

## **Active Asset Allocation in the UK: The Potential to Add Value**

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### **Abstract**

This paper undertakes a quantitative historical examination of the potential to add value through active asset allocation. Value adding potential from active asset allocation is examined in both environments of "*perfect foresight*" and "*uncertainty*". In practice there is considerable uncertainty about future investment sector returns. Ability to forecast is therefore a key aspect in ability to add value. The analysis indicates that although allocation constraints reduce value added, with the range of constraints normally applied significant value added potential probably remains. The extent to which that potential can be exploited depends on forecasting skill.

### **Keywords**

Asset allocation, value added, perfect foresight, uncertainty.

## **I. INTRODUCTION**

The relative amounts invested in broad investment sectors, or asset allocation, is generally recognised to be more important than the precise selection of assets within such sectors. This is because assets are more highly correlated within sectors than between sectors. Asset allocation is therefore the investment decision that generally has the greatest impact on diversified fund performance.

While the importance of asset allocation is well understood there is no clear agreement as to how allocations should be determined. Qualitative approaches might, for example, use average historical positioning to set future allocations, or they may simply utilise subjective assessments of relative sector attractiveness. More usually though there is some quantitative input into the asset allocation process.

The investment process starts with the definition of fund objectives. While these can be defined in a number of ways, they should always involve an explicit enunciation of risk preferences. For defined benefit schemes the asset liability modelling is a key input into the determination of the fund sponsors' tolerance for return volatility. In accumulation style funds factors such as the age profile of investors and their risk tolerance are central in identifying the appropriate portfolio risk stance. These risk preferences are used in conjunction with assumptions about asset performance characteristics to set the strategic and actual positioning of the fund. While the determination of objectives is usually reasonably straightforward, the setting of the required assumptions about performance is not.

The simplest approach to determining asset performance assumptions is to use historical inputs. However, very different outcomes are obtained using data generated over different historical time periods. Moreover, none of these necessarily provide adequate positioning for the future, since they do not take into account the particular features of the future investment environment. The problem with the recent past is that it tends not to be representative of the range of potential outcomes, and the drawback in using long term data is that much of it is just not relevant. Structural shifts in terms of the behaviour of economic agents, the global

environment (as industrialised economies mature and developing economies become industrialised), and the regulatory situation (such as tax, exchange rate regimes and trade barriers) mean that much historical data may not be of use as an indicator of future behaviour.

This paper undertakes a quantitative historical examination of the potential to add value through active asset allocation. The focus adopted is on forecasting sector characteristics over rolling 12 month periods, and structuring allocations on the basis of these forecasts, which are periodically reviewed. Section 2 describes the methodology used. In Section 3 the value adding potential of active asset allocation is examined under the assumption that managers have available *perfect foresight* forecasts of sector performance. Section 4 looks at value added potential under the more realistic assumption of imperfect forecasting ability. A summary is presented in Section 5.

## **2. THE METHODOLOGY**

In examining active asset allocation decision making, it is assumed that a strategic benchmark allocation has been specified. Such an allocation is used to generate benchmark returns in each time period, and value added is measured as the excess of portfolio returns over these benchmark returns. It is assumed that at any point in time the portfolio is positioned at the "target allocation", which will generally differ from the strategic benchmark allocation.

The target allocation is determined using forecasts of sector risk<sup>i</sup> (as measured by standard deviation) and return over a 12 month time horizon (together with a fixed set of correlations which are the average across the whole study period).<sup>ii</sup> Quadratic optimisation of this data generates "optimal" allocations for given levels of risk. The active asset allocation target is then determined by setting the maximum permitted portfolio risk (standard deviation) at a level no higher than the forecast level for the strategic benchmark allocation.<sup>iii</sup>

The study period runs from 1987 to 1995. Allocations to seven sectors<sup>iv</sup> have been permitted:

- **UK Equities**
- **Overseas Equities**
- **UK Property**
- **UK Fixed Interest**
- **Overseas Bonds**
- **Index Linked Securities**
- **Cash**

The Strategic Benchmark allocation, shown in Table 1, is assumed to be a reasonably typical allocation for UK Pension Funds over the study period.<sup>v</sup> It has mean variance efficiency over the period as a whole.

**Table 1**  
**Strategic Benchmark Allocation**

UK	OS	UK	UK Fixed	OS	Index	Cash
Equities	Equities	Property	Interest	Bonds	Linked	
50%	5%	10%	30%	0%	0%	5%

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Value adding potential from active asset allocation in both environments of "*perfect foresight*" and "*uncertainty*" are examined. In practice there is considerable uncertainty about future investment sector returns. Ability to forecast is therefore a key aspect in ability to add value.

Under the form of perfect foresight assumed here investment managers do not behave as though they can forecast perfectly over all points of time. Such a case would not be interesting since funds would be allocated only to the best performing asset. Instead, it is assumed that managers forecast returns and their standard deviations correctly, and then use processes of optimisation to structure portfolios which maximise returns subject to risk objectives. In particular, the form of perfect foresight used here assumes *complete accuracy* in the forecasting of both returns and risk (as measured by the standard deviation of returns<sup>vi</sup>) over rolling 12 month periods.

Of course, in practice, many errors are made in forecasting and hence in setting asset allocations. Opportunities to add value are missed (appropriate over and under weight positions are not taken); and what are perceived to be value adding opportunities in fact turn out to detract from value (over (under) weight positions are taken when in fact under (over) weights turn out to be appropriate). The former result in a failure to add value; the latter introduce lost value to the portfolio. The perfect foresight case abstracts from forecasting errors and so can be viewed as providing best case results.

In order to assess importance of forecasting ability, portfolio value added is also examined assuming that an entirely adaptive view is taken of future returns. In particular, it is assumed that forecasts for both returns and standard deviations over the coming 12 months are simply those that prevailed over the previous 12 months. The purely adaptive case can be viewed as providing worst case outcomes.

### 3. ACTIVE ASSET ALLOCATION UNDER PERFECT FORESIGHT

The perfect foresight analysis provides information on the maximum value adding potential of active asset allocation. Using completely unconstrained allocations, the analysis indicates that around 8.5 per cent<sup>vii</sup> per annum, pre transactions costs, of value may be added through active asset allocation.

This is, of course, not a level of value added that might reasonably be expected to be achievable. It involves a number of periods in which the entire allocation is in a single sector. Obviously, this would not generally be an acceptable position in practice. Typically allocation constraints are used to ensure that the portfolio maintains a greater level of diversification. In the event that managers actually had perfect foresight, constraints would not be necessary. However, considerable uncertainty exists about future portfolio performance, and the extreme allocations generated by unconstrained optimisation analysis would not be adopted in practice. While the application of allocation constraints has the positive benefit of ensuring that the portfolio always has adequate diversification (and they are sometimes used as indicators of the range of permitted portfolio risk), they also have the effect of reducing value added potential from active allocation.

Using the allocation constraints shown below in Table 2, value added potential dropped from the 8.5 per cent per annum unconstrained to around 3 per cent. In addition, the standard deviation of value added fell from around 9.5 per cent (annualised) to 3 per cent. This is a substantial drop in the level of potential value added, but it moves the volatility of value added into a far more acceptable range.

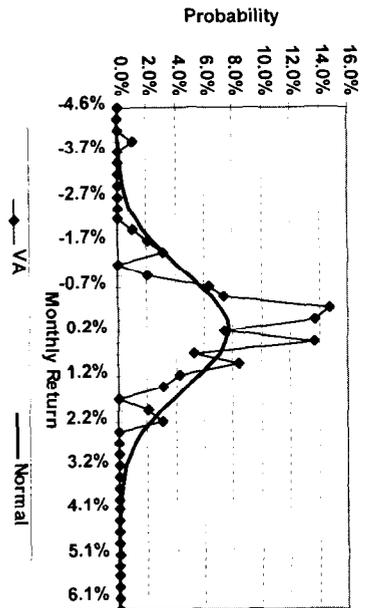
**Table 2: Allocation Constraints**

	UK Equities	OS Equities	Property	UK Fixed Interest	OS Bonds	Index Linked	Cash
<b>Maximum</b>	80%	40%	20%	50%	15%	10%	15%
<b>Minimum</b>	30%	0%	5%	10%	0%	0%	0%

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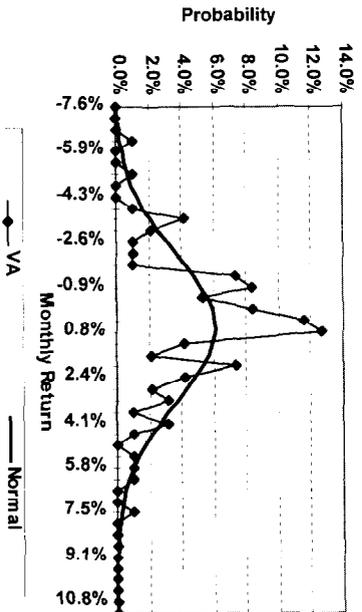
The value added probability distributions for the constrained and unconstrained analyses are shown in Figures 1 and 2 respectively below. As can be seen, value added is less volatile in the constrained case, but the mean is also at a lower level.<sup>viii</sup>

Figure 1: Value Added Distribution Constrained Allocations  
Probability Distribution



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Figure 2: Value Added Distribution Unconstrained Allocations  
Probability Distribution



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In general, more restrictive constraints result in lower returns. For example, where only the minimum allocation constraints are applied value added is on average 2.5 per cent higher per annum than with the full set of constraints. Also, the standard deviation of value added is around 1.4 per cent higher, or only 0.8% higher in periods including 1987. Similarly, where only maximum constraints are applied

value added is around 1 per cent higher and its standard deviation 1.4 per cent higher, or 3 per cent higher in periods including 1987. Historically, minimum constraints appear to have been more effective in controlling the volatility of value added. This is indicated by the cited differences in volatility for periods including 1987.

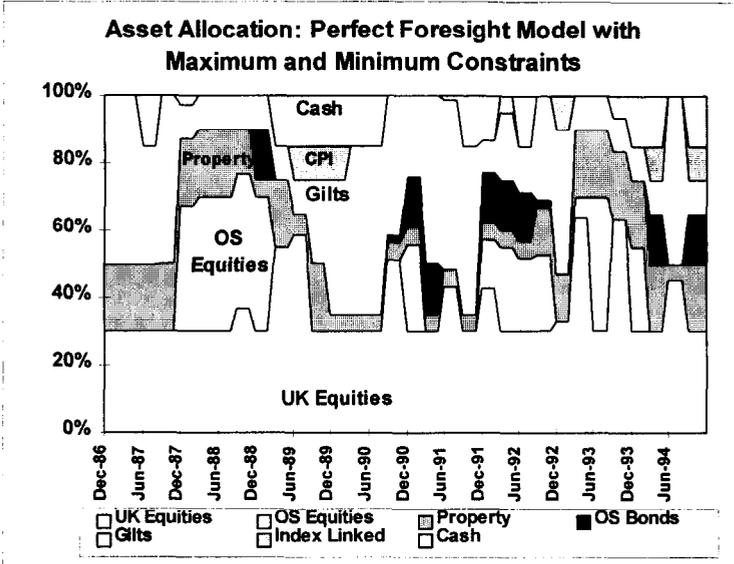
Whether or not this historical significance of minimum constraints in controlling volatility can be projected into the future, depends upon whether the patterns of sector returns which generated this result in the past can be expected to be observed in future. The behaviour of UK equities appears to be the paramount feature. In particular, there are several shorter periods that have atypical returns compared to longer periods within which they lie. What appears to be of importance are short periods of relatively strong returns for this sector, as compared to a relatively poor 1 year outlook. The one year focus in position taking means that value is lost in these short periods, but to a lesser extent where there is a non zero minimum allocation constraint.

The implication of this analysis is that the imposition of asset allocation constraints can be expected to reduce value added potential by more than a half. Against this, constraints act to reduce the volatility of value added significantly, even assuming the form of perfect foresight specified here. However, the key question for active asset allocators is whether any significant potential to add value remains.

The answer depends upon the tightness and comprehensiveness of constraints and the degree of forecasting skill. For example, where constraints focus on the overall allocation to growth assets versus cash plus fixed interest sector allocations as opposed to individual sectors, or where they still permit significant deviations from benchmark, then the analysis suggests that significant value added potential should remain. Whether or not that potential can be exploited depends on forecasting skill.

It should be noted that none of the estimated value added data makes allowance for transactions costs, which can be highly significant depending upon the frequency and magnitude of reallocations. As shown in Figure 3, the size of asset allocation swings is considerable.<sup>ix</sup> In practice it may not be possible to vary the allocation to property as indicated by the analysis, since the costs of doing so would be considerable. A conservative estimate of transactions costs with these sorts of allocation swings amounts to 1 per cent per annum where there is a quarterly reoptimisation. With less frequent reoptimisation the costs can be expected to be lower. Also, where constraints are tightened, the level of transactions costs falls because the magnitude of swings in asset allocation are reduced.

Figure 3



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Estimated value added with perfect foresight can be quite variable from year to year. Although returns were assumed to be correctly forecast, there were periods in which substantial lost value was generated (Figure 4).

Value added potential was found to vary considerably with the timing and frequency of reoptimisation. As might be expected, in 1987 the timing of reoptimisations would have had a significant impact on value added with the best outcomes resulting from reoptimisations just prior to the sharemarket crash. While in the nine months to the end of September 1987 under most reoptimisation alternatives value is lost (because no account is taken of the short term strong returns from equities), those with an annual reoptimisation at the start of August, September, or October add value (because an overweight equities position is held for longer, and there is a reoptimisation before the crash). The maximum value added for the year overall is achieved with a reoptimisation at the start of October, and the lowest value added outcomes are found with reoptimisations in those months following October. In particular an annual rebalance in January adds just 1.2 per cent for the whole year, while with an October rebalance 12.7 per cent in value is added.



However, the shorter the period, the more dependant sector returns are on unpredictable sentiment related factors and the less they are related to valuation, economic and financial fundamentals. It is arguable that these latter factors are forecastable with sufficient accuracy to permit the production of "reasonably" accurate return and risk forecasts. The former are certainly not. What is of interest is how accurate the forecasts have to be to make active asset allocation worthwhile on a risk adjusted basis.

This section examined value added potential in the context of perfect foresight models. In reality, there is considerable uncertainty attached to forecasting returns to asset sectors. Section 4 examines the issue of what degree of accuracy forecasters need to achieve in order to add significant value through active asset allocation.

#### **4. ACTIVE ASSET ALLOCATION UNDER UNCERTAINTY**

In order to assess importance of forecasting ability, portfolio value added has been examined assuming that an entirely adaptive view is taken of future returns. In particular, it is assumed that forecasts for both returns and standard deviations over the coming 12 months are simply those that prevailed over the previous 12 months.

With this approach, over the period 1988 to 1994 more than 6% in value in total would have been lost from the portfolio through active asset allocation (Figure 5). When 1995 is included this figure rises to over 11%. The magnitude of value added or lost varies significantly from year to year. In 1989 for example, value of almost 2% would have been added, because equities and property were the attractive sectors in both 1988 and 1989. However, generally this appears not to be the case, and it is not unusual for the best performing sector in a given year to be the worst the next. In 1991 for example, overseas equities was the highest returning sector, having been the lowest the previous year. Over 12 per cent in lost value is generated through use of adaptive expectations forecasts in 1990. The reason for this is that asset allocation is based on strong returns to growth sectors in 1990, when it turns out that cash is the best performing sector in 1991.

All this serves to illustrate that, not only does the adaptive approach fail to add value, but it also produces a volatile value added/lost series. With adaptive expectations the standard deviation of value added was around 5 per cent, similar to that for the perfect foresight model for the same period. Assuming that value added is normally distributed, the probability of (per annum) value added being

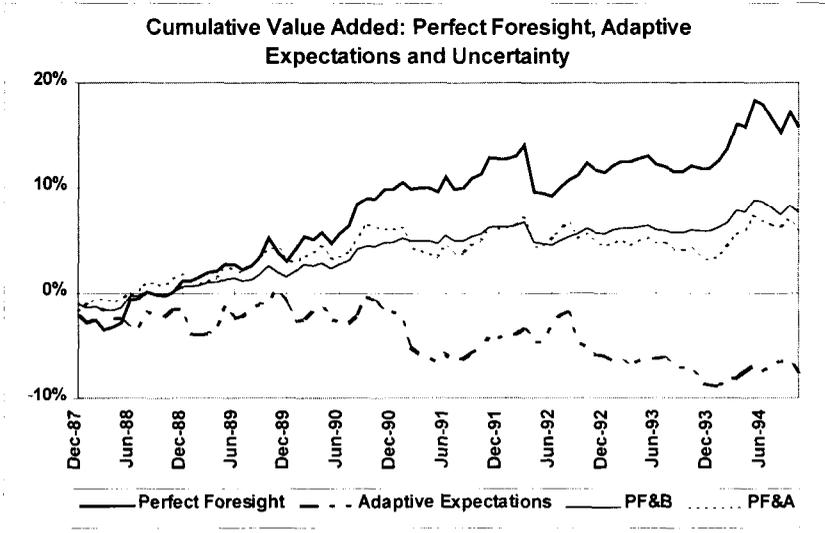
negative under adaptive expectations was around 60 per cent, significantly higher than the 23 per cent probability for the comparable perfect foresight case.

### *Uncertainty*

The perfect foresight and adaptive expectations cases could be viewed as providing a range of value added potential for active asset allocation managers, of -1.5 to say 4.5 per cent per annum, with the 4.5 per cent maximum result obtained permitting relatively unconstrained allocations.

Of course active asset allocators cannot forecast even as well as the perfect foresight method described in this paper. Neither need they be totally reliant on what has occurred in the recent past. Nevertheless, it is possible that there would normally be an adaptive component in managers' forecasts. If this is the case then the actual active allocations of skilled managers may lie between the perfect foresight and the adaptive expectations positions. The case where the active allocation positions are half way between these two allocations has been examined. Here cumulative value added is shown by the series labelled "PF+A" in Figure 5 where, of course, value added lies between the levels for perfect foresight and adaptive expectations.

**Figure 5**



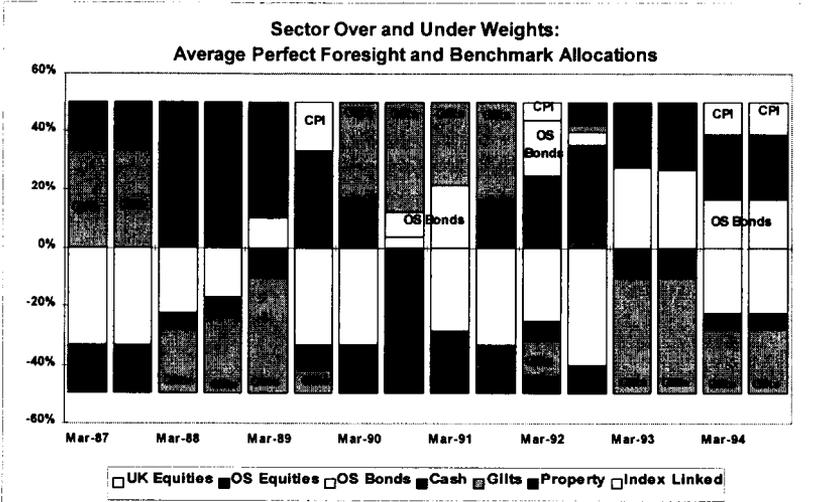
Since managers are aware that their forecasts are imperfect and they are concerned about the extent of potential benchmark under performance. They may therefore tend to use forecast optimal allocations merely to indicate the direction in which allocations should more moved away from their benchmark levels. It may be more appropriate to assume that allocations lie somewhere between the strategic benchmark and the perfect foresight allocations.

The case where allocations are set half way between the benchmark and the perfect foresight optimal allocations is shown as series "PF+B" in Figure 5. Value added in this case, around 1.5 per cent per annum, was slightly higher than that for "PF+A", and the volatility of value added was significantly lower. It declined from around 3 per cent in the perfect foresight cases and "PF+A" case, to around 2 per cent with "PF+B". This reduced volatility is important since it means that value added is more likely to lie within an acceptable range. Although there is a reduced level value added, the lower volatility means that the annual probability of subtracting value remained the same as in the perfect foresight case (23 per cent annually).

On the basis of the data observed historically, with this approach two thirds of the time value added would be expected to lie within the range -0.5 per cent to +2.5 per cent (assuming that value added is normally distributed) where constraints are as in Table 2. With less restrictive constraints value added could be expected to be greater, but so too would its volatility.

The size of allocation deviations from benchmark required to generate this level of value added are illustrated in Figure 6. Substantial deviations from benchmark weightings are required from time to time. However, allocations are generally within a range that Trustees and fund sponsors would regard as acceptable.

**Figure 6**



The generation of this sort of value added is still, of course, highly dependent on forecasting ability. With less than perfect forecasts value added can be expected to be lower on average and probably more volatile (unless allocations are highly constrained). For the "PF+B" approach to work however, perfect forecasts are not essential. All that is required are forecasts that move allocations in the direction of the true optimum.

The sort of approach that is likely to achieve this with a reasonably high level of reliability, is one which utilises multiple scenarios. Such scenario forecasts would need to be focused on the major points of uncertainty in the economic and investment environments. Return forecasts would be generated for each scenario on the basis of specific assumptions for all the relevant variables. By analysing the range of scenarios, active allocations that add value in the most likely cases but which also provide some downside protection against the most important investment risks can then be identified. While value added will certainly be less than with perfect foresight, on the basis of the analysis here significant value added potential would still remain. Additionally, a multiple scenarios process described here can be focused on limiting the volatility of value added.

## 5. SUMMARY AND CONCLUSIONS

This paper has investigated the potential to add value through active asset allocation. It should be noted that the magnitude of value added cannot confidently be extrapolated into the future, since it is dependent upon the differences in the magnitude of sector returns and these can be quite variable through time.

In terms of the relative importance of the different parameters, return forecasting is on the basis of the analysis undertaken here by far the most important variable impacting on value added potential. However, the forecasting of standard deviations does appear to have had a positive impact (even when using historical correlations). While risk forecasting has been unusual, there are now managers that do have a forward looking element to risk assumptions.

The analysis started by assuming that managers have a particular type of perfect foresight. In this case value added potential from unconstrained active asset allocation, was 8.5 per cent per annum. Under the more usual allocation constraints the value added declined to 3 per cent per annum, still a substantial figure. Such allocation constraints, particularly minimum constraints, were also found to have the positive benefit of reducing the volatility of value added, thereby providing something of an offsetting benefit to the reduction in value added.

The key issue for active asset allocators is whether (after transactions costs and fees) any significant potential to add value remains. The answer depends upon the level of constraints applied and the degree of forecasting skill. The analysis indicated that although constraints reduce value added, with the range of constraints normally applied significant value added potential probably remains. The extent to which that potential can be exploited depends on forecasting skill.

Adaptive expectations were used as a basis for analyses designed to assess the importance of forecasting skill in adding value. This generated over 6 per cent in lost value, with considerable volatility in the levels of value added through time.

While active asset allocators cannot forecast perfectly, they need not be totally reliant on what has occurred in the recent past. There may however be some adaptive component in managers forecasts. Where actual allocation decisions lie half way between the perfect foresight and the adaptive allocations, value added was found to be around 1 per cent per annum.

However, in view of the importance of avoiding sub-benchmark performance, it is likely to be more usual for allocations to lie between the optimal and benchmark allocations, than between optimal and adaptive ones. In this case, around 1.5 per cent of value was added and the volatility of value added was significantly reduced.

On the basis of the historical data analysed, with this approach two thirds of the time value added by a "skilled" asset allocator might reasonably be expected to lie within the range -0.5 per cent to +2.5 per cent. With less restrictive constraints value added will be greater but so would its volatility. This suggests that as long as on average a manager's investment process is designed to move allocations from the benchmark towards optimal future levels, then there is scope to add significant value. Asset allocation constraints ensure that the outcome, when managers get it wrong, remains within acceptable bounds.

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<sup>i</sup> The use of a 12 month period to assess the general risk characteristics of a sector would of course be quite inadequate. However, that is not what is being done in this context. Rather the focus on the 12 month period for forecasting risk as well as return, provides the most relevant information for positioning the portfolio.

<sup>ii</sup> The benefits of forecasting correlations over 3 year time periods are not reported here but have been examined. This analysis indicated that there was little return enhancement, as compared to using period averages. However, this may have been because the study period was too short to generate significant swings in correlations over rolling 3 year periods. In principle, an ability to forecast correlations over shorter periods should enhance returns - I have to carry out more analysis to assess the importance more fully.

<sup>iii</sup> An alternative would be to maintain the standard deviation at its average level of the whole period; or to use the probability of negative returns as a risk parameter. An examination of this case revealed little difference in overall value added.

<sup>iv</sup> The sector indices used are FTSE All Share Accumulation Index, MSCI Accumulation Index in £, Investment Property Databank (IPD) All Property Total Return Index, FTA British Government over 15 years Total Return Index, JP Morgan Global Government Bond Total Return Index in £, FTA British Government Index Linked All Stocks Total Return Index, and the UK Local Authority 7 Day Rate.

<sup>v</sup> Information on the positioning of UK pension funds was sourced from "Pension Fund Indicators: A Long-Term Perspective on Pension Fund Investment", PDFM Limited, London, April 1995.

<sup>vi</sup> In principle the downside semi-deviation of returns would be more appropriate. However, with only 12 observations in total per forecast the calculation of a semi-deviation forecast presents some difficulties since, in general there will be too few observations on the downside.

<sup>vii</sup> These figures (and others quoted through this paper) vary depending upon the time period examined, and the particular assumption made on the timing and frequency of reoptimisation. The figures quoted are an average across the contiguous monthly, quarterly and 6 monthly reoptimisation alternatives over the whole data set. In addition, periods excluding 1987 have been examined to ensure that results are not distorted by the 1987 crash.

<sup>viii</sup> The impact of allocation constraints on both the level and volatility of value added are broadly in line with the findings of a recent study from an Australian perspective ("Asset Allocation: Structuring Benchmarks and Adding Value", Susan Gosling, Advance Asset Management, Sydney, December 1995).

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<sup>ix</sup> The constraints set out in Table 2 were used to generate the allocations shown in the Figure 3, with quarterly reoptimisations at the end of March, September, June and December.