actuarial* judgement.

5. GENERAL REASONING

5.1 The Main Guiding Principle states that if there is a rectifiable mismatch, a relative change in the market values of matched and mismatched assets should be reflected in the valuation result. A corollary is the principle of absolute matching, first discussed by Haynes & Kirton[2] and later, *inter alia*, by Wise[3]: if there is no mismatch, market value changes, absolute or relative, do not matter.

5.2 The general reasoning proof of both these statements is that mismatching involves risks which may produce either profit or loss.

5.3 To repeat, the Principle itself relies upon taking the view that there is no *actuarial* reason to suppose that any relative changes in market values that have taken place in the past, whether recent or otherwise, will be reversed in the future. In other words, future investment performances, henceforth from current (new) market values, will be equal for the relevant assets; or at least there is no reason to suppose that the ranking of future performances of the various assets will be in any specific order.

5.4 If the Principle is attacked, then it must be attacked by taking an *investment* view, i.e. by forecasting that one asset will perform better than another asset in future. Such a line is quite permissible as an *investment* view (though see §§ 9.10 and 9.11), but *not* as an *actuarial* one. After all, if it is a general truth, it is open to any fund to rearrange its assets accordingly via current market

values, including a fund which has just gained relative to an identical sister fund (say) due to the relative changes in market values which have just occurred.

5.5 As an example, if two otherwise identical pension funds moved apart in market value by 20% during October 1987 because one held more equities than the other, then this relative change must be assumed to remain. Otherwise, one is saying that equities will recover; if this is so the fund which has moved ahead can go into equities just as easily as the fund which has fallen behind. The point is illustrated by the dialogue in the Appendix.

5.6 If we are therefore to assume that the relative gains made will remain, then even an actuary will have to concede that something real has occurred—and hence reflect it in his calculations.

5.7 At first sight it may appear that if these arguments are accepted, the qualification about the assets and liabilities being mismatched can be dropped. If the recently achieved relative gains are to remain, then what has matching got to do with it? Why will these relative gains be eliminated if the assets and liabilities are matched?

5.8 The answer to this lies in the fact that if assets and liabilities are matched, then *market* values are indeed irrelevant, in the generally accepted actuarial tradition, and so therefore are the recent relative *market* gains. All future investment proceeds are unchanged *relative to the liabilities* and will continue to meet the appropriate slice of them; all is as before.

5.9 The point about mismatching is that at some stage the mismatching must be corrected and, in the absence of clairvoyance, we can only assume that the correction must take place on the *new* market terms rather than on the *old* ones. Thus the gap opened up will be retained.

6. NEW MONEY—THE GREAT RED HERRING

6.1 The remark is often made that matching is only relevant if cash flow problems are looming on the horizon; with regular buoyant cash flow we are alright.

6.2 We may indeed be 'alright' in the sense that future contributions, like existing surplus, can stave off disaster *temporarily*, but beyond that trivial position the remark mixes a number of misconceptions and myths. The first point is that the future cash flow surplus *must* be assumed to be temporary, or why are we funding at all, instead of operating some form of pay-as-you-go system? Put another way, if all matching requirements go out of the window so too do all asset requirements.

6.3 Second, in an environment where the need for funding is accepted, it must be right to distinguish accrued liabilities and the assets held to meet those liabilities, and to treat them independently of the future. This is the world in which we—correctly—now live and to which we have been in many cases too reluctant to commit ourselves.

6.4 In this world, the rebuttal of the future contribution cash flow point is that in a valuation of accrued assets and liabilities there is none!

6.5 Third, when the valuation is extended to bring in the future, it becomes obvious that the future contributions are not just free or surplus assets. They are accompanied by future liabilities, which must also be taken into appropriate account.

6.6 Moreover, to assert that an excess future cash flow invalidates the Main Guiding Principle is to misunderstand the Principle, which is concerned with stating a truth about actuarial valuation technique and not about investment.

6.7 However, our paper is also concerned with investment strategy and this is a good place to start making connections. From an investment viewpoint even if there is new money, it does not eliminate or even reduce the problem. New cash flow must be invested under the new structure of asset values, and not the old one. It will be appreciated from the previous section that we actuaries have no alternative but to assume that the new structure is permanent. Whatever we do with our new money, the change that has occurred will come through unless we are matched. If we use new money to pay the (mismatched) benefits, then the old money simply becomes new money worth less (or more) than it would have been without the change.

7. PARTIAL MATCHING

7.1 In previous sections we referred to situations in which matched assets are simply unavailable. In these circumstances the Main Guiding Principle is not directly applicable since it assumes the availability of matched assets, i.e. that the mismatch is rectifiable. Without a match, we are forced into greater guesswork about the meaning of the relative change in asset values.

7.2 However, it is not the case that the Principle becomes very restricted, because there are *degrees of matching*. It is nearly always the case that a *step towards* matching is available, and we assert that this will do almost as well.

7.3 A simple example will make not only this point but also another. Let us take a man aged 60 due to retire at age 65 with a flat non-commutable pension for 15 years precisely (no mortality consideration) of two thirds of final pay. Let us also assume that his future pay movements are in line with the RPI and that a complete series of couponless gilts, both conventional and index-linked, are available for all durations. Full matching is not possible, however, because we need an index-linked asset before retirement and a monetary asset after retirement; some rejigging of assets, on unknown terms, is inevitable.

7.4 If we make the reasonable assumption that unforeseeable price movements (due to changes in real or nominal interest rates) are likely to be of the same order of magnitude for both conventional gilts and index-linked gilts of the same duration, then it is possible to derive the most nearly matched combination of assets. By most nearly matched we mean the strongest degree of immunisation. It may be a surprise that the proportion of conventional as opposed to index-linked gilts in this most-matched position is about 53%. So much for 'active members should have real assets'.

7.5 Under this structure, a swing of 2% in real interest rates will mean relative uncovering of liabilities of only about 1%, with a similar effect for a swing of 2% in nominal interest rates.

7.6 If we now assume a mismatch, via a 100% holding of index-linked gilts, together with a 2% rise in real interest rates but no rise in nominal ones (i.e. a relative fall in the market value of index-linked gilts) then, as in Section 4, our shortage increases from 1% to 11%; the difference of 10% should be reflected in the actuarial valuation.

7.7 The crucial relevance of the Main Guiding Principle now becomes apparent.

8. APPROPRIATE MATCHES AND THEIR ACTUARIAL TREATMENT

8.1 This paper is *not* about how to select assets which most closely match the liabilities. (Other recent papers, particularly those of Wise and Wilkie[3]-[7], provide detailed theoretical treatments.) Large parts of these liabilities will often be linked to future pay increases where quite clearly no perfectly matching assets exist. Not only will there invariably be problems concerning investment income and limited maturity date possibilities, but the sheer impossibility of predicting matters like sales and acquisitions, leavers, transfers and so on dooms to failure any attempts to identify precise matches. More importantly, there is rarely any need to do so.

8.2 For the purposes of actuarial valuation, at least in the foreseeable future, we are concerned only with a small number of major asset classes and the mix of them which provides the best match.

8.3 For the purposes of investment strategy, we are usually concerned only with the yardstick asset allocation from which decisions are judged. *Since this yardstick is currently non-existent*, again we can be satisfied with making significant distinctions (say 10 or so percentage points) between one fund and another.

8.4 Our own work to date has largely concentrated upon only three asset classes—namely fixed interest stocks, index-linked stocks (both in the 'home' country) and 'other', this last being 'equity-type'. These classes are associated respectively with fixed interest liabilities, index-linked liabilities, and 'final pay' linked liabilities.

8.5 Leaving aside the thorny question of currencies, the association of 'final pay' with 'equity' depends on the assumptions:

(1) that both should have a 'real growth' component (which in principle could be positive or negative) relative to price inflation, i.e. that both are indeed differentiated from the corresponding index-linked classes, and
(2) that in the long run the two should be strongly correlated.

8.6 The first obvious extension is to split 'other' into 'home' and 'away' (overseas). Another, less obvious, is to classify equity-type investments according to their average duration (high income means shorter duration) so as to provide a means of satisfying various durations of pay-based liabilities.

8.7 Any proposed allocation can be tested fairly simply by varying the economic assumptions in the actuarial valuation process and applying the variation to both liabilities and assets. Matched assets will not change the residual, provided the valuation method used for the assets properly incorporates the duration-match (the type match is implied by the allocation). (Section 3 of Redington's classic paper[8] is pertinent to this.)

8.8 This is an aspect of another vital point. The assumptions used to value assets must be consistent with the assumptions on matching. Using inconsistent approaches and assumptions could lead to unmatched assets and liabilities nevertheless meeting the test in § 8.7. As another example, if equity dividends are assumed to be related to pay, then, if we change the pay increase assumption, we must change the equity dividend increase assumption as well.

8.9 This is perhaps a convenient place to raise a point with a strong presentational element, but a point that goes deeper. We actuaries are so used to working in our own units (£ Actuarial) that we convert the real world's units (£ Market Value) into ours instead of vice versa. There is, of course, no reason not to reverse the process.

8.10 Indeed, we would go further and say that if an actuarial valuation has been performed and has identified assets that match the liabilities, then the value of the liabilities can properly be expressed as the market value of those assets, and the excess market value of the actual assets represents the present surplus. (This is in all essentials the Matching Valuation of Section 6 of Wise[3].) It is in many ways desirable to do so: it is high time to draw the distinction between the cash flows of future benefit payments, which we can in general assume to be increasing from valuation to valuation, and their encapsulation in present values. "The values of your liabilities can go down as well as up."

9. RISK

9.1 Like performance measurement, which we tackle in the next section, the most commonly used proxy for investment risk depends upon a market value fixation. We refer, of course, to short-term price volatility, usually paraded as a negative feature, so that all other things being equal, short-term volatility is to be avoided. Why?

9.2 The concept of volatility implies a trend line about which the volatility occurs, and it also implies that the price is sometimes above that line (as well as sometimes below it). Why then is volatility relevant? The answer can only be that sales may be necessary on occasions when we are below the trend line, i.e. that we are adversely mismatched with hindsight. This is a fair point, because membership changes can never be accurately forecast. However, there is a mitigating factor in that we are talking about short-term volatility, and it would be an unusual situation if sales could not be held over until it is thought that prices have returned to trend.

9.3 This leads to another important point. The whole argument that short-

term volatility is an adverse feature depends on the ability to recognise that prices are below trend—if we do not know that, how do we know that forced sales to pay unexpected benefits are *bad*? By the same token, however, we must know when prices are above trend and therefore when we can profit by selling and buying back later! *In this sense of providing opportunities, volatility is good.* It is in this aspect, particularly, that we could expect investment management skills to be displayed.

9.4 In other words short-term volatility is bad only in conditions of enforced sales whilst it is good in all other conditions. Unless forced sales are the order of the day, the *net* effect of volatility should therefore be good.

9.5 In fact, current views on volatility are even less respectable than the above might suggest, because *volatility* is taken as the definition of *risk*. *Short-term* and *absolute* volatility, relative to a cash standard, can hardly ever be the right basis for this. This does not necessarily refute developments of Modern Portfolio Theory, but it certainly does run counter to the central tenet of the quotation at the start of the paper.

9.6 We are now ready to link actuarial work and investment work. Risk is a highly overworked and confusing word, but we think the most helpful meaning for pension fund investment strategy equates risk with possible variation between the actuarial values of assets and liabilities, i.e. equates risk with mismatching. *Note that this implies bringing into account not just volatility, but also returns, and that the account must be taken on a liability-related basis.* Whilst we may legitimately consider absolute returns, we must not do so without taking account of additions to risk through any mismatching that arises.

9.7 As a simplified example to illustrate this point, suppose Fund A has a fixed liability, due in 10 years time, that is initially exactly matched by £100-worth (at current market values) of a couponless conventional gilt. Fund B has an index-linked liability, also due in 10 years time, that is initially exactly matched by £100-worth of a couponless index-linked gilt. These matches are exact in both duration and type.

9.8 Suppose there is one other available investment, cash (which does not match either liability exactly), and that the following happen:

(1) The trustees of Fund A decide initially to invest in cash rather than the matching conventional gilt.
(2) The trustees of Fund B decide to invest in the matching index-linked gilt.
(3) In year 1 there is a fall in nominal 10-year interest rates but a rise in real interest rates resulting from a large drop in the corresponding inflation. As a result, the time-weighted returns on the 3 asset classes for the year are +10% for the conventional gilt, 0% for cash and −10% for the index-linked gilt.
(4) At the end of the year the trustees of Fund A decide to recognise their mistake, and switch from cash to the conventional gilt. However, their cash holding can buy only enough stock to cover 90·9% of the liability.

(5) The trustees of Fund B continue to hold their index-linked gilt, which continues to match their liability exactly.

9.9 The trustees of Fund A have achieved a *nominal* return 10 points higher than the trustees of Fund B. Yet they now only cover 90·9% of their liabilities, and 100% of Fund B's are met. The point is that Fund A's trustees ran a mismatching risk, and got caught. But unless this risk is quantified in this way they are in danger of congratulating themselves on having done better with their investments than Fund B's trustees!

9.10 Our definition means, and the example shows, that risk is in the eye of the beholder, or that risk is liability-driven and hence that high-risk for one fund may be low-risk for another. It also follows that all talk about direct relationships between *absolutes* of risk and reward is nonsense. We may assume that each investor demands higher rewards for taking greater risks, *but the converse is not true*: over any period, any particular investment will generally have *different risk characteristics* for two investors, but will have the *same actual reward* for both.

9.11 Thus we are led to the principle that *bigger risks do not imply bigger rewards*. It is *not* correct to say that "over the long run, equities are more risky and will therefore produce greater rewards". It may be that the investors influencing equity prices are those for whom equities are *low-risk* investments.

9.12 Indeed, it is well enough understood that the fact that the same investment may have entirely different risk characteristics for different investors provides one of the main opportunities for two parties to the same transaction (one seller and one buyer) *both* to gain.

9.13 As we say in § 9.10, we may retain the fundamental premise that greater risks will be taken only in the expectation of greater reward, but these trade-offs can only be judged on an individual and not a collective basis. What must happen now is that each pension fund must be able to tell what actually constitutes 'greater risks', given its own unique position. In other words, it must identify its matched position.

9.14 We cannot stress too strongly that 'identify' does not mean 'adopt'. Mismatching provides scope for losses or profits and the permissible or desirable extent of mismatching depends on a number of variables. What we are talking about is a means for scientific control of surplus or deficiency via investment strategy. A low-risk strategy will mean a narrow range of possibilities for surplus/deficiency, while a high-risk strategy will have a much wider range, the strategy being justified by the expected surplus being higher (or deficiency lower) than that under a low-risk strategy.

9.15 Indeed, whilst risk is about asset-liability divergence; there must generally be further analysis about how much this matters. We have stressed the dependence of a proper risk analysis on the liabilities, but these further considerations depend also on the level of surplus and on the funding flexibility applying.

10. PERFORMANCE MEASUREMENT AND MARKET VALUES

10.1 It will be clear from our earlier remarks that we have a great respect for market values in actuarial work. However, we do not share the almost universal adulation afforded to them in the assessment of investment skills via current performance measurement techniques. The example in the previous section shows that rates of return are inadequate without a liability-based interpretational framework, but we believe that there is also another problem.

10.2 We should first emphasize that our reservations concern one specific aspect of performance measurement. There may be several reasons for measuring past performance; the one we wish to discuss here is that which is aimed at identifying skills which imply *future* success. Furthermore, there are many indicators of such skills, a fact to which the prevalence of 'beauty parades' testifies. We are concerned only with the role of past performance measurement, which we believe to be overrated, at least while the present measures continue to be used.

10.3 These measures are almost exclusively time-weighted rates of return (TWRs), the dominant element of which is market value. In turn, the ending market value is usually dominated by the performance of stocks which are still in the portfolio as opposed to those which have been sold. *It is the role that market values of unsold stocks play in the measure used to assess skill, and thus future performance, which we would like to question,* by suggesting that we have seen only half the relevant qualities displayed.

10.4 For present purposes, we can largely put the question of income on one side and say that no asset can be used to pay benefits under the scheme until it has been sold: thus it is the ultimate sale which counts. The relevance of market value is limited to its use as an indicator of the value to be obtained on this ultimate realisation.

10.5 The question we have to answer is this. Does a higher upward movement in the market values of a fund manager's unsold stocks, relative to other managers, show an indicator of superior skill which can be expected to continue into the future?

10.6 If the unsold stocks have been held for a long time, then intuitively the answer is 'yes'. However, over a long time there are other measurable indicators for the manager's skills with the portfolio. In particular:

(1) The income received from all stocks in the portfolio will be significant and certainly in the case of equities the patterns of dividends and their growth will be excellent indicators in their own right.

(2) Much of the long-term performance will have come from investments which are no longer in the portfolio. An analysis of sold stocks would eventually tell us a lot of what we want to know. For example, if sold stocks had *during their period of tenure* outperformed the market, this would be a very positive indication of skilful investment management, and vice versa.

10.7 In the shorter term, information about dividends received or about stocks that have been sold may be less revealing, but the data about them are complete, whereas for unsold stocks the jury is still out.

10.8 Another idealised illustration may help. Let us assume a world without dividends and with a universe of investment managers, half with portfolios whose share values have risen and half with portfolios whose share values have fallen, all, we may assume, satisfied with their portfolios at the date in question. What is our justification for believing that those with portfolios whose share values have risen will outperform in future?

10.9 Both sets of managers believe in their holdings, both are saying in effect, that their holdings are undervalued at present. Why should we believe the one more than the other? Would *we* buy a portfolio that has risen? We would not buy it merely *because* it has risen, since buying shares that have risen rather than fallen is not a recipe for success. Therefore we would only buy it because we believed the manager. But why do we believe the manager?

10.10 The only reason for believing this manager in preference to another whose portfolio has fallen is that he has shown himself to be correct once before. To the extent that this is genuinely true, it must be a factor. However, this requires him to have said at the outset that the portfolio would rise (relatively) *during the period concerned.* Such a statement is rare, even if the period is as long as a year. Many investment managers argue that they believe the market will re-rate a stock. But few would claim to anticipate precisely the *timing* of such a re-rating. How much of current market value is an accident of timing?

10.11 We are happy to concede that there is some relevant information to be obtained from the market values of unsold stocks, but it is certainly what we would call 'soft' information rather than the 'hard' information produced by investment proceeds actually banked. Yet the combination of limited analysis and the short intervals (quarterly or annually) between performance reviews means that current performance measurement systems in their present state of development weight their results much more heavily by this soft information than by the hard.

10.12 This is an area where more research is badly needed and we have no simple panacea. But we suggest that more attention and emphasis should be given to:

(1) distinguishing between returns from sales and those from retained stocks; and
(2) investigating the pattern and relative performance of investment income as well as capital.

10.13 In order to produce sensible results, an approach on the lines above would require a relatively long review period (the same is true of current methods of performance measurement, and we also believe that shorter-term indications derived from these methods have no more validity than those available under our proposed approach). This would have the merit of reducing 'short-termist' pressures, to the benefit of both the managers and the funds being managed.

11. THE SPONSORING EMPLOYER

11.1 Before developing some thoughts on asset allocation strategy following from our view of risk, we need to look at the people who may be involved in such a strategy. Here we consider the interests of the sponsoring employer. We can say immediately that unless the employer is affected by investment strategy his interest is nil. Usually, however, the employer *will* be affected because he is the ultimate provider, at a cost influenced by the success or otherwise of the fund's investments.

11.2 There is room here for trustee/employer conflict in the risk/reward trade-off. For example the trustees, faced with a deficiency or negligible surplus on a discontinuance basis, may wish to pursue a low-risk strategy based on minimising the range of actuarial outcomes on that same discontinuance basis. The employer, for all sorts of perfectly valid reasons, may wish to pursue greater risks in the hope of greater reward and lower long-term contributions.

11.3 There are some interesting questions here concerning the ultimate beneficiaries of successful or unsuccessful investment, whether considered on a discontinuance or continuing basis—made more interesting by such matters as the recent OPB report[9] on pension expectations and windings-up, or an indemnity insurance system as operated in the United States of America under ERISA. However, these aspects lie outside the scope of this paper.

11.4 Two things are clear. The first is the previous point, that the employer will generally have a legitimate interest in the risk/reward trade-off around the matched position, and therefore that he should then be involved in the decisions concerning this trade-off. The second is that the degree of surplus/deficiency is a major influence on the risk/reward trade-off for the trustees, from which it follows that not only does investment policy influence long-term costs, but also the funding philosophy pursued must influence investment policy. A low funding philosophy must mean that the scope for a risky investment policy is less.

11.5 The employer will be interested in controlling short-term contributions as well as long-term ones, especially under a regime of constraints such as Inland Revenue surplus considerations, SSAP 24, etc. It may be argued that the control of the volatility of short-term contributions can be aided by a specific investment policy (e.g. low short-term price volatility should be pursued). Generally speaking we do not accept this argument; as with life offices' with-profits funds, there is more scope for control via actuarial techniques than via investment strategy, and such an approach is more appropriate.

11.6 Apart from making a contribution to risk/reward decisions, we believe it is a good working principle that the employer's other interests in investment policy should either be compatible with those of the trustees, or must be subordinated thereto. It must be remembered that the prime purpose of external funding is to provide security for accrued benefits should funding cease. Thus security must also be the prime purpose of risk-minimisation via investment strategy. It would not normally be permissible for an employer to introduce competing risk criteria that redefine the minimum risk position as something other than the matched position.

11.7 This is one reason for rejecting an extension of the employer's interest argument to the idea of treating pension fund assets as part of the company's overall assets and devising an all-embracing investment strategy covering the risk position of the combined assets. At the present stage of development and sophistication of thinking, another excellent reason is that this concept is likely to lead nowhere because it is too complex.

11.8 Indeed we see two big dangers to making worthwhile progress over the next few years. One is that the status quo will be maintained on the grounds that any improvement suggested can be criticised as imperfect. The other is that invalid methods of asset allocation will take hold—a point developed in following sections.

12. ASSET ALLOCATORS

12.1 We start by posing the question: would the title of this section be more apposite if it read 'Investment Management Versus Asset Allocation'? Our answer is that sadly, in current mainstream thinking, it would certainly be more accurate, although it should not be.

12.2 An asset class, like any investment within an asset class, must be viewed according to two features, namely its expected return and the variability of that return. As explained in Section 9 the variability feature is not short-term volatility; rather it is the range of effects upon the future actuarial position of the scheme, and depends on the particular liabilities of the scheme. More strictly, we should not view the expected and variability features in distinct compartments; rather there should be a probability distribution of 'actuarial effects'.

12.3 This means immediately that the actuary has a valid, indeed a necessary, role in asset allocation. At the very least, the actuary must produce the liability-related variability picture. The general approach is described more fully in Section 14, accompanied by most of the comments that we have to make on present asset allocation processes. However, we reserve for this section our views on the participation of investment managers.

12.4 For present purposes we can revert to the assessment of the 'expected' return, dependent on the assumed probability distribution of returns. The essential feature can be expressed in various ways, such as a central expected return (absolute or real) over a particular period, an 'excess' expected return over a standard assumption or over the expectation from other asset classes, or a 'percentage cheap or dear' figure. What concerns us here is "who makes the prime assessment?"

12.5 The possible and currently practical answers to this question are one or more of the following:

(1) the investment manager(s);
(2) the trustees/employer;
(3) the actuary;
(4) a specialist asset allocator.

12.6 Investment managers' skills are all about *evaluating* prices, relative to the projected cash flows which the prices represent and relative to each other. Hence a price is seen as correct, low, or too high relative to an alternative.

(As a brief digression, we must here include amongst the projected cash flows the possibility of a transaction—purchase or sale—at a price which *itself* is out of line. For example, it may be right to buy something overvalued if still greater overvaluation is envisaged later, although we ourselves are dubious of the success of a policy on these lines.)

12.7 Most investment management organisations in the U.K. offer a 'balanced fund' facility, meaning that they have the capability to invest in all the important asset classes (except possibly property), although this does not necessarily mean that they will always have a 'balanced' portfolio with all the major classes represented. Some investment management organisations specialise in some, even just one, but not all of these asset classes.

12.8 The specialist asset allocator envisaged in § 12.5 is not an investment manager either of the specialist or of the balanced variety.

12.9 In answering the question posed in § 12.4, our strong preference here is for a combination of the investment managers, the trustees/employer and the actuary, and in particular to include the investment managers. This goes against the current tide. Our case may be summed up in three principles:

(1) Investment management is indivisible at least in part;
(2) Practising investment managers are the people with the skills to assess the correctness or otherwise of any *existing* price level, which has a crucial bearing on the result;
(3) The extent to which departures are made from the matched or minimum-risk benchmark is a continuous spectrum from 0% to 100% and must encompass this price level assessment, as well as matters such as the extent of available surplus and trustee/employer views on the risk/reward trade-off.

Indivisibility

12.10 Taking firstly the indivisibility of investment management, one need only look at the prominence of 'bottom-up' systems to prove a (partial) point. A bottom-up manager approaches investment from the point of view of stock picking; asset allocation is a consequence rather than a cause. This approach would rarely be used across the whole investment spectrum—the sizes of the fixed interest, index-linked and direct property sectors almost certainly need to be determined via a top-down approach, and they need to be considered as separate asset classes for matching considerations. The best example of bottom-up versus top-down lies in the selection of global equities, where a top-down manager will first select his countries, then his sectors, then his stocks, while a bottom-up manager will select stocks independently of sector or country. The same goes for the choice between sectors of the U.K. equity market: although not

yet considered to be asset allocation (as opposed to stock selection) this activity could soon move into that camp.

12.11 Another example of indivisibility is thrown up in performance measurement techniques. If the U.K. equity index returns 7% and the gilt index 10%, but a particular manager achieves 12% in U.K. equities and 10% in gilts, then even though the indices show gilts outperforming equities, they have not outperformed *this* manager's equities. Given his stock selection skills, he was right to be in U.K. equities—is this an asset allocation matter or a stock selection matter?

12.12 A related point is that asset allocation decisions can affect stock selection performance. For example, a wholesale move out of Japan (say) for asset allocation reasons may well mean poor stock selection performance because the time-scale over which stocks were expected to perform has been truncated.

12.13 None of this is to argue against the view that a specialist manager can beat, *in his sector*, a balanced manager. This may well be likely. However, our point is that this view should be followed only to the extent that the gains of the specialist are assessed net of possible asset allocation losses. The view also presupposes that sectors or asset classes can be defined in a logical, unarguable, and mutually exclusive manner—a supposition that is partially untrue.

12.14 For most U.K. funds at present, given the structure of investment management houses, this gives a strong boost to the traditional 'balanced manager' system. We return to this point in the next section.

Assessment of Price

12.15 Our next point, concerning the skill of assessing price relativities, is linked to the remarks about volatility made earlier. Let us consider the price changes that occur for reasons essentially unconnected with the expected long-term cash flow from the asset (e.g. supply/demand, such as the present gilt buy-in programme). We may suppose that any change will not be immediately reversed, so that short-term volatility is not an issue.

12.16 In these circumstances it is irrefutable that there is an *inverse* relationship between past and future returns; the *higher* the current price the *higher* the past return and the *lower* the future return, and vice versa. In other words, extrapolation leads us completely in the wrong direction—yet it is via extrapolation that much mechanical asset allocation proceeds.

12.17 Such price changes occur all the time, and how can a person distant from the markets hope to assess these situations correctly? More generally, how can such a person hope to undertake successfully an activity such as asset allocation which relies so crucially on current market price levels? More generally still, what skills does such a person think an experienced investment manager has: just those of short-term stock selection?

Continuity

12.18 Turning to the third principle, on moving from a matched or minimum

risk position the spectrum of increasing risks and increasing rewards is a continuous one. The point at which one settles in this spectrum depends, *inter alia*, upon views as to the relative values of the respective asset classes. If it is generally felt that equities are relatively cheap, by 20% say, then the departure from minimum risk will clearly be greater than under a feeling that the relative cheapness is only 10%. Such a situation could easily occur, and on a 'strategic asset allocation' timescale as well as on a shorter timescale.

12.19 Moreover, such a view (equities 20% cheap) might impact upon the variability assumptions, with an asymmetric distribution applying: i.e. the downside variability is assumed to be less than the upside, and the bottom of the selling range is taken as little below the current, already 20% cheap, position.

12.20 It may well be asked: if the whole investment process is indivisible, with asset allocation mixed up with stock selection, how can the earlier sections of this paper, on matching, stand up? Surely one cannot assume distinct classes for the purposes of valuation by matching, and then largely ignore these distinctions in formulating the principles of the investment approach?

12.21 Our answer to this is that these distinctions are very real, but not to the point of creating a complete divorce in the investment treatment of the different classes. Similarly the matching process is itself indistinct. But the study of the whole topic is still in its infancy, and we expect progress in the actuarial study of matching to be made alongside progress in the study of investment management techniques.

13. INVESTMENT OBJECTIVES AND BRIEFS

13.1 No asset allocation system can proceed without a frame of reference. We must start at the beginning.

13.2 A necessary preliminary step is to identify and define the interested parties—always the trustees (on behalf of the members) and usually the employer as well. The employer would usually be represented by the financial director (at least) and the trustees possibly by a sub-committee. There are no other interested parties but clearly actuarial guidance is required, and a trusted investment expert with actuarial appreciation would be helpful if only on a one-off basis.

13.3 The first stage for this group, as always, is to define objectives. (At this point, we are, of course, concerned with the fund's overall objectives, and not with the briefs for individual investment managers.) In the common and loose phrase, the primary objective will be "to maximise the long-term return with an acceptable degree of risk", but closer definition is needed of 'acceptable degree of risk' as well as of 'long-term' and of 'return'. Indeed we would go further and suggest that without this exercise the objective as stated is almost meaningless.

13.4 A better expression would be "to maximise the asset/liability ratio without risking a fall of more than $x\%$ in this ratio over the next 5 years" (say). The $x\%$, of course, relates to losses caused by (avoidable) investment strategy and must have associated confidence limits of, say 95%. Nevertheless, we still need to decide which assets and liabilities are to apply.

13.5 As before, our view is that we must concern ourselves with existing assets and current liabilities. We take account of the regular accrual of new money and liabilities, but emphatically do not base the approach on a long-term, prospective view of liabilities and assets.

13.6 There are still questions of the precise liabilities to which we refer. These should accord with the funding philosophy (e.g. 'projected unit credit, strong actuarial basis'), but in any event there should be an underpin concerning the cover for winding-up liabilities or 'cessation of service' liabilities which could be set at a minimum of, say, 125%.

13.7 Future contribution rates do not directly affect the fulfilling of the main objective, but they do affect the underpin and if it is in any danger then investment strategy can be formed only with knowledge of funding intentions. We are confident that at least for the next decade or so, the overwhelming contribution from investment policy to the *constraints* in the main objective will result from the decisions about the allocation amongst the usual seven major sectors, namely U.K. and overseas fixed interest stocks, U.K. index-linked gilts, U.K. and overseas equities, (U.K.) cash and (U.K.) property. There will no doubt be developments and sub-divisions, but the essential features should remain for a long while.

13.8 Because of this, the way in which asset allocation decisions are to be taken needs to be settled at this stage. It must involve an actuarial model of the type described in the next section, and as mentioned in Section 12 our own firm view is that there must be a strong contribution from the investment management world.

13.9 We have already identified a leaning to the traditional 'balanced manager' system as resulting from our principles. Our view of the necessity of involving the day-to-day managers in the asset allocation process adds weight to this, and we favour a small number of managers (we suggest one or two) operating under identical briefs. To the extent that this approach does not perform at present, it is not due to a failure of the balanced manager system, but rather to a failure of the participants to establish the broader framework and to follow it whole-heartedly.

13.10 The next stage then is to settle the nature and numbers of investment managers, including questions like in-house versus external. Draft briefs are drawn up, and the particular investment managers are selected.

Investment Manager Briefs

13.11 The important question of briefs is usually neglected. The briefs will be drawn up from the decisions made for §§ 13.4, 13.6 and 13.8. It will now be clear that crude rate-of-return briefs do not feature heavily in our thinking.

13.12 Some frequently-set objectives for investment managers are useless through being effectively self-conflicting: for example, the triple objectives set by a large public company, *simultaneously* to:

(1) be in the top 40% of CAPS rankings;

(2) achieve at least a 5% real return; and
(3) achieve at least a 9% nominal return.

13.13 An investment manager can realistically adopt only one of these as an objective at a time—and will probably choose the first—and the other two then effectively become *constraints* that impede a strategy designed to meet that objective.

13.14 The above example also fails on a more important count. None of the conflicting objectives covers the question of risk. Paragraph 13.4, or its equivalent, is missing. Only with such a statement does it become possible to pursue proper asset allocation of the type discussed in the following section.

Monitoring

13.15 Having established the framework, the process becomes a matter of operating the system and monitoring it. Of course, the monitoring must be *relative to the agreed objectives and briefs.*

13.16 Such a monitoring process must clearly address all the objectives set, and all the proxies used for predicting the future. Again, much of present practice bypasses these fundamentals, and a thorough review is required, preferably based on some general principles that are deliberately kept simple at the start. We look forward to the paper!

14. ASSET ALLOCATION PRINCIPLES

14.1 By the time this paper is discussed we may be proved wrong, but we have yet to see a valid allocation system; most of them have gone wrong before they reach this point in that their risk definition is incorrect. An asset allocation system which depends in any way on the idea that cash is necessarily and always less 'risky' than gilts or index-linked gilts or equities can be safely rejected. This is fortunate for us actuaries, since it means that much recent work, in which we were not heavily involved, will soon be put on one side for the purpose with which we are concerned, which we repeat is *investing to meet liabilities.* It rules out, for example, any form of the Sharpe Optimiser or its derivatives that takes little or no account of the nature of liabilities and give the same answer for all funds.

14.2 Before we make some further dismissals, it is necessary to grasp a particular nettle in the form of the Haynes & Kirton corollary given in § 5.1: "if there is no mismatch, market value changes, absolute or relative, do not matter".

14.3 As the aftermath of October 1987 demonstrated, much of mainstream actuarial thinking drops the qualification 'if there is no mismatch' and should therefore have no difficulty with this weaker version. We can all therefore agree that, to a greater or lesser extent, *some* of the relative changes in the market values of asset classes, even over a period of a year (say) as well as a month, *do not matter.*

14.4 Now, an actuarial review is nothing if it does not provide a current

appraisal of the true financial position of a scheme. We are therefore saying that certain relative changes in market values have contributed nothing to the financial conditions of the scheme. Why, then, has investment management done so well or so badly by producing these changes?

14.5 The answer is that it has not. We simply cannot argue on the one hand that a market value gain is irrelevant but on the other hand that it is nevertheless 'good'. Here, then, is another crucial maxim as presaged in § 13.4: *good investment management improves the asset/liability ratio.*

14.6 Armed with these points and the ammunition of the earlier sections, we can return to the asset allocation fray and dismiss a lot more that presently enjoys too much respectability. In our opinion the correct view is that the features of asset classes used to make the allocation (likely growth in value, volatility, etc.) *are only valid features if they can and will be recognised in an actuarial review.* Thus 'good potential for growth in value' is relevant only if any growth achieved serves to improve the actuarially assessed asset/liability ratio. In other words, there must be full coordination between investment features and their actuarial recognition.

14.7 Of course not all the current lack of coordination comes from fallacious *investment* views. Some comes from fallacious actuarial treatment. As a simple example, there is little point in (a) giving up an investment yield of 10% p.a. on gilts for an anticipated 12% p.a. on equities (made up of 5% p.a. current yield and 7% p.a. dividend growth) yet (b) valuing equity assets on the assumption of 3% p.a. dividend growth.

14.8 Nevertheless, many of the fallacies lie on the investment side. In particular the use of volatility as a substitute for risk when the real risk is of an adverse movement in the asset/liability ratio, and the use of market value projections for assets which may later be evaluated without direct recourse to those market values, are both likely to have perverse effects.

14.9 How then should we proceed? This is an enormous topic in which we expect to see major developments take place over the next decade. We content ourselves here by closing the paper with some suggested guidelines for the basic assessments of the relative worth of each major asset class and the ways in which such assessments can be woven into an overall investment management system. We do not attempt to cover the myriad of possible decision-making structures nor the extent to which generalists, specialists, or any other types of investment management organisation are used. Our only comment on decision-making structures is to repeat that investment management skills should be present in asset allocation as well as in stock selection.

14.10 Any assessment of the relative worth of each major asset class must cover anticipated rewards and risks and the desired trade-off between them. There is nothing new in this concept. However, two points concerning risk are important.

14.11 The first is that while variability of reward is the essential ingredient, it will be clear by now that we mean variability of the cash flows (investment

proceeds) rather than variability of market value. Only in this way can the correlation of assets and liabilities be properly dealt with. Market values and their volatility should not feature, except to the extent that they represent part of the anticipated cash flows necessary to finance the liabilities.

14.12 Thus variability is expressed *relative to the liability cash flows.* Conventional gilts matching fixed liabilities have *no relative variability*, but covering non-fixed liabilities they do have such variability. Similarly, the (relative) variability of equities is found by examining the range of likely cash flows from dividends and from earnings-related liabilities. To the extent that a change in dividend cash flow is associated with a like change in liability cash flow (for example, both upwards due to productivity gains) there is *no relative variability.*

14.13 The second point concerns the assessment of risk, and is that it is not independent of anticipated reward. In theory, the expected return from a particular asset class and its variability may be such that, within the confidence limits chosen, the distribution of possible returns shows even the worst outcome to be better than the expectations from alternative investments.

14.14 This point forces us to return to the question of a yardstick asset allocation, since it implies that in extreme cases pure investment criteria could lead us to certain conclusions virtually irrespective of the liabilities. Indeed, something of the sort is commonplace now—though usually less explicitly recognised, and unaccompanied by thorough analysis—as a justification for high levels of equity holdings in many very mature pension funds. However, the analysis underlying the illustration in § 14.13 can still only be done on a liability-related basis for there to be confidence in its conclusions, and the real world rarely provides such a clear-cut example in practice.

14.15 We therefore continue to believe that it is essential to have some sort of *liability-related* yardstick. This not only provides focus and gives a measurement tool; it also enables an investment view to be expressed in one way yet to cover many funds. "You should be 5% overweight in U.K. equities at present" is a single statement which can cover different liability profiles provided each scheme has its own, different, yardstick portfolio.

14.16 The question then arises as to whether this yardstick should be the actuarially matched or minimum risk portfolio discussed in Section 8 or something different. This depends largely on whether or not some long-term bias is desired in favour of a particular class on 'expected return' arguments. For example, the view is often expressed "on average, equities will outperform gilts. They usually have done and the nature of capitalism and risk is such that they will usually continue to do so." This is a long-term view which deserves consideration alongside the actuarial one and it should be incorporated into the yardstick portfolio, thus introducing an equity bias. The extent of this equity bias will depend on the extent of expected outperformance. It will also depend on something else now, namely the risk tolerance of the scheme, which becomes relevant as soon as differential returns between the asset classes are assumed.

14.17 We now have another problem, however, concerning the importance of existing price levels, raised in §§ 12.15–12.17. The idea that equities will outperform must depend on the price at which they are bought—there will always be a price level above which *under* performance will occur. The long-term view about equities quoted above is really saying that "on average, equity prices will be such that they will outperform". But this view still permits the possibility that *current* prices are too high and if the weight of current assets (versus anticipated future contributions) is itself high, which nowadays it often is, then *current* price levels are overwhelmingly important and the 'long-term view' is worth little. So how is this to be built into the yardstick portfolio? Indeed how many yardstick portfolios are we going to end up with?

14.18 Our own inclination is to have only one yardstick portfolio, the actuarially matched one which would be used if no differential investment returns were anticipated. The major drawback of such an approach is that it will contain much smaller equity proportions than those with which we have become familiar in recent years. If it is genuinely thought that equities will outperform, this will set an undemanding target and tend to result in actual equity proportions which are near the yardstick and hence too low.

14.19 However, these drawbacks can be overcome by a proper brief, sensible target setting (outperform yardstick by 5% p.a.) with liability-related risk constraints, and a good relationship between trustees and managers.

14.20 The constraints are determined by risk tolerance, and an essential aid lies in the use of permissible bands around the yardstick. Unless very high yield differentials are assumed, or risk tolerance is enormous, there will always be some asset mixes which are out of bounds. The actual policy pursued from time to time should thus be expressed as permitted ranges around the yardstick. There is no reason why these ranges, and the targets set, should not be skewed so as to take into account long-term views about risk and rewards. This point reinforces our view about having one yardstick and enables targets to be set with flexibility; for example the target returns could relate to an asset distribution at the border of one of these ranges rather than in the middle.

14.21 It remains for us to close with two points on the assessment of the relative returns from asset classes, to be used in the formulation of the bands and in the actual investment policy itself. The first point, illustrated in § 14.19, is that the expected returns should be expressed relative to those underlying the yardstick, as a basis for good communications between all parties. The second is that it may help to work not in the form of rates of return but in the form of percentages of 'cheapness' or 'dearness', again relative to the yardstick. This also may lead to clearer communications and fewer misunderstandings, given that investment manager skills are essential to the process. It could also help in another way, in that anticipated rates of return are not very meaningful unless combined with a duration over which they are expected to be achieved, whereas '10% cheap' partly sidesteps such difficulties. Nevertheless the point in § 10.10 applies, and we need to know at the outset over what period this undervaluation will be recognised.

15. ACKNOWLEDGEMENTS AND CONCLUSION

15.1 This is a paper of views, which necessarily are ultimately our own. In arriving at them, we will have consciously and unconsciously drawn heavily from the well of actuarial lore, and from many years of conversations with colleagues, clients, investment managers and others. We are indebted to all those concerned, and thank them all, but are unable to identify them individually.

15.2 Our views are about general principles of co-ordinating actuarial work and investment work, with specific but not exclusive reference to pension funds. As we hinted in the introduction, there are many detailed ways in which these general principles can be implemented. We have our own ideas, and we look forward to the discussion to hear others'.

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APPENDIX

AN ACTUARIAL PUZZLE

There are two U.K. pension funds, A and B, which at 30 September 1987 are identical in every respect save one. This is that while A is invested in the ratio 9:1 in equities and bonds, B's ratio is 5:5 (both ratios are based on market values). Actuarial valuations covering accrued service (on full projected pay) and existing assets have just yielded identical results, including a healthy surplus of 5% of assets.

During the next three months, equities fall in value by 30% (gilts rise by 5%) and the trustees hurriedly call for new valuations.

Again the valuations show identical results. (The actuary had some problems deciding what the results should be but eventually left the 5% surpluses intact.)

The actuary concerned then dons his performance measurement hat and discovers that fund A's quarterly return was −25% while B managed to achieve −11%, some 14 percentage points better than A.

One gentleman happens to be a trustee of both funds. A meeting is arranged for the trustees and the actuary and the following conversation ensues between the common trustee and the actuary:

T: How is it that the actuarial positions remain identical when B has outperformed A by 14 percentage points?
A: I do not use market values for valuations. They are . . .
T: You did in 1984.
A: Yes, but I do not now. They are too fickle. What really matters is income earning power and this is unchanged.
T: I suppose so. And you are quite happy that both schemes still have a small surplus?
A: Yes.
T: Well that is something. Let us turn to investment performance. Manager A seems to have been pretty dreadful.
A: You should not read anything into a single quarter's results.
T: No but he is in the bottom quartile over 5 years. I think we should sack him and move to manager B.
A: That would be silly. That is all down to the last quarter. Manager B has usually been down there as well—in fact slightly below A for most of the time, until these last few months.
T: Oh. They are both poor then. I have never felt comfortable with either of them. I have been talking to another investment manager who has an excellent record over many years. I think we should sack both managers, cash the investments, and give the money to him.

A: I cannot quarrel with that.
T: That is that then. Now you are sure that we are still O.K. actuarially speaking are you not?
A: You did say cash the assets and pass them over didn't you?
T: Yes.
A: And naturally you would expect the performances of both funds to be identical henceforth?
T: Of course.
A: Well Fund B will start off with 19% more money than Fund A and will retain its lead. I really think in these circumstances I will have to use the value of the cash as my asset value. In which case Fund A has a big deficiency.
T: Does that mean that the company will have to inject some funds?
A: Well it ought to really.
T: I do not think that is on.
A: Well, you do not have to transfer cash. That is expensive anyway. Just transfer the assets and everything will be O.K.
T: But surely that is just playing games. The manager will still provide the same performance from now on. He will get out of the cash or the transferred assets, whichever he gets, and into his normal position pretty quickly anyway.
A: I suppose you are right. Well you had better leave well alone with Fund A. Just appoint the new manager for Fund B.
T: But then we are sacking the best one and keeping the worst one.
A: Yes, I suppose you are. But really this performance measurement stuff is a bit suspect.
T: What do you mean? You recommended it.
A: I know.
T: Perhaps we should not change *anything* at present.
A: I am sure you are right.
T: Good, that is that then. I am thirsty.

ABSTRACT OF THE DISCUSSION

Dr P. N. M. Sisson (opening the discussion)**:** I agree with the authors that the three topics that they deal with in relation to U.K. pension schemes: the actuarial valuation, the investment management, and the measurement of investment performance, are nothing more than three aspects of a single topic, but I take slight issue with them in their belief that actuaries do not already appreciate the inter-relationship.

I am not convinced that the authors' Main Guiding Principle justifies the dignity implied by capital letters. The paper draws a distinction between an investment view and an actuarial view and claims that, when placing a value on the assets for valuation purposes, the actuary must not involve himself with the former. At times it is convenient and useful to draw this distinction, but, in general, I do not believe it is sensible to do so. The paper would have the actuary ignore the assets actually held by the scheme and the views of the investment managers which have led to the current portfolio, and to switch these notionally into assets which, in some sense, match the liabilities, and to value these notional assets.

We are all familiar with the technique of valuing a notional portfolio, most commonly comprising entirely, or predominantly, U.K. equities. The pros and cons of this technique are well known, as is the fact that the valuation, itself, has no effect on the long-term cost of financing the scheme; it affects only the incidence of contributions, that is cash flow.

In these days of best estimates under U.K. and U.S. accounting standards and the narrowing of the gap between minimum and maximum funding levels, the valuation ought increasingly to reflect the realities of life. Included in this would be a recognition of the investments expected to be held by the trustees in the future and the assumed returns thereon. To introduce a notional investment for an exercise which itself has no direct influence on costs might be thought doubly aloof on the part of the actuary.

The notional portfolio recommended in the paper is one which matches the liabilities. In the early examples it is hypothesised that assets exist which match the liability cash flows absolutely, £ for £. As illustrated in § 7.3, the complexity does not need to be very great for an absolute match not to exist, even if the liabilities are fixed or linked to the retail price index. Once the absolute match disappears, the authors seem to become more vague, with phrases like "By most nearly matched we mean the strongest degree of immunisation". Greater precision was needed at this point, even in a non-technical paper. In his 1984 papers (*J.I.A.* **111,** 375 and 445), Wise set out in some depth what he meant by the matching of assets to liabilities; namely, the minimisation of the variance of the possible outcomes at successive valuations. Absolute matching is simply a limiting case of this, in which the variance of the possible outcomes is zero. The 53% solution has no doubt been determined against some optimisation constraint, but I wish the authors could have let us into the secret.

I question the dismissal given to new money in Section 6. A comparison of accumulated assets with the value of past-service liabilities has increasingly become an accepted norm for valuation purposes, and this may be appropriate for funding. In most circumstances we can, however, assume that the scheme will continue after the valuation date, accruing more liabilities and receiving further contributions. The authors draw attention to one of the techniques adopted by some investment managers, namely to match the assets and liabilities by duration, and the past-service liabilities are used for this purpose. This is a rare activity, because external managers providing a supermarket service have not sought, nor been offered, information about each fund's liability profile. If allowance is made for future-service liabilities and contributions, in most cases this would lead to a different pattern of the emergent cash flows, a different term and presumably a different asset allocation. Future-service liabilities and contributions may be ignored for valuation purposes, because they have the same capital values, but, just as they would not be ignored in making a cash flow projection of income and outgo, I believe they should not be ignored for investment strategy.

For duration matching purposes, the emergent cash flows are split into those resulting from past service and those yet to arise for future service. A similar arbitrary split of the total liabilities occurs under the technique of matching by type. For example, if conventional fixed-interest stocks are

deemed a type match for liabilities which are non-escalating pensions, and equities a type match for in-service members, then I have seen it claimed that a scheme with a membership profile for which 50% of the total value of the past-service liabilities relates to pensioners and the other 50% to in-service members, should have assets split 50/50 in gilts and equities. Some of these simplistic ideas, which have almost gained acceptance, should be re-examined.

It is not so unusual, as the authors seem to say at the end of Section 8, for valuation results to be expressed in £ Market Value rather than £ Actuarial. I am not talking about putting the assets in the valuation balance sheet at market value, having discounted the liability cash flows at a long-term rate of interest, which somehow remains the same irrespective of market conditions, nor about re-expressing the assessed values of assets and liabilities in terms of market values simply for presentational purposes. The way this is often done, by scaling, ignores the question of whether the assets are matched by term to the liabilities. Instead, I am talking about identifying the market value of the assets which would be required, by reference to market conditions ruling at the valuation date, to finance the past-service liabilities accrued at the valuation date. This method involves a consideration of the market value returns expected on different asset classes over the period the assets are expected to be held, to meet the past-service liabilities. This method requires the actuary to take an investment view, and usually this leads to different implied rates of return on the different asset classes. Moreover, except by coincidence, the market rate of return used to discount past-service liabilities will be different from the rate of return adopted to determine the contribution rate required for future service. The fact that different rates of return are used to value past-service and future-service liabilities is akin to an initial yield being different from a reinvestment yield, a concept readily accepted to calculate cash equivalents.

In my experience, discussions with the client on the assumptions underlying the valuation sometimes involve the investment managers as well. These discussions often show that the managers take a more optimistic view of future investment conditions than actuaries do—maybe the current rash of surpluses in pension schemes is, in part, a consequence of over-cautious bases in the past, and we should have listened more closely to the managers.

Risk is a word which means different things to different people, and care needs to be exercised when it is used. In a general sense, risk is simply associated with not achieving a desired outcome. For an investment manager, this could be the failure of the fund's return to beat the median in a league table (which may result in loss of tenure) or, at the individual stock level, the failure to capture the return expected because of a fall in the market price. The example in § 9.7 demonstrates well how the trustees' risk of not meeting the liabilities varies from scheme to scheme, according to the liabilities themselves. What is risky for the trustees of Fund A is not for the trustees of Fund B and vice versa.

Section 11 identifies risk for the sponsoring employer in terms of contribution fluctuations. It is useful to identify risk for the employer as something different from risk for the trustees. So long as there is willingness of the sponsor to continue contributing, the two parties can be separated in this way, but the employer usually has the option of winding up the scheme and, because of this, the risks for the employer can have a knock-on effect to the trustees and the members. The different objectives for the various parties—the employer, the trustees and the investment manager—can lead to conflicting investment strategies. Even in an idealised world, where each party has a clear vision of his own objectives and risk-tolerance, the problems are considerable. In practice, I find that employers are unwilling, or unable, to identify how risk-averse they are, and there is sometimes indecision about whether it is the trustees or the employer who should take the initiative on investment strategy for the pension fund.

Considering performance measurement, in Section 10 a case is put that, somehow, the effect of realised gains should be separated from the effect of unrealised gains. Inevitably, the shorter the period under review, the more the traditional calculation of the rate of return will be dominated by unrealised gains. Statistics from CAPS indicate that activity in the U.K. equity market has been around 25%, that is an individual stock is held on average for 4 years. Over a 4-year cycle, therefore, the distinction between realised and unrealised gains is lost. The distinction is not valid and requires a modification to traditional performance measurement calculations. Managers are continually faced with the decision whether to sell or buy, or indeed, whether to hold the current volume of stock. The

decision to hold is as important as the decision to buy or sell, and I believe it is correct that performance measurement recognises this.

What would be the practical effect on investment management if performance measurement gave greater weight to realised gains? The managers might be tempted to sell at the year end those stocks which had appreciated more than the average, and not sell those which had not. This would introduce an ability for managers to manipulate their performance in the short term, which for them is, perhaps, of more importance than the long term, and the investment process would be distorted.

The traditional performance measurement calculations do not distinguish between unrealised and realised gains, on the grounds that the former could be converted into the latter at essentially the same market value. The authors seem unhappy about recognising a notional switch for performance measurement purposes, yet the early part of the paper advocated a notional switch of assets for valuation purposes. There is need for changes to performance measurement techniques, but not one which distinguishes between realised and unrealised gains.

The later sections of the paper discuss investment manager briefs in terms of liability-related and thus, in principle, scheme-dependent benchmarks. It may be expected that, if this were to become generally accepted, then league table peer group comparisons would disappear. I believe this would be welcomed by managers, since it would remove the need for them to second-guess what the other managers are doing all the time. They can get on with their job of trying to outperform a benchmark which does not depend on anyone else, except possibly as regards stock selection within the various markets. In this environment, investment managers will perhaps distinguish themselves from one another by the extent to which they are prepared to deviate from the benchmark in the attempt to add value. We may find that the asset distributions typical today will still be typical in the new world, but I would like to believe that such a distribution would be justified on other grounds than simply following the pack.

The work of Wise shows that the asset allocation benchmark for a particular scheme is not unique. The spectrum of portfolios depends on the degree of variation which is to be tolerated in the outcomes at future valuations. The benchmark which emerges depends also on the assumptions for the future behaviour of the asset classes which are input to the calculations in the first place. Although to a lesser extent, the distribution of the minimum risk portfolio, the one which is expected to give rise to the smallest variation in future valuation results, also depends on the assumptions input. The authors would have us use a notional portfolio for valuations and not to take an investment view; yet the construction of the notional portfolio itself is dependent on taking investment views about different asset classes.

The demise of the league table would occur only if there were a sudden and wholesale change of attitude and practice. A gradual shift would leave the medians and quartiles on view for all to see, and despite consultants telling trustees that league table statistics have little meaning for their fund, once the scheme-dependent benchmark has been chosen, human nature will take over. How will trustees react when even an outperformance against the benchmark leaves the fund in the nether regions of the league table? The patience of the trustees might wear a bit thin if this state of affairs continued for 3 to 5 years.

The major problem in moving to a new style of investment management is to overcome inertia. To implement the changes, the trustees and/or the employers need to have confidence in what they are doing, especially when traditional measures of short-term performance appear poor. We need also to convince the investment managers, because they have to be involved. At the very least, the managers should be consulted about the assumptions which underlie the calculations leading to the benchmark, because the answers are very sensitive to the assumptions. At this stage there is much discussion between the interested parties and, more informally, between actuaries and investment managers, but we must be careful that, as actuaries, we do not overstep the mark. There should be co-operation, not confrontation. After all, the money belongs neither to the actuary nor to the manager.

Mr K. E. Ayers: I endorse the use of market values, especially where the purpose of valuation is related to the choice of an appropriate asset allocation, since this must take account of relationships between returns currently expected from each asset class, which are clearly market-level related, and

also the need to involve the nature and timing of liabilities in forming asset allocation policy. If this is done, the co-ordination alluded to at the end of § 14.6 will be achieved. The example in § 7.4 is heavily biased: the proportion in conventional fixed interest would be lower if a more realistic age, or age distribution, were used.

In Section 9 the question of whether short-term volatility should be avoided is considered. It is unacceptable underperformance that needs to be avoided. Justification for the use of volatility as a measure of risk is based, in the real world, on the trustees' or employer's habitual concern over the value of the fund, and degree of apparent solvency, over a shorter period than that which is appropriate to investment objectives. Looking at it slightly differently, risk can be defined as the chance of failing to meet a defined minimum acceptable objective, which should be liability based. We are only concerned with achieving a result in excess of the required return (or ratio of assets to liabilities) minus one standard deviation, not with being outside the range of required return, plus or minus one standard deviation. This is close to one of the points made in § 14.8, and which is alluded to again at the end of § 14.16, where it is stated that asset allocation should be influenced by the scheme's risk tolerance. As is implied in § 9.4, upward volatility is a good thing! As long as we are involving liabilities in the consideration, the additional risk of mismatch is taken into account.

Why is the specialist asset allocator rejected solely because he is not an investment manager? I contend that the involvement of the investment manager in the asset allocation process may be inappropriate, because of his concentration on the short-term aspects of stock evaluation and, in particular, I would not give him free rein to vary the asset allocation according to his own views of the attractiveness of various markets, often regardless of liabilities. This is what is normally implied by balanced management, and often the neutral position is regarded as being the average asset allocation of all pension funds. To act in this way makes the whole concept of identifying what is the appropriate strategic asset allocation almost meaningless. The specialist asset allocator is in a position to adopt a broader view, to take full account of the liabilities in conjunction with the actuary and not to be influenced by so-called short-term opportunities. The investment manager is uniquely placed to use his skills by way of tactical departures from the strategic allocation.

Paragraphs 12.10–12.14 imply that there is no case for strategic asset allocation policy, and that the techniques of asset allocation are only of use in identifying a benchmark portfolio against which managers may be judged, and this in a situation in which the investment manager has himself been involved in the setting of the benchmark. There can be no control of risk if this is the case. It is necessary to involve in the process someone who is aware of market conditions, as is implied in §§ 12.15–12.17. The asset allocator should be just such a person.

If more than one balanced manager is involved in the asset allocation, this invites the complication of adjudicating between various views. How can the trustees control asset allocation of balanced managers, or, even more so, of multiple balanced managers? The authors' suggestion of giving multiple balanced managers identical briefs is counter-productive. For example, different views will inevitably, from time to time, produce a situation when one manager is selling and another is buying the same stock, and this can only add to costs.

I agree that an asset allocation strategy, which depends on the idea that cash is less risky than gilts, which are less risky than index-linked, which are less risky than equities or property, is useless for pension funds as currently developed, but I do not agree that this rules out the use of a Sharpe optimiser, or any of its derivatives, on the grounds that they take little or no account of the nature of liabilities and give the same answer for all funds.

In Section 14, the authors seem to confuse yardsticks with objectives. The method described is appropriate for measuring the progress of a fund against its liabilities, but it is not appropriate for identifying objectives for managers, for whom yardsticks should be the strongest indicator of investment objectives that can be provided by the trustees.

Mr N. D. Freethy: This is probably the first paper to this Institute which argues that the actuary *per se* should have a principal, not a secondary or merely advisory, role in pension fund investment. It is probably no coincidence that the growth in market values, particularly for pension funds, over the last decade, has shifted the emphasis from technical matters, like actuarial valuations and

contribution rates, towards controlling the investment return on the much greater pool of assets now under management.

Success achieved in maximising the return on a relatively mature fund has, at least for the time being, reduced the importance of the contribution rate (or the lack of it). With approaching maturity, matching takes over from yield maximisation. A valid point made in the paper is the consideration by the actuary of assets and liabilities as an indissoluble whole, and only actuarial discipline incorporates the technical training linking the two. Arguably, therefore, the actuary is uniquely qualified to pronounce on investment strategy for long-term funds.

In practice it does not always work out like this. An example of confusion is met by those actuaries who sit regularly on pension fund investment panels. Quite often they are listened to politely enough, but at the end their advice is largely secondary, the prevailing principle so often being that the most productive type of investment management is when the investment manager is given complete discretion. This is fudging the issue. The investment manager could take responsibility for one aspect, like share picking, and the actuary for another, like sector allocation. It certainly ignores the fact that the investment manager may not be best qualified to decide on which sectors the funds should be in and that he is completely unqualified to ensure that these accurately take account of the fund's technical liabilities.

There are two main ways for the actuary to contribute to pension fund investment. One, the aspect of matching, more important as the pension fund matures, has always been with us. The other results from the actuary's specialised training, which enables him to use his techniques as an aid to evaluating whether the current price of an investment is relatively good or bad value. He will usually approach this quite differently than a non-actuary investment manager, one who, nevertheless, may have considerable experience of long-term pension fund investment. Sometimes this concept of value may be allied to matching. It might be argued, for example, that index-linked stocks at a 3·5% p.a. real yield, apart from matching particular situations precisely, also offer relatively good long-term value.

For most situations there is no matching investment. This applies particularly when a fund is still immature. Forty years ago equities were considered a risky investment, with their 'reverse yield ratio' (as we would now calculate it) less than unity. Now this ratio fluctuates between two and three, and equities, their streams of increasing dividends recognised and depended upon, have gained wide recognition as the best match for 'real liabilities'. But who is to guarantee that dividends are to go on increasing for ever? Even if they do, if the supply of equity investments does not equal demand, prices become too dear and provide, at best, an expensive near-match.

This lack of perfect matching highlights the very valuable concept of spread, particularly for a fund which, foreseeably, will grow for at least another decade, the point being that it does not need to realise investments over that period unless it chooses to do so. Suppose—perhaps with the use of actuarial techniques—that a particular asset class is identified as relatively cheap. The fund can concentrate, certainly with new money, on that asset class. Next year, perhaps, a different asset class may be so identified and new money, or possibly more than new money, may be targeted on that. This strategy does not preclude selling along the way an asset bought cheaply when it has become identifiably dear. Neither does it matter if the fund becomes somewhat unbalanced during its growth period, provided progressively more attention to 'pure' matching, if ever possible, is paid as maturity approaches. By the time this happens, however, the fund should hold a spread of assets, all with partial matching characteristics, but bought at prices relatively cheap to the market. One side element of this approach is that its quality is unlikely to be correctly judged by the blind use of quarterly performance statistics in the way correctly criticised by the authors. We need to interpret them quite differently. Such a method also trades on volatility to cash in more on market fluctuations and supports the authors' implied contention that volatility, far from being risky, offers the prospect of greater safety for long-term pension funds.

Considering the growing use of 'index funds', the implication is that somehow the market's view is correct. For proof that this is not necessarily the case, we need only refer to October 1987. However, the proponents of index funds would argue that they enable you to concentrate on varying the proportions in market sectors, for example, winding down the proportion of U.K. equities if that market becomes technically more expensive. How many investment managers did that in 1987? This

is further evidence, if needed, for greater objectivity to be brought to bear by a profession outside the investment management industry. Even if a manager had judged sector allocation more correctly, then surely any argument which justifies taking views on, that is altering proportions invested in, a collective market like U.K. equities, say, cannot stop short of taking views on individual stocks. The argument is the same in each case. So, the more slavish the addiction to indexation, the greater the denial of the opportunity to make valued judgements, which is the negation of long-term investment strategy. Indexation is a useful tool, as the more it is used by others, the greater the opportunity it affords an individual investor to profit from an opposite view.

Mr T. S. Shucksmith: At the heart of the paper is a conflict between a strict actuarial approach and an investment view. On the actuarial approach, different asset categories are assumed to give the same expected rate of return. The ideal of an actuarially matched portfolio is derived by considering the term of the assets and liabilities and the linkage, in terms of price inflation or salary escalation, between the assets and the liabilities. The investment view, on the other hand, makes assumptions regarding the differences in the expected long-term yield from the different asset categories. The authors' inclination appears to follow the strict actuarial approach, leading to a yardstick portfolio, which they accept, in practice, would be subject to tolerances in which some account of investment views could be taken.

The problem with the strict actuarial approach is that the ideal of a fully actuarially matched portfolio cannot be reliably defined. The authors acknowledge this, and in §8.1 they refer to uncertainty regarding demographic-type factors. A much more important factor is that the characteristics of the main investment categories, particularly equities, are not known in the long term. Any mathematical derivation of matched portfolios will depend crucially on assumptions which are unreliable.

Nevertheless, I believe that there is considerable value in the concept of a minimum risk strategy and in its use as a benchmark. It would be liability driven and its formulation would balance the actuarial input (as narrowly defined) and the investment input. In the formulation of such a strategy, risk would be acknowledged as the possibility of the trust not meeting its liabilities in the long term. The formulation process would take into account the appropriateness of various asset categories, having regard to such factors as duration, monetary certainty or inflation hedge qualities, differences of expected rate of return and uncertainty of those returns in the long term. Central to the minimum risk strategy is a minimum risk portfolio. I would use, and have used, the minimum risk portfolio as a notional fund in which assets are reinvested in periodic actuarial valuations. I have also used the strategy as a benchmark for measurement of investment performance.

A minimum risk strategy cannot be uniquely defined because of the enormous uncertainties involved and the subjective judgements which have to be made. In most situations a wide range of portfolios could reasonably and properly be adopted as a benchmark. The important thing is that it is consistently applied. To substitute a different model portfolio in an actuarial valuation to that being followed for investment purposes is likely to lead to instability in results. Similarly, in investment performance measurement a comparison based on a common yardstick for pension funds, perhaps with similar expected liabilities, but, nevertheless, following different but valid minimum risk strategies, is likely to be misleading.

Mr G. R. Alexander, F.F.A.: The authors' Main Guiding Principle states that a relative change in the market value of major asset classes which are 'mismatched' to the liabilities should be reflected in the actuarial valuation of those assets. This paints only part of the authors' intended picture, which is that all relative market value changes should be reflected in the actuary's valuation of not only the assets but also the liabilities, the special case being that of assets which are in some way 'matched', so that the actuary adjusts both assets and liabilities by similar amounts.

It is easy to justify this more general statement. The authors argue that, unless the assets are matched, 'something real has occurred' when relative market values change, because this must be taken as representing a permanent reappraisal of long-term economic conditions, which will have a measurable effect, good or bad, on the ability of the assets to meet the particular liabilities. In

practice, most actuaries choose not to adopt the 'active' approach to valuations for the very good reason that it can be impossibly difficult to interpret just what sensible long-term economic changes are implied by relative market movements. In preference a more passive approach is usually advocated by the actuary, using a notional portfolio of assets.

Relative changes in market values are important for both actuarial valuations and investment performance. Before this is accepted we need to consider why those market value changes were thought to be important. They represented a reappraisal of fundamental value, but is this necessarily true? I do not believe that all relative market value shifts are fundamental events, and even although I might use the passive valuation technique already mentioned, I am thankful that most of my clients remain satisfied with actuarial valuations only every three years. Nevertheless, the pressures for more frequent actuarial valuations are there, and actuaries should beware of being pushed into the same short-termism traps as ensnare investment managers.

I have similar reservations in the context of investment performance, when we need to know whether a change in market values really does result in an increase or reduction in the future investment proceeds, and I am not surprised that the authors are uneasy about the significance of the market value of unsold stocks. One answer would be to follow actuarial valuations, and to avoid looking at investment performance over a shorter period than three years. In practice this will not happen, since it is the success, or otherwise, of the investment performance that contributes to the true cost of the pension scheme, not the actuarial valuation. Investment monitoring must be constant, but it must also be sympathetic to the need to allow time for those hoped-for enhanced actual investment proceeds to emerge.

Many investment practitioners hold out performance analysis, relative to a scheme-specific benchmark, as being the means of escape from the herd instinct and short-termism. I agree that benchmark analysis is a logical progression and will undoubtedly shed further light on this difficult area. In practice, at the present time, I would be surprised if liability-driven benchmarks for the majority of funds turn out to be very different from the much maligned industry median. This is for two reasons: the greater investment freedom available to the many schemes with substantial surpluses; and that the asset allocations adopted by the investment community are probably not as herd-like nor irrational as many seem to think.

Dr L. W. G. Tutt, F.F.A.: The quotation given in § 13.3, "to maximise the long-term return with an acceptable degree of risk", is often adopted by investment fund managers to indicate their primary investment objective, yet it contains very loose expressions. For example, it is not clear what risk is being referred to. Is it indicative of a one-parameter measure of risk and return; a measure of systematic risk; a return to volatility ratio; a return to variability ratio; or is there an implication that rate of return and risk are separately assessed? Is there an implicit suggestion in the quoted statement that individual investments may be considered without regard to the covariance of each security with each other security, a factor relevant from the aspect of diversification; or is risk used in the sense of a risk of possible financial strain due to the investors departing from a policy of matching assets to liabilities? There can, thus, surely be no disagreement with the authors when they say that the quoted statement is almost meaningless. One can only guess why some investment fund managers continue to choose so to report.

The opener and Mr Ayers suggested that risk can be defined, and Mr Freethy defined what he thought he meant by risk, but I found the definitions of risk given by all of them to be somewhat imprecise. The authors are more explicit, for they say in § 9.6 that they favour equating risk to mismatching. From this they proceed to concern themselves with the asset/liability ratio. This ratio does not solve all problems, but clearly it is important.

If it can be validly assumed that there exists, in both the numerator and denominator of a quotient, a correlated factor of high significance, then such should be brought into account in evaluation of the quotient. This naturally leads, as the authors state in § 2.1, to evaluations based on future cash flows, and virtually all U.K. actuaries working on pension funds accept this. Nevertheless, other actuaries working in spheres other than pensions do not seem to accept this basic general principle. Moreover,

actuaries working on pension funds, other than British actuaries, do not seem altogether to accept it either, as is apparent from FAS 87.

Surely no one would disagree with the authors when they suggest that variability of asset class should include consideration of the range of effects on the future actuarial position. Thus, a commendable theme, running through the paper, is that there should be actuarial involvement in asset allocation. Yet, what is the present position? The legal framework of occupational schemes is largely that of trust law, so that, necessarily, trustees have to be appointed. Some remarks included in the influential NAPF's recently published guide for such trustees seem to be both apposite and interesting, and are, "if trustees have any doubts about their own competence to determine asset allocation, they should certainly take appropriate professional advice". To whom should they turn for such 'appropriate professional advice'? The guide first suggests that "A fund's investment manager should have the competence to provide this", and only when it goes on to say, "but trustees should also seek the views of other financial advisers", that it may seem that the actuary to the scheme, as such, may possibly be implicitly included.

Also, PRAG's recent publication suggests that trustees usually reserve to themselves the asset allocation decision, but, even here, they say that the trustees, whilst making the actual decision, will normally take advice beforehand. From my own reading of that publication, it does not seem that advice from the actuary to the scheme is being directly advocated.

The authors justifiably conclude that the actuary has a valid, indeed a necessary, role in asset allocation. The profession should take more positive steps to bring it about. The strong preference expressed in § 12.9, which explicitly includes the actuary, is surely reflective of sound judgement based on extensive practical experience.

Paragraph 11.6 mentions the relationship between employer and trustees, security for accrued benefits and suggests that it would not normally be permissible for an employer to introduce competing risk criteria, for there are, in practice, cases outside normality. Probably a relevant position arises when an employer is sole trustee.

The OPB states in Cmnd. 573 that there are situations in which employers in financial difficulty have used pension funds as lenders of last resort, usually without the consent of members. The OPB also states that it has examples of substantial self-investment in failing companies which have proved disastrous to the finances of the schemes concerned. Such may not be typical, but it is part of the world in which we live. It all seems to add emphasis to the authors' expressed views regarding the necessity for co-ordination of actuarial and investment work in pension affairs.

Mr N. Ryan (a visitor): I have, over the years, been associated with the practical investment of pension funds, and the management of those funds, especially assessing the activities of external managers, and finding out what they are doing, when that is possible.

There are a number of reasons why a monitor of what is happening inside a pension fund on the value side as opposed to the liability side is required. Concerning the actuarial valuation of liabilities, you cannot divorce what is going on in the market from how the fund will go in the long term. The markets are, after all, the places in which we actually buy and sell assets. Even if they are very thin, such as the markets in property or in unquoted securities, if we hold such in our portfolios it is because we have a reason for so doing. If we believe that these are going to be long-term stores of value that will return value to us when we need it, then this is relevant to the actuarial valuation process, and is certainly so from the point of view of the fund manager trying to determine his future policy.

Monitoring is to do with whether or not the strategy adopted in the past has actually been followed, and if so, to what extent it has been successful, and to what extent the risk associated with it has been realised or evaded. There is a purpose in monitoring or measuring, which is to reward the managers for their success or lack of it. I use 'reward' in an algebraic sense—it can be negative as well as positive.

I agree with most of the authors' comments on the future policy for the allocation of assets, although I am sceptical about the value of involving too closely the external managers, particularly if balanced managers, in this process. This is for two reasons: first, that very few managers, no matter what they claim, can give a completely balanced view of the entire spectrum of available assets;

second, that in practice, when there is a pension fund—not a large £1,000 million fund, but, say, a small, £10 million to £25 million fund—the people present at the asset allocation meetings are not necessarily the most high-powered ones.

Differing objectives and conflicts of interest can be considerable, much more so than is hinted at in the paper, particularly in Sections 11 and 12. These conflicts of interest have been referred to in the OPB report. One difficulty is allowing the residual legatee, the employer, to have too much of an interest in the precise details of the investment performance. This is not the place in which to go into the reasons for the divorce or attempted divorce of the assets of the members from the assets of the employer in terms of trust law and for reasons of security. However, given that that is the legal background, it is very dangerous to allow these conflicts of interest to get into the allocation process. It is appropriate to have regard to them, but they should be kept on one side.

Allocations are made taking into account these views and also those of the employer, who has a perfectly legitimate interest in the outcome of the pension fund. It is essential in this process that the emerging pattern of liabilities of the fund are considered. This is where I would take issue with Mr Ayers for saying that it is possible to do this in a global sense. I agree that there are models which enable allocation to be done for an individual fund, but they are complicated, time-consuming and labour intensive. In practical terms, not many funds can afford to use them.

Although short-term measurement of performance is known to be unsuitable for pension funds, there is much difficulty in persuading people, in practice, to stop it. Even the trustees, who know that they are long-term investors, over-react to the results shown in their quarterly CAPS report or their annual WM report. It is my function as a non-actuary, as a consultant, and, I suggest, one of your functions as consulting actuaries, to continue weaning people away from this approach. It is also extremely difficult to get investment managers to do in practice what they say they are willing to do—that is to invest for the long term.

A question that arises in my mind is that, since immediately following Black Monday 1987, real long-term yields on the all-share index rose by about $\frac{1}{2}\%$, should not all the valuations of surpluses have also gone up immediately? They did not, because, quite properly, this profession decided that this was not something to which they could take immediate aim. We are not going to see instant changes in long-term values, but the allocation process does require us to think about whether there is some long-term change. Is it happening now? Is there a long-term change in which we can, in the long run, presume that there will be changes in the returns that we can obtain on investments?

Mr R. C. Urwin: Speaking with a manager's perspective, I shall consider performance measurement, which the authors propose should be unbundled into hard gains (income and realised profits) and soft gains (unrealised profits). For any fund that has sufficient liquidity to reshape its profile, this is a totally false basis of accounting: unrealised gains can be turned into realised gains. Indeed, you can easily invent *reductio ad absurdum* dialogues just like that in the Appendix. By adopting such a regime you risk a wholesale gaming of the system by managers to make the numbers look better. Everyone would be poorer.

I have sympathy with the generalisation that certain gains yield more information about the managers' past and future capabilities than do others. I follow the general principle that splitting investment returns into smaller slices yields greater information about a manager's skills than an obsession with a single number, the bottom line. More performance attribution is needed. This all underscores the only sensible paradigm of performance measurement, that it is a qualitative analysis of a manager's actions and capabilities in which quantitative analysis just plays a part. For performance measurement to gain a better reputation the quality of the analysis must improve, with more time in interpretation, better statistical tools and more money spent.

Turning to strategy, the liability-led investment approach is fine in theory, but we are in urgent need of better answers as to what constitutes a partially matched minimum risk position for active in-service liabilities. The authors suggest U.K. equities as the yardstick, with the obvious rider that they need to be strongly correlated with final pay in the longer term. There is no statistical evidence to support that statement, quite the reverse, and I am convinced that the minimum risk position would, instead, comprise a hybrid of equities, index-linked and, maybe, other assets.

Asset/liability modelling is a tool which needs greater focus and wider coverage. Another is the mathematics of the Sharpe optimiser, which is written off in the paper. It has no value in its traditional use, looking at nominal volatility, but it has great value when redesigned to accept a new definition of return like the asset/liability ratio.

The tools are there. They need a research mission to bring in proper refinement. They need a parallel 'mission to explain' to bring them into proper usage. Only then will this 'mission impossible' become probable and desirable.

Managers have been guilty of separatist thinking, which has not been all their own doing. Too often they are pigeonholed into a specific role and not welcomed into playing a wider strategic role, which can be very frustrating at times.

Consultants and actuaries have developed their own separation theorem: that managers cover the short term and consultants the long term, and the two should not overlap. This type of thinking is going to cause a lot of pain with actuaries who set their clients off on long-term strategies that conflict with the medium-term outlook and the short-term pricing. By contrast, I subscribe to the integration theorem which says that short-term and long-term considerations must be weighed alongside each other. This argues towards the need for a harmony of interests and contributions from managers alongside consultants as the key to the debate.

The world of today is very much separatist. The opportunity to think about pension fund policy and to do something useful about it seems to have migrated from investment groups to the consultants. The pressure is very firmly on actuaries to be the integrators both in asset and liability management and in marshalling the combined skills of the actuary, the manager and the trustees.

Mr D. M. Eadie (a visitor): I have specialised in performance measurement of investments for twenty years. In Section 10 the authors comment on the use of performance measurement to identify managers who will succeed in the future. It is important to read the words carefully. The authors did not say that all performance measurement should be done on a particular basis. They refer only to the specific case of identifying skills in investment management.

I agree that much more analysis is required than just the use of end numbers when attempting to identify future investment performance. Indeed, if only end numbers are available, then, other things being equal, the contrary view of choosing the manager with the worst recent results could well be correct. I suggest that if there were a set of managers who were genuinely trying to meet the same objective, or perhaps to follow the same benchmark, and if they were reasonably professional in their activity, then it would be best to put your money with the one with the worst recent results. Unfortunately managers and their marketing departments do not agree with this!

In the paper two forms of analysis are suggested: income growth and realised gains. If the manager knows in advance that he is going to be measured on these two bases then he can create their appearance for some time at the expense of the capital value of the remaining portfolio. There are some examples of that which are current in large numbers. They are called TOKKIN funds, and exist in Japan. There the return that is promised by such a fund is measured as realised capital gain plus income. They hope that in each six-month period enough gains will appear to make the return possible. I do not believe that the authors are advocating a switch to that kind of approach!

I would prefer to analyse returns more in terms of type of investment decision, for example, measuring the skill of the manager over time in selecting asset categories and in stock selection. I believe that five-year trends in these detailed attribution statistics do give more information than pure end numbers.

In Section 12, where asset allocation is discussed, I agree that the process of determining weights in major investment categories is indivisible from investment management. We are presently experiencing a trend in the U.K., largely imported from the U.S.A. to centralise asset allocation with multiple specialist managers. This approach could be valid if the centralised decision makers are experienced investment managers, as, for example, occurs in major life insurance companies. This is an example of actuaries involving themselves in investment processes. My understanding of life insurance companies is that the people who are making the strategic asset allocation decisions are fully aware of the nature of the liabilities as a result of the policies that have been written, and yet, at

the same time, are part of a department which is actively involved in investment markets. That type of integration is what is required to do this type of long-term investment successfully.

Another example of a similar integration, which we do not hear much about, is where the pension funds are managed by an in-house team. That applies to about 40% of the assets of U.K. pension funds. Often the in-house management team, because it is not subject to the same market pressures, can afford to take the time to ask the right questions of the actuary and of other advisers. Very often the in-house team also has a higher degree of confidence from the trustees.

In that particular area it is potentially dangerous for the concept of centralised asset allocation to be sold to laymen, possibly including very well-equipped finance directors, but those who have not had the experience of how easy it is to get it wrong in investment markets.

One serious flaw is the timing of any change. From experience, some major pension funds have been persuaded to make large shifts in their long-term asset structure at random intervals. Occasionally this is a well-timed decision. Often, it is not. Those advocating such strategic changes should recognise the timing risk of these major reorganisations, and should explicitly notice that they are giving serious investment advice to their clients when they advocate such changes. Even if they claim not to be exercising investment judgement, the timing of the change reflects an investment judgement based on the current price of the securities at the time the change is made. Since this is done without consulting the investment managers, I think it is a very dangerous practice.

Mr A. J. Wise: Matching for its own sake is not a particularly good objective for the majority of pension funds. I would like to correct the implication in § 8.1 that the five papers of Professor Wilkie and myself were all to do with selecting assets which most closely match the liabilities. Mismatching is much more important in practical investment work. That was the entire thrust of the latter three papers to which the authors refer.

The authors rightly draw attention to different approaches to risk. We have heard about the three different viewpoints of the trustees, the employer and the fund manager. Interestingly, the authors appear to have added yet another approach, the actuary's risk relative to the matching position. Their Main Guiding Principle is aimed at minimising the risk of the actuarial valuation being a poor estimate of the long-term financial position of the scheme. Is this not too narrow a view, as open to criticism in its own way as the volatility measure used by investment managers? Do we now have four different views on risk instead of a proper reconciliation of the three?

I agree with much of what the authors say on investment objectives and asset allocation, except that their knowledge in § 14.1, of what other people are doing, seems a little incomplete. There is much to be said for the trustees, fund manager, actuary and even sponsoring employer, all working together, to agree a mutually acceptable investment strategy. However, if the actuary is taking on a tangible part of the responsibilities for the eventual asset allocation decision, there should be accountability for the actuary's advice. If part of the asset allocation decision is shifted by the trustees and fund manager to the actuary it is not prudent for that part of the decision to escape the investment monitoring process. The danger is that some actuaries will give poor advice in this area, for example, if somebody were to combine the authors' principle with the good matching characteristics of indexed-linked gilts relative to final salary benefits. This could lead to investment policies which are too heavily weighted by index-linked. Therefore there is a need for the monitoring of such actuarial work, in the way that the profit and loss analysis is a form of monitoring by the actuary of his own valuations.

Another professional guidance note may be required in due course. An appropriate starting point for guidance would be the suggestion in § 14.6 that the features of asset classes used to make the allocation are valid if they can, and will be, recognised in an actuarial review. However, this starting point is not enough, because the actuarial review is concerned, traditionally, with expected returns from investments, whilst investment theory and practice are concerned, also, with variations in returns.

When helping a client to decide upon a strategic investment benchmark, it is appropriate to consider a range of alternative portfolio structures, from matching at the low risk end to the ultimate in high risk strategies, such as everything in overseas equities. The sensible and practical answers will

appear in the middle of the range, not at the extremes. The authors refer to this in Section 12, but return to their preferred matching portfolio in § 14.18. However, in scanning the range of alternative portfolios from low risk to high risk, there is a reduction in the degree of sensitivity to the liabilities in the calculations, but an increase in the sensitivity to the investment return assumptions. Therefore, if the trustees are not especially risk averse in this sense, the authors' work could be overstating the importance of the liabilities in forming investment strategy in the way that they have described.

However, setting an investment strategy can also depend on the liabilities other than by reference simply to pure matching, namely, along the low to high risk dimension. A well-known example is given by the comparison between a young scheme with no pensioners and an old scheme with few active members. I do not think that the authors' principles deal accurately with this situation other than perhaps fortuitously.

Mr J. P. McCaughan: The events of October 1987 highlight the difference between risk and volatility. Risk suggests the chances of things going wrong and something that you may want to avoid. Volatility, on the other hand, is something that gives you opportunity. The authors' concentration on the value of realised gains, recognising them and not recognising unrealised gains, is extremely dangerous and has the potential to cause measurement to distort actions. The danger is that this may cause the realisation of gains which would not otherwise be realised and lead, as in the Japanese case of TOKKIN funds, to excessive activity rates in portfolios.

Any useable performance measure has to be objective and cannot really be subject to manipulation. The Japanese experience, where they do not mark portfolios to market over lengthy periods, is quite instructive and merits study for those who are thinking of this method of measurement.

The paper highlights the difference between discounted cash flow valuations leading to £ Actuarial, and market valuations leading to £ Market. It seems that the main purpose of £ Actuarial is to make the arithmetic easier. Market values are always a reflection of a reasonable consensus for the present value of the future receipts from an investment.

Volatility offends many people, including many actuaries. This volatility, however, simply reflects the fact that the future is uncertain, and that views on the future are constantly changing. An actuarial valuation is a snapshot in a long-term control process. There is no reason, in principle, to use anything other than the discount rates, real growth rates and inflation rates implied by the market. If this is done then £ Actuarial is the same as £ Market. This identity need not always be made if it is inconvenient to do so, but it would be wrong to pretend that the actuary's valuation basis has more objective reality than that implied by the market.

Modern portfolio theory contains a very simple mathematical model of risk which is based on short-term volatility. Volatility is clearly a good thing in investments if it can be exploited. Risk and volatility should not be equated. It is too easy to look at a simple mathematical model and think you are describing the real world. This is one of the dangers of mathematical and actuarial analysis, and it is something that should be avoided. However, the short-term volatility model has been useful for some in assessing investment policy.

The nature of the liabilities of British pension funds are such that the modern portfolio theory model is of limited value, and so the development of liability based models along the lines indicated in the paper can only be helpful.

Mr N. W. H. Ferguson (closing the discussion): In spite of my being a fund manager first and an actuary second, in my day-to-day activities I have for many years felt that there should be closer integration in the treatment of the assets and liabilities of a pension fund. Many fund managers do not take this line. I am therefore much in sympathy with the general objectives of the paper. One past barrier to that integration has been that actuarial valuations take place rather infrequently and appear months after the valuation date. Investment managers live in real time in the real world, so by the time those results appear, they seem academic to the investment manager.

The situation is improving, however. In my own fund and many others our cash flow projections

are featuring more. As funds mature such projections are becoming more important, and this might be the catalyst that leads to investment managers and actuaries talking more to each other.

As a fund manager, I find that the concept of matching is useful and drives me in the right direction, but a rigid pursuit of it would be futile. The business world does not shape its investments to suit pension funds. We might end up paying too high a price if we insist on a particular shape of investment. The problem of matching inflation, for example, can switch in emphasis to be replaced by the problem of seeking to share in real growth. The fund manager has to be very careful that he is not solving yesterday's problem, because he is in a fast-changing world.

In the U.K. we have final salary pensions and post-retirement increases, so what we have done is to set ourselves one of the toughest targets in the world. Our objective could be said to be to obtain as large a slice of the gross national product, or as it is now, the gross world product for our members.

There are constraints of cost and of variability of cost. The plan sponsor takes an interest in this, and that is a factor. Nevertheless, overall, that seems to be what we have been attempting to do. Once we do that, we are into the realms of politics and the whole structure of society. With that background it is self-defeating to define our objective at all narrowly.

Although it might be useful, say, if you appoint a new investment manager to monitor him closely for a year or so, because you are unsure of his capabilities, but you should not look over his shoulder too much. This might inhibit him from cutting his losses.

The subject of balanced versus specialist managers for the U.K. pension fund should be reviewed in a world context. In this the U.K. funds have performed well. There are various reasons for this. Some are good fortune and are not necessarily because we achieved it ourselves, but an important part of this success story has been because of how prevalent the balanced approach has been in this country.

I share the authors' preference for 'bottom up'. I am not saying that you do not look at 'top down', but at the end of the day it is 'bottom up' where value is added. I share their fears for separating asset allocation from a detailed knowledge of markets, in spite of the fact that my own fund, for example, for overseas investments uses specialist managers. We go to enormous lengths to try to be a balanced manager, and we look for feedback from those people who manage that money for us as to whether there is relative value in those markets. I fear for a situation where the two are really separated, although, having said that, there is no one right way to structure investment management. The problems vary enormously from in-house, large funds, to small industrial companies with no expertise.

The opener stated that there should not be too sharp a distinction between the actuarial view and the investment view, and that much more detail was needed when looking at matching notional investment portfolios. Mr Ayers said that volatility has more attention paid to it by the outside world than by actuaries, but perhaps he believes in specialist asset allocators more than I do. Mr Freethy concentrated on the increasing role of the actuary. I sympathise with that within reason. He emphasised diversification, which again I felt was a valid point, especially as maturity approaches.

Dr Tutt referred to the NAPF guidelines, and professional advice on asset allocation—from whom? That is indeed the big question. Mr Ryan was sceptical about a balanced manager's ability to cover the whole range of assets and to be unbiased. I take that point. There are blind spots in certain balanced managers, particularly in their relation to property. Mr Urwin said that we need a practical solution to matching. My view is that the words he used later, 'mission impossible', are the answer.

I see absolutely nothing wrong with sacking the good performers. We run a certain part of our portfolio on the basis that when the specialist manager has fulfilled the role for which he was appointed, and his investment plan has achieved its result, we then rebalance, and take money away from him. That seems to be a perfectly logical thing to do. If the good idea succeeds, move on to the next man with the next good idea. There was some talk of conflict of interest for actuaries. It is worth reminding ourselves that that is as true of our profession as any other.

Mr Wise referred to the accountability of the actuary which should be monitored. I think that he was referring to the denominator in the authors' asset/liability ratio. The actuary might get the liability calculations wrong by making the wrong assumptions. I think the counter argument is that you have to start somewhere.

Mr McCaughan reminded us that volatility is an opportunity. Some of us tried to take the

opportunity during a recent mini-crash and found the markets to be extremely narrow. Liquidity can vanish on these occasions. It may well be that actuaries, looking at the numbers in retrospect, think how marvellous that the index went down, but try to deal in size!

The Chairman (Mr R. E. Brimblecombe): This paper is a very important one and also very topical, bearing in mind that we are awaiting the Government's response to the OPB report on the rights and expectations of pension fund members. The paper and the discussion demonstrate the importance of the actuary in pension scheme investment, and it is vital that the actuary is not seen to take too low a profile. The parallel with actuaries involved in life funds, particularly with-profits life funds, is a theme throughout the paper and the discussion. In simplistic terms, if by a more adventurous investment policy, actuarially driven, pensions funds can achieve a much healthier financial position, then the greater the possibility of benefits for members being improved. Whatever the arguments for and against some of the authors' propositions, I believe that the profession would be ill served by ignoring the issues raised, either because of these differences within the profession or, more likely, because the issue is a complicated one and difficult to explain. It is a pity, in some ways, that the authors did not have time to develop issues arising from the implementation of the OPB report, because I suspect that this might ultimately have an effect on investment policy. If pensions schemes have to provide high levels of accrued benefits at any time and simultaneously meet long-term liabilities, the actuary to the pension scheme may well be likened to an actuary to a with-profits life fund, who has to determine an investment policy with the dual aim of maximising the long-term returns to the policyholders, but also has to provide guaranteed surrender values at any time!

The first reaction after the October 1987 crash, was from pension fund managers who intuitively expected that the asset/liability ratio of their pension funds had been dramatically reduced. After a little thought, actuaries were able to refer to the fact that their asset/liability ratios had not been altered at all, because of the actuarial valuation method for the assets. I think this paper indicates that those statements should have been modified by clearly underlining that the effect of the actuarial value of the assets depended very much on the matching position.

I do, however, believe that there is a role for mismatching in pension schemes, provided the risk and rewards of that mismatching are made perfectly clear both to employers and trustees, and perhaps, above all, to members of pension schemes. After all, the Appointed Actuary to a life office has to make reference to his mismatching reserves in the annual valuations.

We have had a very important contribution to actuarial literature on an issue which will, no doubt, continue to be discussed for many years. I now ask members to join with me and give our thanks to the authors.

Mr T. G. Arthur (replying)**:** I shall make a few points concerning the discussion. First, on investment strategy, our starting point is that everybody implicitly accepts that risks are liability related, and that the strategy does depend on the purpose. Few forty-year-olds would invest for next year's holiday in the same way as they would for retirement in twenty or thirty years. Few would expect to compare the performance of the two. One can argue that pension funds are all similar, but we suggest that the evidence is very much against that. With regard to performance measurement and the demise of league tables—I would not say that we are in any way suggesting the demise of league tables—we just suggest that we could, maybe, be a little more selective in devising the peer groups. The fact that the main peer groups we use for measurement at present are restricted to U.K. pension funds implies that we are taking account of a liability-related matter. All we suggest is that that process is made more sophisticated.

With regard to matching, I would stress, at this stage, that we do not advocate that a matched position is adopted. We do advocate that it is identified, and that investment decisions are taken relative to that position. Of course, it may be argued that matching is imprecise, and is itself a mission impossible. Various speakers have suggested that some of their criticisms are to do with the fact that it is all a little bit too difficult. I do not think that partial ignorance is an excuse.

Regarding new money, at this stage we stand by our principle that, basically, new money helps in only two ways: one is if you are clairvoyant, in which case we can all go home; and the other is that the

new money cushion allows one to say 'so far, so good', in the same way as somebody who is falling 50 floors, and has not hit the bottom may also say, 'so far, so good'.

We were criticized for our remarks in § 14.1 where we said that we rule out any form of the Sharpe optimiser or its derivatives that takes little or no account of the nature of the liabilities. That is all we have said.

WRITTEN CONTRIBUTIONS

Dr G. B. Chaplin, F.F.A.: Much of the authors' work rests on the identification of a matched or nearly matched portfolio. For a typical pension fund, however, no such portfolio exists, and, in particular, we must reject any suggestion that equities match earnings-related liabilities. This problem arises in Sections 7 and 8, where the authors talk of immunisation, partial matching and matching. Matching, as correctly identified in § 3.3, is the identity of asset and liability cash flow. It is a description of the structure of the cash flows independent of any assumptions and has a very precise meaning. However, in Section 7, the authors discuss an immunised liability under the heading 'partial matching'. Immunisation is model related, and hence an immunised portfolio may actually produce large losses because of deficiencies in the model.

In Section 8 the authors deviate even more sharply from the meaning of matching. In § 8.4 they state that fixed-interest stocks are 'associated' with fixed-interest liabilities, and equity type assets with final pay linked liabilities. What do they mean by associated—the implication is matched? Associated in what way? The first example can provide exact matching, but the second cannot do so. What is the justification and evidence for their statement? Their justification seems to rest on *assumptions* in § 8.5. Over what time-scales are these assumptions valid (if at all)? How good is the match? We cannot be expected to build a theory on unsubstantiated claims. The justification for any such association is stochastic and one which does not work very well.

Based on annual data for 1952 to 1985 I find the variability relative to earnings of 25% for an equity portfolio and 10% for bonds. For income streams I find standard errors of 6% and 3·5% respectively. Note that it is variability that defines matching, not actual level of mean returns. An extreme example would be if an earnings-linked bond existed at a -4% return. Such a bond could give an exact match for the liability, although at a cost. These results show that the variability of fixed-interest dividends relative to earnings is a little over half that of equity dividends. The mean real returns would be positive for equities and negative for bonds, but, as we have seen, cost is a separate issue from matching. This is not to suggest that bonds are necessarily a more appropriate investment for pension funds, merely that equities are not the good match that the authors suggest, and are at least as bad a match as bonds in the short term.

Of more relevance are the figures for 10-year returns—unfortunately we have only three time periods and great uncertainty in the calculated figures. For the capital values of the fund the standard errors turn out to be 3% for equities and 4% for bonds, but for income streams they are 7% and 1% respectively. The difference between bonds and equities capital funds is small and in income terms bonds seem to be a better (though much more costly) match for earnings streams! This paradoxical result arises because earnings growth tends to vary slowly and modestly, bond income is fixed, but equity dividends vary by relatively large amounts. Index-linked stocks will probably show a much better correlation with earnings growth. The magnitude of the variability, as well as rejecting any implication of matching earnings growth with equity assets, also casts doubt on the practicality of the authors' definition of acceptable risk in § 13.4. This definition may not be possible for any value of x which is other than large, that is there is an inherently large degree of risk in final salary schemes on a 5- or 10-year time scale.

At a fundamental level, once it is accepted that the relationship between earnings and equity performance is a stochastic one, then there is also a stochastic relationship between earnings and fixed interest, index-linked and cash. A much more obvious way to proceed is then to simulate pension fund asset/liability futures and present results to a client in the form of ranges of possible outcomes for

several different asset class mixes. This allows the client to see directly the implication on funding rate variability of different allocation strategies.

The authors state three principles of investment management: indivisibility, assessment of price and continuity. Bottom up systems are prominent, not necessarily because they are better, but because that is the way the system has evolved—even now investment managers are generally trained as stock pickers. In the example of § 12.11, if the particular equity manager can consistently beat the market index by 5% then this will be taken into account by the asset allocator and the authors' example is incorrect. The indivisibility principle can be rejected. On assessment of price, the authors imply that most asset allocation systems operate by extrapolation, yet this is true of none of the asset allocation systems that I have seen. They are based on valuation models or econometric models or rationalising expectations. To reject asset allocation because of the unsound practices of the few is unreasonable. Their second principle can be rejected. Their third principle does not appear to present any problem—the trustees and treasurer must agree on the risk level that the fund is prepared to adopt, and whoever is managing the funds (one manager or several, vertically or horizontally stratified) has to operate within these guidelines.

The authors begin by quoting the separation theorem—a theorem which applies to investors who make decisions in mean variance space, that is those who prefer higher return to lower for the same volatility. I agree that this assumption does not apply to pension funds, but the authors have done nothing to assist greater understanding by quoting a result of theory out of context.

Mr R. S. Clarkson, F.F.A.: The main theme of the paper 'Improving the Performance of Equity Portfolios', by J. Plymen and myself, presented to the Institute in April 1988 (*J.I.A.* **115,** 631), was that the Modern Portfolio Theory definition of risk (namely the variability of return) did not accord with what practical investors perceived risk to be. Although that paper was essentially practical in nature, we outlined a possible alternative approach to the measurement of risk. In a subsequent paper entitled 'The Measurement of Investment Risk' (*J.I.A.* **116,** 127), I developed this alternative approach into a theoretical framework and showed that the original Markowitz formulation of portfolio theory is a very restrictive special case of this general framework. An important feature of my approach is that risk is not an absolute property of a particular investment, but depends on the financial circumstances of the investor. This is the precise point that this paper makes in the particular context of pension fund investment. As is shown in Section 1 the Modern Portfolio Theory approach to risk is quite misguided.

It is one thing to criticise a particular approach, but quite another to suggest an alternative. Through a skilfully constructed set of simplified examples the authors show that, in the case of pension fund investment, risk is equivalent to a mismatch between the assets and the liabilities. I agree with this conceptual approach, and believe that the computational methods set out in my latest paper can be used to translate these concepts into a practical framework for assessing the degree of mismatch. In particular, the risk threshold, L, in my formulation clearly corresponds to the value of the liabilities.

Mr D. D. Ezra: The authors begin with valuation principles, because these show most clearly the unspoken assumptions made by actuaries, especially the one that the pension valuation actuary can forecast the markets better than market participants.

Consider the interpretation of the market value of a gilt which a student of finance might offer. Some market participants expect interest rates to rise; others expect them to fall. The price of the gilt represents the point at which opposing views balance. Subsequently, only one view will prove to be right, the other wrong, but at the time, the price of the gilt represents the market's best consensus of the present value of the cash flows to be received by the owner. Thus, embedded in the yield curve is the market's consensus forecast of one-year forward interest rates.

Unless this term structure of interest rates is used in the actuary's valuation of the liabilities, the actuary is implicitly making the arrogant assumption of superior forecasting ability relative to market participants. As the authors rightly point out, this is an investment view, not an actuarial one.

Similarly, embedded in the prices of index-linked gilts is the term structure of the market's forecast of future inflation. These should be consistent with the rates of salary increase assumed by the actuary. Thus market values should be used by the actuary to derive the basis for valuing liability cash flows in a manner consistent with the market values of assets.

This principle of interpreting market values of assets (which we might call the Finance Principle) leads directly to the authors' Main Guiding Principle as a corollary, and therefore to conclusions regarding valuation which are identical to those derived by the authors.

The very important consequence of the Finance Principle is that it allows a given set of liabilities to be valued at any point in the past. Just as historical asset returns can be calculated from such a sequence of historical asset valuations, so too historical liability returns can be calculated. Moreover, these liability returns have characteristics such as volatility and correlations with different asset classes.

Assets matching liabilities can be determined instantly: they are assets with the same volatility as the liabilities and a correlation of +1 with the liability returns. These assets, as the authors rightly point out, represent zero-risk assets relative to those liabilities. Any system of risk measurement that uses a different definition for risk is simply inapplicable to those liabilities. No such assets may exist in practice, but the principle is clear.

It is feasible to go further than the authors appear to consider possible. For example, it is routine to use an optimiser, with inputs for asset class returns, volatilities and correlations, in order to solve for what are called 'efficient portfolios'. These asset mixes are efficient in 'asset space', that is, in a framework which ignores liabilities. However, it is also feasible to include liability characteristics: expected growth, volatility and correlations with the asset classes, and to derive distributions for each asset class in 'surplus space', that is, to derive the corresponding expected growth, volatility and correlations of surplus if investment is made in each asset class. This makes it possible to define 'efficient portfolios' in 'surplus space'—portfolios characterised by minimum surplus volatility at one extreme, and a trade-off involving increased surplus volatility, in exchange for expected increased surplus, as the decision-maker's risk tolerance increases. The authors evidently have not come across these tools, but they are not only feasible, they exist and are used, because my colleagues and I have worked out the theory and applied it in practice. Our work leads to the use of the minimum surplus variance portfolio, as the authors suggest, as being the most appropriate one from which to measure deliberate mismatching in search of surplus growth.

It also leads to one particularly disappointing conclusion. Low-risk decision makers want to match assets to liabilities as closely as possible; differences in benefit design will then imply different allocations of assets. However, most decision-makers have moderate or high tolerance for risk. Moving along the risk spectrum in the direction of increasing risk tolerance, the precise composition of the liabilities matters less and less; and in the portion of the spectrum where most decision-makers appear to reside, the appropriate asset allocation is largely independent of the liabilities. I find it distinctly disappointing that the relevance of the liabilities is more theoretical than practical.

In the section on making judgements on investment skills through traditional performance measurement, the authors are barking up the wrong tree when they suggest separating sold from retained securities. The problem does not lie with the common use of market values for both sold and retained securities—as the authors constantly stress, any other measurement imposes an individual's judgement on the measurement system. The real problem lies in attempting to use historical performance as an unerring basis for determining investment skill—an ideal that will never be realised, since past performance is not a predictor of the future. There will never be a substitute for the application of judgement here.

The authors rightly point out the potential for conflicting objectives between the trustee (charged with responsibility for members' benefit security) and the employer (seeking to minimise the cost of underwriting defined benefits). This is a conflict which U.S.A. legislation (ERISA) refuses to face. ERISA requires investment decisions to be made in the sole interests of the beneficiaries, but it does not accept the notion of the employer as the residual beneficiary in a plan in which assets exceed liabilities. In such a case (which typifies many, if not most, American plans today), the employer is the initial recipient of both risk and reward, and the risk policy adopted for the assets ought surely to

reflect (as it certainly does in practice) the primacy of the employer impact. However, nobody ever suggested that legislation must be based on economically realistic notions.

The authors express their personal preference for balanced fund management. This is an unfortunate indulgence in a paper on principles, because it confuses three levels of decisions:

(a) long-term asset allocation policy, which is based on equilibrium or consensus expectations, and which reflects the decision-maker's risk tolerance;
(b) short-term tactical asset allocation, which is predicated on superior forecasting ability as to the relative returns of the different asset classes in the short term; and
(c) security selection, which is predicated on the superior ability to identify specific securities which are likely to outperform broad asset class benchmarks.

Of these (a) is not an investment decision, while (b) and (c) are investment decisions, although there is no need to have them made by a single manager. It is particularly important to distinguish between (a) and (b). Decision (a) is best understood through the following framework. In such an environment, the only way to achieve a higher expected return is to take more risk. How much risk is the decision-maker (the trustee or the employer) prepared to take? The answer determines the asset allocation policy. The investment manager may be an adviser in speculating about the future, but has categorically no role at all in making the risk-tolerance decision. Much grief is possible by assigning decisions (a) and (b) both to the investment manager.

Mr S. J. Green: It has been accepted actuarial wisdom for decades that a valuation cannot be carried out without regard to the assets. For almost as long, actuaries involved in investment have agreed that risk, particularly for solvency purposes, is the risk of mismatch. Yet, even today, some of our colleagues are prepared to introduce a mismatch into their valuations by using contradictory assumptions for the investments and the liabilities of the same fund. Those who accept the authors' Main Guiding Principle should no longer fall into this trap.

When specifying the interested parties, the authors include the trustees on behalf of the members. However, young active members, their older colleagues, retired members, deferred pensioners, their beneficiaries and potential beneficiaries all have differing and, often, conflicting interests. Only the actuary can evaluate these interests and it is frequently overlooked that only the actuary, in his recommended asset allocation, can ensure that the investment strategy adequately reflects these interests, because the trustees are not usually representative of the membership as a whole.

Once the trustees, acting on the advice of the actuary, have established the most appropriate long-term allocation of assets best suited to match the various liabilities, there is scope for investment managers to recommend deviations from these targets for short-term economic and technical reasons. For those who still believe in portfolio optimisation there is even room for an asset allocator, at this point, to use his skill, to determine the most efficient sub-portfolios to match the asset targets established by the trustees and the actuary. There is, however, no logical reason for adopting the transatlantic approach of placing the fund's long-term asset allocation in the hands of an asset allocator.

Logic, though, demands that if this process is adopted, the performance of the investment managers (and the asset allocators if they are employed) should then be judged against the long-term asset targets. This leads to the conclusion that performance is best judged against the appropriate indices and suitably constructed notional index funds rather than by the current emphasis on position in the TWR league tables. Fortunately it would require little adaption by the performance measurement services to provide the necessary figures. As Mr Eadie said, the fault with the present statistics is their misuse by the investment managers and the consultants.

Mr J. MacQueen & Mr R. Rice (visitors at the meeting)**:** As members of a firm whose principal activities include the provision of computer software to fund managers to help them obtain the optimum balance of risk and return for their clients, we believe that the relevant definition of risk is fundamental to the investment process, and are greatly encouraged by the emphasis laid in the paper on the importance of measuring risk relative to pension fund liabilities or an appropriate proxy.

However, there are three points arising from the paper and the subsequent discussion which we believe require clarification.

The Role of the Actuary and the Role of the Fund Manager

It is the task of the actuary (and not the fund manager) to analyse the liabilities of the pension scheme and in the light of this analysis to specify the portfolio (in terms of broad asset classes) which best matches that set of liabilities. This portfolio will consist of the least risky combination of assets for that particular scheme, and, as such, will require no return forecasts to be made, except, perhaps, of the most general kind, for instance that equities are likely to outperform bonds in the long run. It is unlikely that any such portfolio will exhibit zero risk with respect to the liabilities, that is that it will match the liabilities exactly, and it may well be, within the margin of error inevitable in this inexact process, that there is more than one portfolio with an equal claim to consideration.

It is only when the actuary has specified this minimum risk portfolio that the task of the fund manager begins. Taking this portfolio as his benchmark, and in the light of the returns he forecasts for financial markets, he will deliberately deviate from it in order to add value. The actuary may impose prudential limits on the *degree* of deviation permitted and, in the limiting case, require that the fund be run completely passively. But the *pattern* of deviation, and its success or failure, will be the responsibility of the fund manager. He should be judged by the return he achieves relative to the benchmark, and, of course, by the risk he incurs relative to it. He should not be judged by the absolute return, since he has played no part in the benchmark selection process.

The Dynamic Nature of the Benchmark

Since the liabilities of the pension fund will evolve over time, so must the benchmark portfolio which is their proxy. It is the responsibility of the actuary to develop a strategy for coping with this. His strategy may be to review the benchmark, say once every three years, which for the fund manager will entail jerky but infrequent changes; it may be to adopt some form of dynamic benchmark.

Even if the liabilities do not change, the assets will. Some may become illiquid, others may be effectively replaced by assets of a totally new class. Even if the nature of the assets over a particular period does not change, the relative value of the different assets comprised in the benchmark will. If no action is taken to revise it, and a *de facto* buy-and-hold policy is adopted, the proportion of the best performing assets—typically equities—will grow: exactly the wrong policy if the company also 'buys and holds' its employees so that the scheme matures.

The actuary must then develop a strategy in advance and inform the fund manager of it, so that the portfolio can be managed with a view to facilitating changes when they become necessary.

The Availability of Valid Asset Allocation Systems

In § 14.1 the authors state that they "have yet to see a valid allocation system; most of them have gone wrong before they reach this point in that their risk definition is incorrect".

To our certain knowledge, two systems which comply with the authors' risk definition, and are in other respects valid, have been available in the U.K. and overseas for the last four years. Over seventy such systems are in use, by, amongst others, index and active fund managers, consulting actuaries and pension funds themselves. The two systems are the Global Portfolio Analysis Service (GPAS) and the International Risk Analysis Service (IRAS). The first allows allocation over a broad range of asset classes, the second the selection of individual stocks within 22 different stock markets. Both permit optimisation not only on an absolute basis, but also relative to a chosen index or a 'normal' or benchmark portfolio.

Mr W. D. Scattergood: I wish to consider occupational pension schemes, separately invested, with a positive cash flow, where pensions are linked to final salary and provision is made for increases of pensions in payment.

In Section 9, dealing with investment risk, I am surprised that no mention is made of the risk of inflation, which has a great effect on both the liabilities and the assets. There is a real risk that gilts,

and similar investments in fixed terms, may decrease steadily (or rapidly) in purchasing value, both as to capital and income, as inflation continues and I am sure that inflation will continue.

With regard to the model portfolio mentioned in Section 3, I suggest that an improvement would be to aim for equities varying between 70% and 90% of the fund—the balance being mostly in short-term deposits immediately available to take advantage of volatility. The investment policy must be flexible. Percentages for investment of funds in different fields should be reviewed continually, so there seems little point in fixing them exactly. There may even be times when the high yields of non-linked gilts appear attractive in the short term.

As a pensioner I believe that a good pension scheme should aim to provide its pensioners with a fixed standard of living and not an income reducing all the time in real value.

In § 13.2 the trustees are mentioned as the party interested on behalf of the pensioners and members. Of course, they should be, but they are appointed by management and are unlikely to make decisions without the approval of management. Their membership should be widened to include at least two pensioners.

Mr C. M. Stewart: In § 13.6 the authors draw attention to present uncertainties concerning the 'liabilities' to which the assets should be matched, but, correctly in my view, conclude that the bottom line must be to cover the winding-up liabilities. They then recommend that there should be a safety margin of 25% and it is this suggestion that I wish to consider.

The authors' conclusion appears to correspond with that of the paper presented to the Institute in January 1987 by Mr D. J. D. McLeish and myself (*J.I.A.* **114,** 155), namely, that, at any time, a scheme's true accrued liability is to be able to cover the winding-up benefits, and that valuation methods which result in assets more than sufficient to cover this accrued liability are effectively providing a margin for contingencies.

The authors recommend that the minimum funding target should be the winding-up liabilities plus 25%. I can see some justification for an explicit margin like this, if the actuary's valuation basis is in all respects a current market basis. It would then seem prudent to provide for the possibility of an adverse change in economic conditions, but I would expect there to be considerable argument as to what the percentage margin should be. However, it has hitherto been more usual for the actuary's valuation basis to reflect his view of what economic conditions were likely to be in future and both assets and liabilities would be valued on that basis. Actual market conditions would vary from time to time, so that the amount required to purchase the winding-up annuities and deferred annuities from an insurance company would be different from the value placed on the assets by the actuary's ongoing valuation. In presenting the paper to the Institute, I described circumstances in which the margin would have been positive in most years for some time past, although it would obviously have varied as market conditions varied.

So which is it to be, the presently favoured approach via long-term assumptions and a margin which varies with market conditions, or a market value approach with an explicit funding target $x\%$ above the accrued liabilities on winding up? In practice it might not make all that much difference if surpluses or deficits were consistently run off over the same period under both methods and 'x' corresponded to the mean solvency margin experienced under the long-term approach, but the *visibility* of 'x' would be sure to lead to heated arguments, and not only between actuaries, as to the appropriate value of 'x'.

The authors subsequently wrote: We welcome the opener's recognition of our call for co-operation rather than confrontation; one of our major themes is the need for all parties to work together. Our comments here, however, mainly relate to the points of difference between ourselves and the contributors.

Actuarial Valuations and Matching

The opener suggested that we regard most actuaries as not appreciating the relationship between the actuarial valuation, investment management and the measurement of investment performance. Our argument is not that the inter-relationship passes actuaries by, but that, by and large, appreciation of

it is confined to theory rather than being part of day-to-day practice. Some of his remarks on actuarial valuations also surprise us. In particular, he would surely accept that it is important to assess, from time to time, the costs that have accrued of particular benefit arrangements; the rate at which they are continuing to accrue and the extent to which these costs have been met by putting assets aside for the purpose. Moreover, the point of adopting a matching portfolio as the valuation norm is precisely that it characterises the costs that will eventually need to be met, and thus *is* the proxy for the investments that the trustees will ultimately need to hold to meet those costs. We are emphatically *rejecting* a switch to an *arbitrary* notional portfolio, which is present common practice. We think it is also clear that we join him in rejecting simplistic approaches to valuations based on market values.

We accept the opener's remark that the composition of the minimum risk (matched) portfolio will depend, to a certain degree, on the assumptions and detailed actuarial method employed to determine it, but it is relatively insensitive to these. More fundamentally, this does not call into question our basic point that the approach of our Main Guiding Principle is the one to adopt for valuation purposes.

Mr Wise took us mildly to task for what he regarded as an overemphasis on matching. We see matching as an essential conceptual tool, in particular as the means of establishing the liability-asset link, and the minimum risk portfolio as the natural reference point from which investment objectives are set. But we hope we have also done enough to convince him that we too regard mismatching as the norm; as we say in § 14.19, yardsticks and targets are emphatically not the same thing. We recognise that his and Professor Wilkie's recent papers, which we cite, range far beyond techniques for matching, which are incidental to their main thrust. Nevertheless, they and their predecessors include what we regard as the most satisfactory and thorough treatment of this aspect, and it was to this that we referred in § 8.1.

Equity-type Investments as Match for Final Pay Liabilities

Mr Urwin and Dr Chaplin took issue with us over our assumption that 'equity-type' investments are the appropriate match for final-pay linked liabilities. We think it is fair to say that there is as yet no general consensus, but we do not propose to extend the debate here. Our view is emphatically based on a long-term perspective; in particular, we have major reservations about some of the conclusions drawn from analysis of recent statistics and about the value of extrapolations from them.

Measurement of Investment Performance

A number of speakers disagreed with aspects of Section 10, but we are heartened by the general acceptance that present systems need improvement, and by Mr Eadie's careful reading of just what we said. We stand by our view that unrealised gains are overemphasised, but agree that any developments must not be capable of manipulation. We are confident that this can be achieved.

We fully endorse Mr Ryan's distinction between investment performance measurement, which is essentially a limited quantitative process, and monitoring, which is a broader, more qualitative and more judgemental matter.

The Investment Process and Asset Allocation

We remain of the view that trustees should invest the assets they have for the liabilities they have and deal with the future as it arises. Mr Stewart chose to read § 13.6 as supporting the well-known views that he and Mr McLeish hold on what the funding target should be. In fact, we were careful to say that the liabilities in question should be those which 'accord with the funding philosophy' (whatever that may be) and we think he is stretching our statement in asserting that we 'recommend' 25% as the specific margin between assets and winding-up liabilities.

Our doubts about the role of specialist asset allocators are rooted in the three principles elaborated in §§ 12.09–12.21, particularly the indivisibility principle; in our preference for a co-ordinated and co-operative, rather than a compartmentalised, approach to the investment process; and in a desire to apply Occam's Razor where possible. We do not agree with Mr Ayers that the arguments advanced in §§ 12.10–12.14 mean that the advantages of strategic asset allocation are nullified, nor that they deny the possibility of control of risk.

We intended our wording of § 14.1 to make clear that it is only where 'little or no account is taken of the nature of the liabilities' that we are rejecting models derived from the Sharpe Optimiser, and hope that this will deal with Mr Ayer's and others' misapprehension of our position. We welcome the comments of Mr McQueen and Mr Rice and are pleased to hear that their systems, which we have not had an opportunity to study, meet the criteria which we propound. In the paper we were careful not to pass judgement on models that we have not seen, but our experience is that critical examination reveals that the liability-dependent characteristics of a number of other models are more claim than fact.