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# Returns from Active Management in International Equity Markets: Evidence From a Panel of UK Pension Funds*

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**Abstract**

This paper proposes new performance decomposition measures that allow us to analyze the sources of returns on the international equity holdings of a large cross-section of UK pension funds. Our results suggest that the pension funds earned negative returns both from international market timing and from selecting stocks within individual foreign regions. The average fund underperformed a passive global equity benchmark by 70 basis points per annum. This is substantially greater than UK pension funds' underperformance in their domestic equity market. We discuss the implications of these findings for theories of informational asymmetries in international stock markets.

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## 1. **Introduction**

Despite the increasing integration of international capital markets, there has been little research on institutional investors' asset allocation decisions in foreign markets. This limits our understanding of both the causes behind the large movements in international capital flows and the potential for shifts in foreign investors' asset demands to affect the volatility of domestic asset prices. It also restricts our comprehension of the sources of home country bias, i.e. the finding that investors' weightings in international assets are far smaller than predicted by modern portfolio theory. A key reason for our poor understanding of the sources of this bias is that the vast majority of existing studies have analyzed aggregated country holdings of foreign assets at fixed points in time. At this level of aggregation, it is difficult to identify the sources determining portfolio weight changes, since these are influenced by changes in the composition of investors.

This paper provides an empirical investigation of the sources of returns on foreign institutional investors' equity holdings. We analyze a unique data set on a panel of 247 UK pension funds' foreign equity holdings over the period 1991 to 1997. UK pension funds face very few restrictions on their investment strategies and have the highest international equity weighting among the world's pension funds: Table 1 shows that UK pension funds' international equity holdings ranged between 27 and 30 per cent of their total equity holdings over the sample period. As a result, many new insights into the sources of performance of institutional fund investments in foreign markets can be learned from our data set.

Our analysis of returns from international market timing and security selection builds on decompositions previously used for domestic asset returns. However, we extend these to allow for time-varying reference weights and a global benchmark for performance. We find robust evidence that international market timing yields negative mean returns. This is consistent with the findings in Timmermann & Blake (2002) of negative returns from the funds' 'extra market timing' attempts. These reflect the returns from changes in the funds' portfolio weights that are orthogonal to time-varying conditional first and second moments and hence cannot be explained by publicly available information. Returns from international security selection, though generally negative, are more dependent on the benchmark model used.

These findings have direct implications for our interpretation of home country

bias. It is common practice in studies of the financial gains from international diversification to assume that the return in foreign equity markets equals that on a common equity market index. While this may be an accurate reflection for a passive investor, it need not be so for an active fund manager who is paid to outperform the foreign benchmark. In fact our data strongly contradicts the assumption that returns in foreign markets equal the return on the local common index. In the North American, Asian and European equity markets more than 80 per cent of the sample of pension funds obtained returns below the local index. This proportion of underperformers is far higher than has been found in analyses of asset managers' performance in domestic markets. Blake, Lehmann & Timmermann (1999), for example, show that over the period 1986-1994, the percentages of UK pension funds underperforming in the domestic equities and bonds sectors were 55 and 23 per cent, respectively. This suggests that a major reason why investors are reluctant to invest internationally is that their relative underperformance is likely to be higher in these markets.

Informational asymmetries between domestic and foreign investors is one of the most prominent explanations of home country bias, c.f. Gehrig (1993) and Brennan & Cao (1997).[1] This theory argues that foreign investors are worse informed than domestic investors about stocks in the home country. If correct, it suggests that foreign investors should underperform relative to domestic investors, i.e. that returns from international security selection are negative. To our knowledge, this implication of informational asymmetries has not previously been tested.

Informational asymmetries have less to say about the returns from international market timing, i.e. the attempt to earn positive returns from dynamically changing exposures to international markets. There are some indirect implications, however. The poorer is foreign investors' information about returns in individual markets, the more difficult it is likely to be for them to successfully time their investments across these markets. On the other hand, even if foreign investors know less about the performance of individual stocks abroad than domestic investors, this does

[1]Other explanations for home country bias include institutional constraints and transactions or deadweight costs (Black (1974), Stulz (1981b)), heterogeneity of expectations by investors from different countries (French & Poterba (1991)), increasing return correlations in bear markets (Lin, Engle & Ito (1994)), hedging against deviations from purchasing power parity (Stulz (1981a), Adler & Dumas (1983), Cooper & Kaplanis (1994)) and, in the case of net investors such as pension funds, liabilities denominated in the domestic currency.

not imply that they face similar disadvantages when trying to predict the relative overall performance of international markets.

Our finding of negative returns from security selection within each foreign market suggests that informational asymmetries are an important factor in explaining the home country bias puzzle. However, the finding that the major source of negative returns from international asset management stems from international market timing also suggests that information asymmetries do not provide a complete answer. The presence of better-informed domestic investors can explain the relatively poor performance of foreign fund managers within each market, but this argument cannot be used to the same extent to explain their poor performance in allocations of funds between major international markets.

The plan of the paper is as follows. Section 2 provides a description and characterization of our data set. Section 3 proposes decompositions of return performance and examines a variety of measures of returns from international market timing and security selection. Section 4 concludes.

## 2. **Data**

The WM Company of Edinburgh, Scotland provided us with a data set of 84 monthly observations on 247 UK pension funds' investments in international equities over the period 1991:1 - 1997:12. The sample comprises all of the funds that maintained the same single, externally-appointed fund management house throughout the period.

For each fund, we have data on four regional constituents: Japan, North America, Europe (excluding the UK) and Asia-Pacific (excluding Japan).[2] For each region, every fund reports initial market value and net investment, income received, and return over the month. All asset holdings and returns are reported in pounds sterling. There is no strong evidence of survivorship bias in the data (see Timmermann & Blake (2002)).

[2]Some funds also held positions in a sector entitled 'other international equities' which largely consists of African, Middle Eastern and South American equities as well as mutual funds that could not be allocated exclusively to one of the four main categories. But these holdings were very small, less than 1 per cent of total international equity holdings for much of the sample period. Since the data records on this category were found to be incomplete, this sector was dropped entirely from the analysis and the weights rescaled for the four main regions.

The standard procedure for reporting investment performance in individual equity markets is to regress generated excess returns on a constant and the excess return on the local market index and to consider the estimated intercept term. While the resulting single-index 'Jensen' performance measure does not have the same interpretation in the context of internationally diversified portfolios, as a means of characterizing returns in the four regions in a way that is comparable with much of the existing literature on domestic equity market performance, we estimated the following model:

$$\rho_{ijt} = \alpha_{ij} + \beta_{ij}\rho_{mjt} + \varepsilon_{ijt}. \tag{1}$$

Here $\rho_{ijt}$ is fund $i$'s excess return in the $j$'th market at time $t$ and $\rho_{mjt}$ is the market excess return in the $j$'th market. For the total portfolio, we used a multi-factor regression where the factors are the market index returns in the four regions under consideration:

$$\rho_{ijt} = \alpha_{ij} + \sum_{k=1}^{4} \beta_{ik}\rho_{mkt} + \varepsilon_{ijt}. \tag{2}$$

A number of caveats are in order: first, Jensen alpha regressions do not have the usual interpretation of measuring superior stock selection skills when asset allocations change over time; second, the individual equity markets cannot be presumed to be segmented in the way implied by equation (2) and a mean-variance optimizing investor would use the world market return as the benchmark. Hence we view these market-by-market single-index regressions as part of the description of the data set rather than a formal test of performance.

For the total international equity portfolio, 55 per cent of funds produced negative $\alpha$ estimates relative to the single-index benchmark, although none of these was statistically significant. For the multi-index regression, the median $\alpha$ estimate was -1.27 per cent per year and 87 per cent of the funds produced negative $\alpha$ estimates, 15 per cent of which were significant at the 5 per cent level. On the basis of equation (2), Figure 1 shows that the majority of funds had $\alpha$ estimates between 0 and -3 per cent per annum and a small cluster of funds generated large negative estimates between -3 and -4 per cent. This poor performance emerges even though UK pension funds benefited inadvertently from being underweight in Japanese fi-

nancials over the sample period[3] and the effect of this has not been controlled for in these regressions. The chief reason for UK pension funds' poor performance was, of course, their massive underweighting of the US market which happened to pay very high mean returns over the sample period, c.f. Timmermann & Blake (2002).[4]

## 3. **Performance Decompositions**

We next perform a range of tests on the active fund management skills of our sample of pension funds. This is an important exercise since it helps to discriminate between competing theories of home country bias. Gehrig (1993) and Brennan & Cao (1997) argue that domestic investors have an informational advantage relative to foreign investors. If true, this suggests that foreign investors' attempts to select stocks should yield lower mean returns. A more indirect implication is that international market timing strategies are also unlikely to generate positive returns. If investors have relatively poor information about returns in different foreign markets, they are less likely to be able to switch successfully between them.

### 3.1. *Four Decompositions*

The summary measures from Section 2 do not indicate how returns from changing portfolio weights can be attributed to security selection within each market, market timing between markets and the long-run contribution from the strategic asset allocation. In this section we provide estimates of returns from these three components. The results will reveal whether UK fund managers perceived themselves as being poorly informed investors in foreign markets and they will also help to identify the sources of returns from international asset management.

We build on a simple decomposition proposed by Brinson, Hood & Beebower (1986). Suppose there are $M$ regions and let $\omega_{nijt}$ be the 'normal' or strategic asset allocation of the $i$'th fund in the $j$'th region at time $t$, $\omega_{aijt}$ be the actual portfolio weight, $r_{njt}$ the 'normal' portfolio return, and $r_{ajit}$ the actual portfolio return.[5]

[3]Overseas investors are unable to achieve the market weight in Japanese financials on account of the size of the existing cross-holdings between Japanese financial institutions.

[4]These findings are robust to allowing for time-varying investment opportunities, c.f. Timmermann & Blake (2002).

[5]Compared with Brinson et al. (1986), we have more time series observations (84 to 40), more funds (247 to 91) and data on more asset classes (4 to 3).

The following must hold as an arithmetic identity:

$$\begin{aligned}\sum_{j=1}^{M}\omega_{aijt}r_{aijt} \equiv & \sum_{j=1}^{M}\omega_{nijt}r_{njt}+\sum_{j=1}^{M}\omega_{nijt}(r_{aijt}-r_{njt})+ \\ & \sum_{j=1}^{M}(\omega_{aijt}-\omega_{nijt})r_{njt}+\sum_{j=1}^{M}(\omega_{aijt}-\omega_{nijt})(r_{aijt}-r_{njt}),\end{aligned} \tag{3}$$

or Total Return ≡ Normal Return + Return from Security Selection + Return from Market Timing + Residual Return.

This is a useful decomposition if we have reliable measures of 'normal' portfolio returns and weights for our sample of UK pension funds. Reasonable measures of 'normal' portfolio returns are the various FT/S&P benchmark indices used by the WM company. However there is no accepted model of 'normal' portfolio weights.[6] We therefore explore four different models, each of which makes different assumptions regarding the underlying data generating process and the constraints facing the pension funds.

The first model, proposed by Brinson et al. (1986), takes the average portfolio allocation over the sample as the normal portfolio weights:

$$\omega_{nijt}=\sum_{t=1}^{T}\omega_{aijt}/T, \tag{4}$$

for all $i$ and $j$. This definition seems reasonable if the funds are in a steady state in the sense that they have achieved their target portfolio composition across major asset groups and that long-run investment opportunities are stationary. It may not be an attractive assumption in our case because of strong trends in portfolio weights over the sample period documented in Timmermann & Blake (2002).[7] However, suppose that the vector of stock returns is covariance stationary. Then returns based on the average portfolio weights provide a consistent estimate of returns to a passive mean-variance optimizing investor who does not adjust portfolio

[6] This would require detailed information on the maturity profile of the pension funds' liabilities. Timmermann & Blake (2002) propose an approach that projects individual funds' portfolio weights on the first and second conditional moments of asset returns computed in the context of a bivariate GARCH model.

[7] Over our sample the average fund's weight on North American stocks declines from close to 30 percent to just under 15 percent, while the allocation to Europe rises from 45 percent to just under 60 percent of the foreign equity portfolio.

weights with changes in the conditional first and second moments of asset returns, but holds the optimal portfolio weights on average. Furthermore, these constant weights provide a natural reference point and similarities between the decompositions generated under this somewhat unrealistic model and those produced using more dynamic models will indicate the robustness of the decomposition given in (3).

The second model allows for a trend in the normal portfolio weights; trended weights do not require the covariance stationarity of returns. Accordingly, our second measure of the normal portfolio weights is

$$\omega_{nijt} = \omega_{aij1} + (t/T)(\omega_{aijT} - \omega_{aij1}). \tag{5}$$

Since $\sum_{j=1}^{M}(\omega_{aijT} - \omega_{aij1}) = 0$, this measure ensures that the normal portfolio weights lie in the interval [0,1] at each point in time. Benchmark portfolio weights increase (or decrease) linearly in time between the initial and terminal weights. This is a reasonable description of UK pension funds' investment in US equities but is incompatible with some of the variations in the portfolio weights of the other markets.

The third model assumes that, collectively, UK pension funds have no ability to market time. This is imposed by setting the normal portfolio weights equal to the cross-sectional average holding:

$$\omega_{nijt} = \frac{1}{247}\sum_{i=1}^{247}\omega_{aijt}, \tag{6}$$

This definition may be reasonable if variations in the funds' regional market weights were the result of asset-liability matching considerations and did not reflect active market timing attempts.

All of these definitions of normal portfolio weights are centered around the funds' sample weights. However, UK pension funds' portfolio holdings differ substantially from the weights in terms of both their levels and evolution. By disregarding this difference, the above definitions of normal weights ignore the economic importance of the decision that UK pension funds made in terms of deviating from the world market portfolio. Our fourth and final definition of normal weights simply sets these equal to the world market weights:

$$\omega_{nijt} = \omega_{ajt}^{world}. \tag{7}$$

While this definition ignores UK pension funds' particular exposure to currency risk,[8] mean-variance optimizing investors ought to hold the same world market portfolio if differential information and hedging effects related to liabilities denominated in local currency are relatively small and investors only differ in terms of how much they hold in the risky world market portfolio versus the world riskfree security, c.f. Dumas (1989). Furthermore, if foreign investors recognize that they are likely to be worse-informed than domestic investors, the global portfolio would represent a feasible passive investment vehicle.

The negative values for the residual term are less straightforward to interpret in economic terms. They suggest that when funds are overweight in a particular market (relative to the normal benchmarks) they also perform poorly in terms of picking stocks within that market. This finding is unlikely to reflect a market impact effect since foreign investors tend to be small relative to domestic ones.

Table 2 summarizes the aggregate evidence on returns from these components. First consider the model which assumes that normal portfolio weights are computed as sample averages and are thus constant through time (eqn. (4)). In this model, the normal return was 13.51 per cent per year, about 1.1 percentage points higher than the pension funds' realized total return of 12.43 per cent. This implies that the contribution to mean returns from the active management component was negative (although not statistically significant using Fama & MacBeth (1973) time-series standard errors): mean returns from security selection are -0.24 per cent per year while market timing contributes on average -0.59 per cent.

Turning to the definition of normal portfolio weights that permits a linear trend (eqn. (5)), the mean normal return was 13.97 per cent per year. For this model, the mean return from security selection was –0.09 per cent per year, while the market timing component contributed on average –1.05 per cent per year to performance. Again neither of these figures is statistically significant. When normal portfolio weights are set equal to their cross-sectional average (eqn. (6)), mean returns from market timing equal zero by construction, while the selection component contributed a statistically insignificant -0.36 per cent. Only when normal portfolio weights are set equal to the value-weighted world average (eqn. (7)) did

[8]Recall that their liabilities are denominated in sterling.

the selection component add a small (but statistically insignificant) positive value to the portfolio. Again the market timing component subtracted value and dominated the selection component so that active portfolio management still subtracted value.

Although the sign of the selection component depends on the benchmark model (but is negative in three out of four models), irrespective of which benchmark model is used for the normal portfolio weights, we find that the timing component always contributes negatively to portfolio performance and that the mean total contribution from active management (the sum of these two components) is also always negative.[9]

We can compare the decomposition of returns from the international equity holdings of UK pension funds with that from their total holdings (which include international equity holdings). This is done in Table 3 for the case of the constant and trended benchmarks for normal portfolio weights, using results from both Table 2 and Blake, Lehmann and Timmermann (1999). While the data panels for international equity and total holdings do not coincide precisely, the table nevertheless provides clear evidence that UK pension funds' active management of international assets delivers even poorer performance than their active management of domestic assets. The table shows that security selection adds a negligible 0.01 percentage points to the total portfolio return, but subtracts -0.24 percentage points from the international equity portfolio return, although neither of these amounts is statistically significant. Market timing, on the other hand, subtracts -0.34 percentage points from the total portfolio return and -0.59 percentage points from the international equity portfolio return; the first of these figures is statistically significant, while the second is not. Similar figures emerge when a trend is permitted in the normal portfolio weights. In this case the total security selection contributes 0.03 percentage points to the total portfolio return while it subtracts -0.09 percentage points from the international equity return, neither figure being statistically significant. International market timing subtracts -0.30 percentage points from the total portfolio return and a massive -1.05 percentage points per annum from the international equity return, with both figures being statistically significant.

[9]Using a sample of 18 UK unit trusts Shukla & VanInwegen (1995) also find that UK-managed mutual funds in the US underperformed relative to domestically-managed US funds and that this was partly due to their inferior market timing skills.

### 3.2. *Performance Distribution across Funds*

To gain further insights into the performance of the individual funds, Figures 2 and 3 provide cross-sectional evidence on the distribution of the mean returns from the individual funds' selection, timing, residual and normal return components. For the decomposition that includes a trend in the normal portfolio weights (Figure 2 based on equation (5)), most funds had a negative security selection component, although a few funds managed to earn positive mean returns from this activity. Almost all funds experienced a negative contribution to mean returns from market timing. Mean normal returns are tightly and symmetrically distributed around 14 per cent, while residual returns are overwhelmingly negative.

Setting normal weights equal to the global weights (Figure 3 based on equation (7)), leads to small positive mean returns from security selection. This arises from the consistent outperformance in Japan coupled with the higher weighting of Japan in the global portfolio and hence is unlikely to reflect genuine selection skills. Many funds still produced large negative returns from market timing according to this benchmark model.

Figures 4 and 5 plot the cross-sectional distribution of the percentage of the total variance of portfolio returns accounted for by security selection, market timing, residual returns and normal returns. For the decomposition that includes a trend in the normal portfolio weights (Figure 4 based on equation (5)), the security selection component accounts for less than 8 per cent of return variation for the majority of funds but accounts for up to 30 per cent for a small fraction of funds. The contribution from market timing tends to be even smaller and is concentrated between 1 and 3.5 per cent. The residual term is the smallest component, contributing less than 0.8 per cent of the total return variation for the majority of funds. Hence the essentially passive normal return component accounts for the bulk of total return variation. The fact that it often accounts for more than 100 per cent of the total return variation is explained by its negative covariance with the other components.

Unsurprisingly, when the normal weights are taken to be the global index weights (Figure 5 based on equation (7)), then the market timing component accounts for a far larger proportion of total return variability: between 10 and 20 per cent for most funds. The security selection component mostly accounts for less than 10 per cent of return variability and the residual component for less than four

per cent for most funds using this benchmark model. This suggests that, in respect of a global benchmark, international market timing dominated the funds' active portfolio allocation decisions.[10]

As a more formal assessment of whether any individual fund was genuinely able to produce outperformance from international asset management, we apply Bonferroni bounds to the individual funds' $t$-statistics from the security selection and market timing components. Taking normal portfolio weights as constant, Table 4 shows that only the fund with the largest negative return from market timing and the largest positive return from selection appeared to be genuinely capable of producing abnormal returns from active management. In contrast, once a trend is permitted in the normal portfolio weights, there is no longer any evidence that the best pension fund is capable of producing positive mean returns from either timing or selection. A similar conclusion emerges when the normal weights are set equal to the world weights, while only the fund with the best selection performance seems genuinely able to outperform the cross-sectional average benchmark.

## 4. **Conclusion**

Our decompositions of the investment performance of a large sample of UK pension funds show that not only do the funds underperform substantially relative to the relevant regional benchmarks, but this underperformance is much larger than has been found in studies of performance in the domestic market. This underperformance is mainly caused by unsuccessful market timing attempts, i.e. by systematic−and ex-post misjudged−changes in the portfolio weights across international regions.

Recent explanations of home country bias have focused on informational asymmetries and our finding of negative returns from security selection in foreign markets is certainly consistent with this. This explanation does not, however, address why fund managers take such large international market timing bets. The discussion of informational asymmetries has focused on domestic and foreign investors' rela-

[10]The fact that the market timing component in UK pension funds' international equity allocation appears so large when measured against the external world market weights, yet is far smaller when measured against the fund-specific or 'average' pension fund's international asset allocation suggests that the funds were measuring their equity performance against their own peergroup rather than against a benchmark reflecting global equity market weights.

tive possession of information about total asset returns within a particular market. However, our findings call for a finer distinction. Suppose that returns in each national market can be decomposed into a set of common or global factors and a set of idiosyncratic or country-specific factors. Although foreign investors may be at an informational disadvantage relative to domestic counterparts concerning the country-specific return factor, some of them could conceivably believe that they were in possession of superior information on key global factors and their effect on national markets. This setup would certainly explain the extensive attempts at international market timing observed in our sample of pension funds. Nevertheless, the negative estimates of returns from international market timing are more consistent with poor information about the impact of global factors on regional markets.

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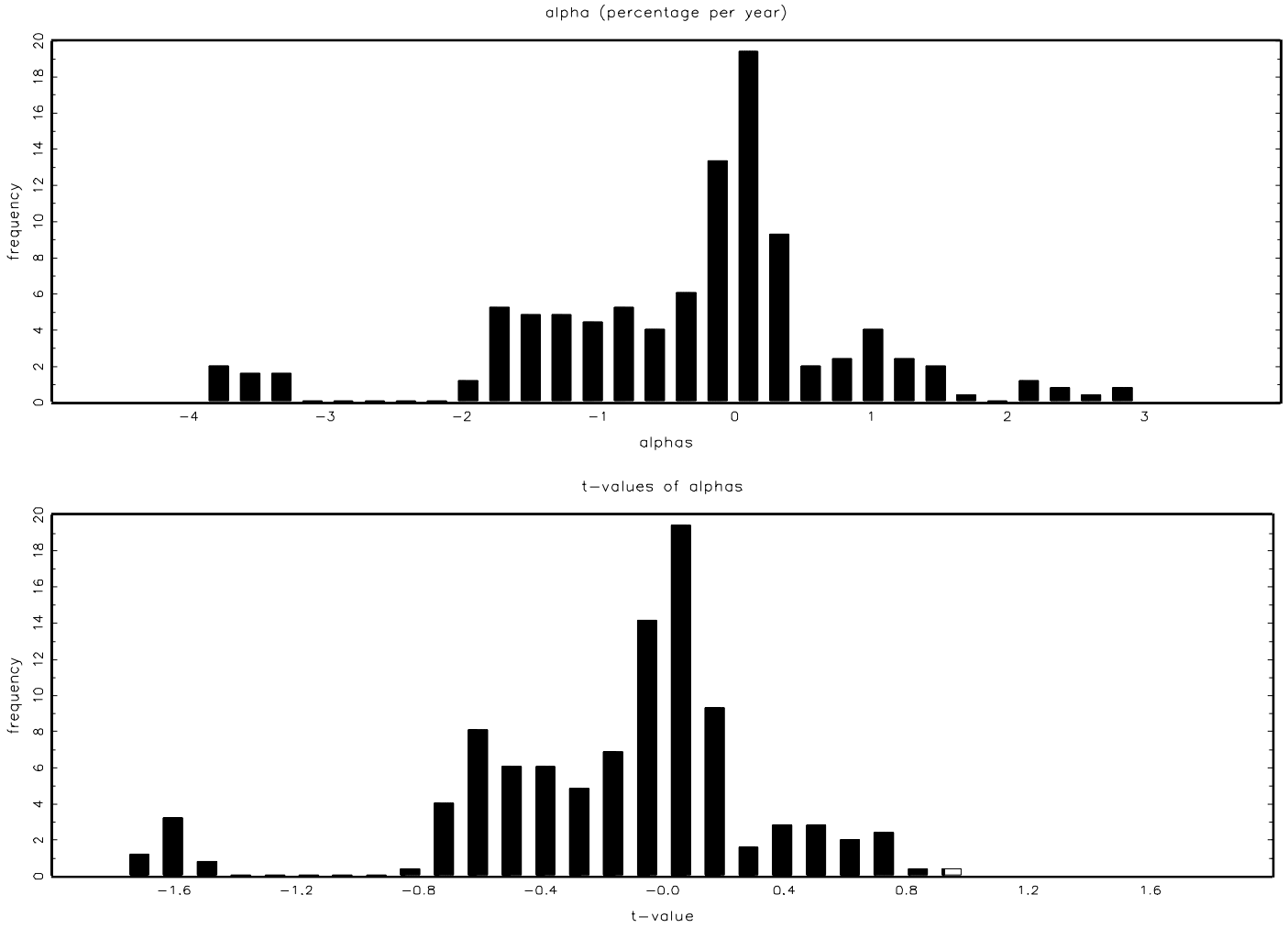
alpha (percentage per year)
frequency
0
2
4
6
8
10
12
14
16
18
20
−4
−3
−2
−1
0
1
2
3
alphas
t−values of alphas
frequency
0
2
4
6
8
10
12
14
16
18
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−0.0
0.4
0.8
1.2
1.6
t−value

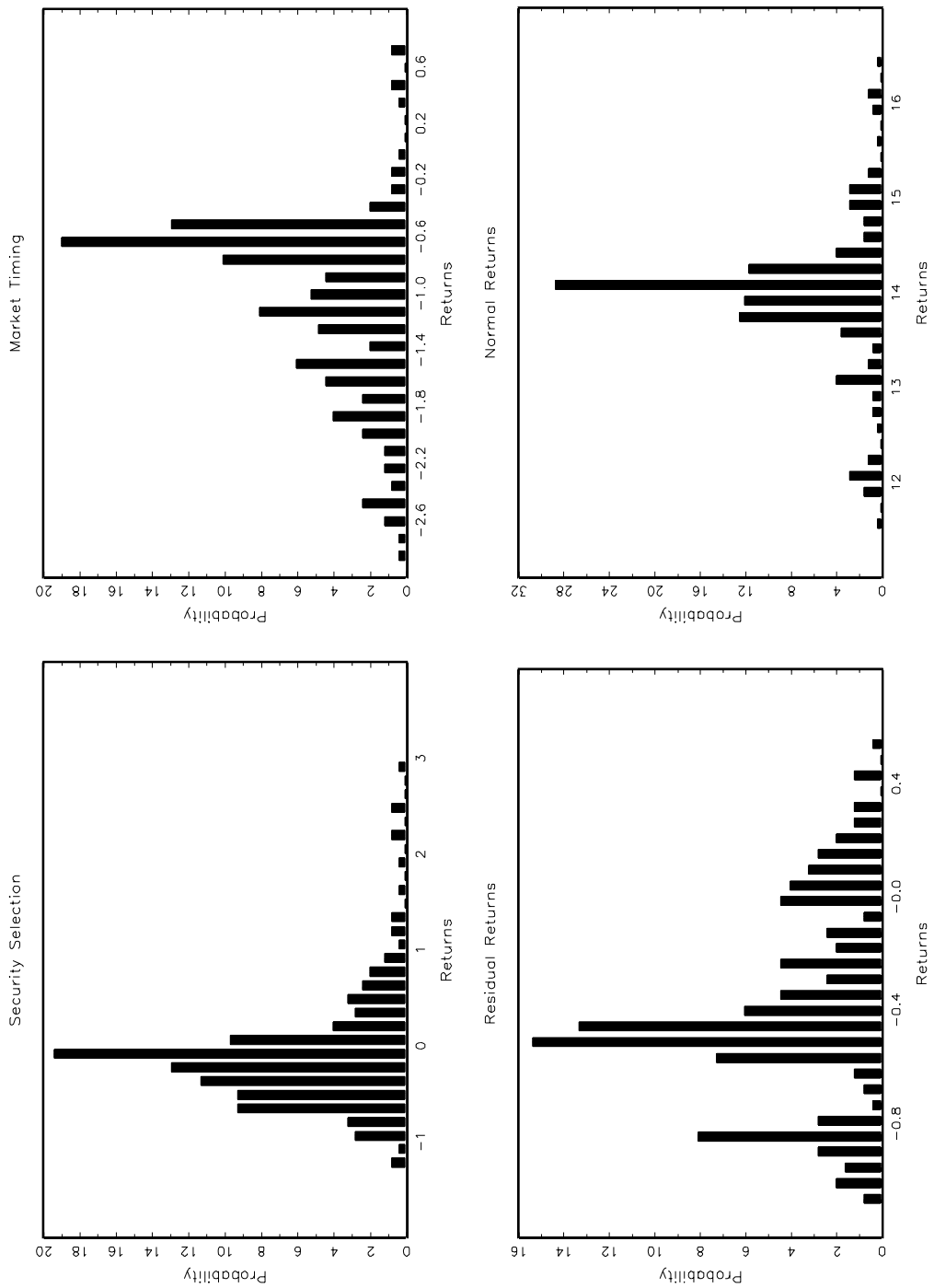





Figure 2: Total return decomposition (fund-specific, trended benchmark - equation (5)).

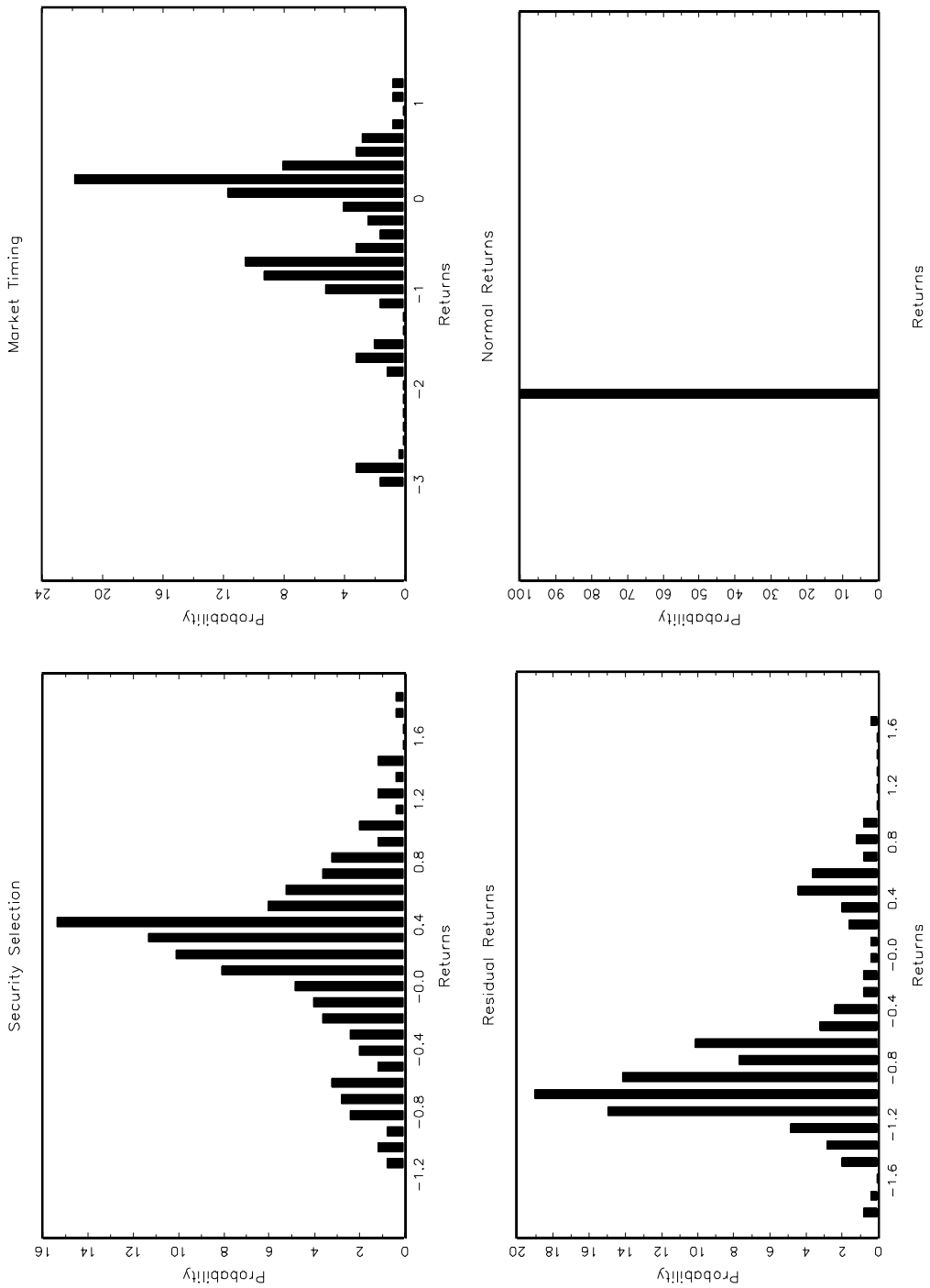
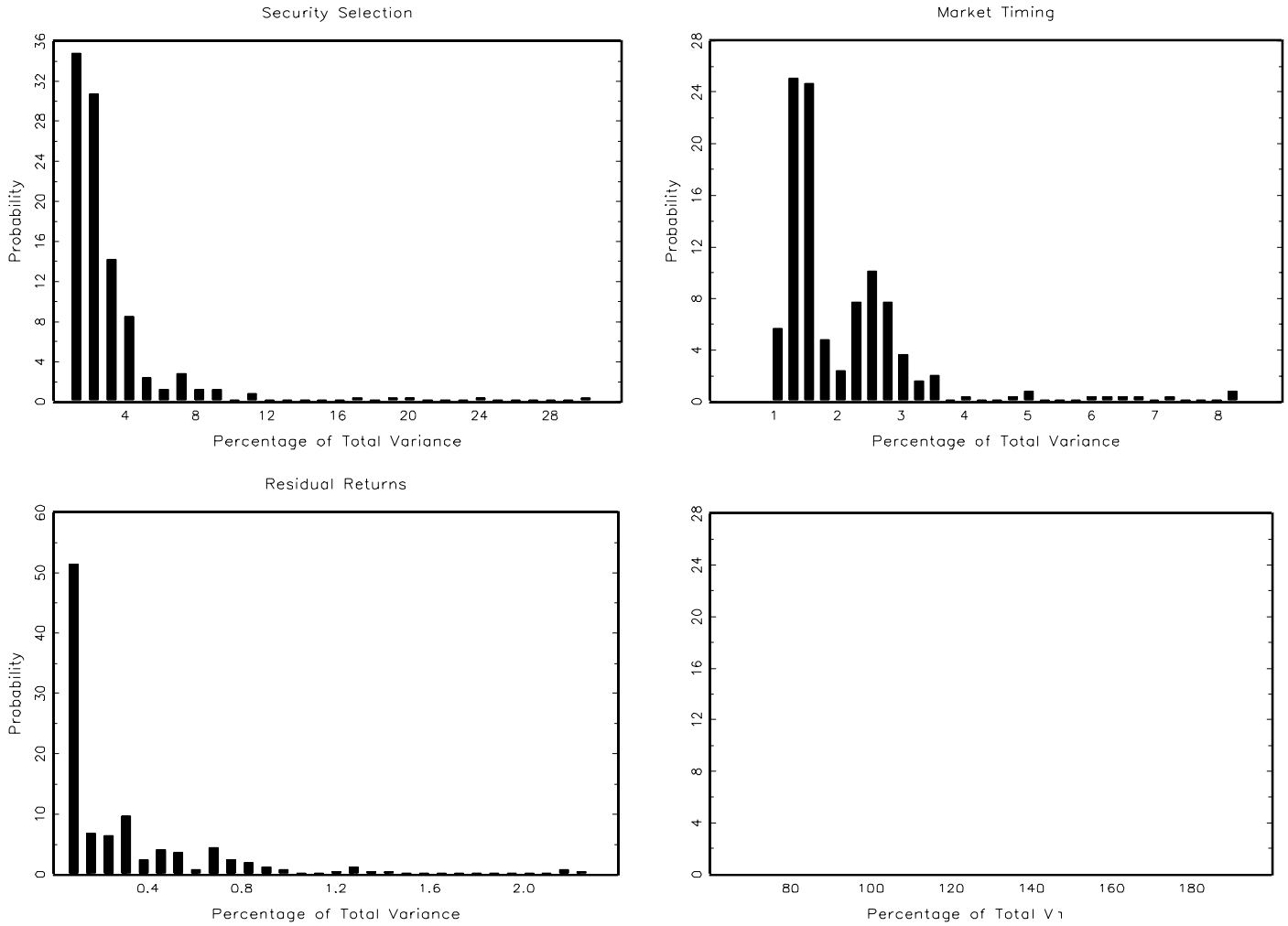





Figure 3: Total return decomposition (global benchmark - equation (7)).


Security Selection
Probability
0
4
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12
16
20
24
28
32
36
4
8
12
16
20
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28
Percentage of Total Variance
Market Timing
Probability
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4
8
12
16
20
24
28
1
2
3
4
5
6
7
8
Percentage of Total Variance
Residual Returns
Probability
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20
30
40
50
60
0.4
0.8
1.2
1.6
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Percentage of Total Variance
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24
28
80
100
120
140
160
180
Percentage of Total V1

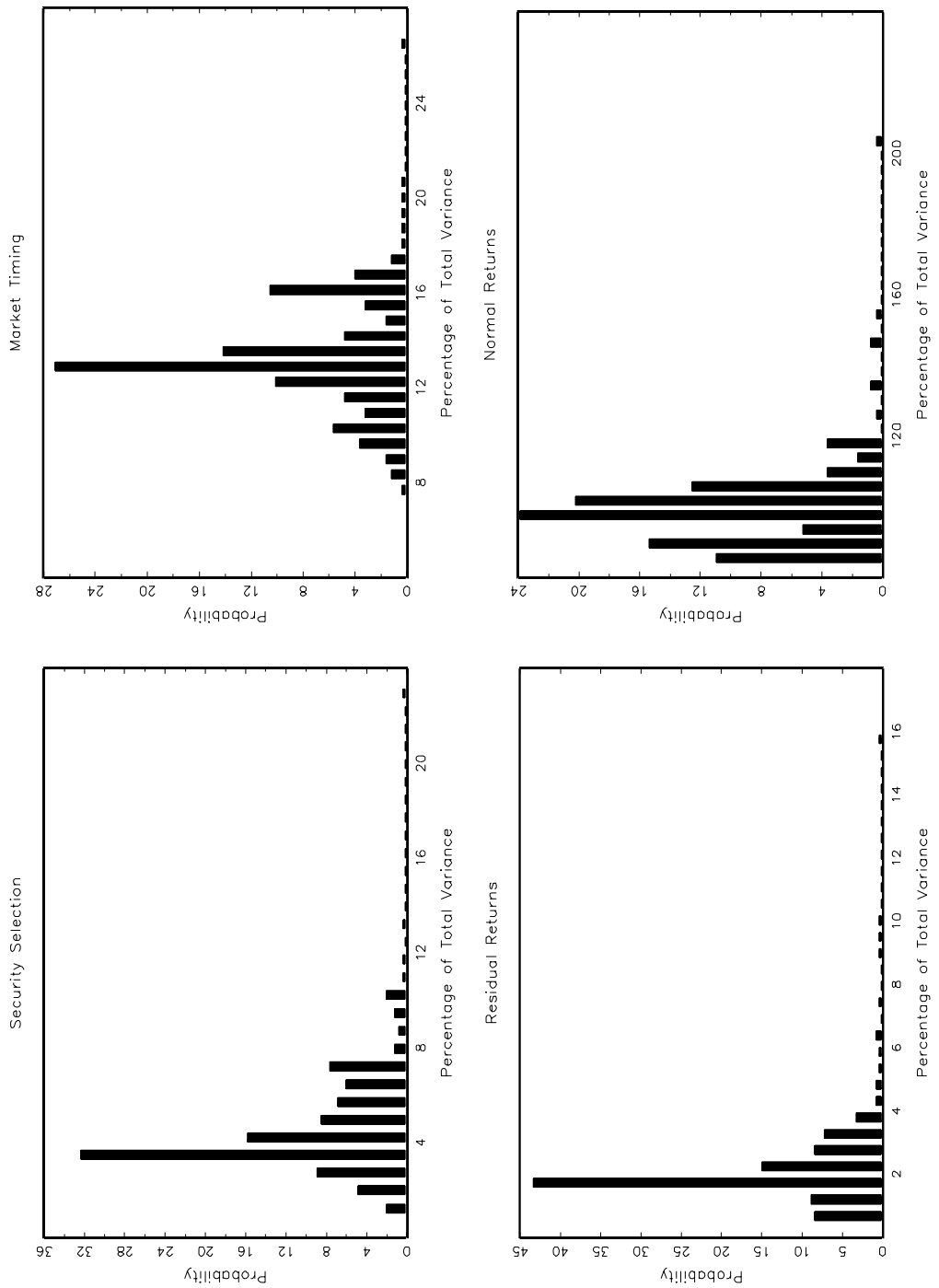




Figure 5: Variance decomposition for returns (global benchmark - equation (7)).

Table 1. UK pension funds home country bias: Aggregate portfolio holdings 1991-1997.

| | 1991 | 1992 | 1993 | 1994 | 1995 | 1996 | 1997 |
|---|---|---|---|---|---|---|---|
| International equity as a ratio of total equity (%) | 27.3 | 27.5 | 30.0 | 28.9 | 29.9 | 29.3 | 27.4 |
| International assets as a ratio of total assets (%) | 26.0 | 26.5 | 28.0 | 25.3 | 26.7 | 25.0 | 22.8 |

Note: This table shows the percentage of equity and total assets held outside the UK by the pension funds tracked by the WM Company.

Table 2. Decomposition of UK pension funds' returns from international equity (average annual percentages)

A. Constant benchmark for normal portfolio weights (equation (4))

| | Normal | Security selection | Market timing | Residual | Total |
|---|---|---|---|---|---|
| Mean return | **13.510** | -0.243 | -0.594 | **-0.241** | **12.431** |
| (t-value) | (2.52) | (-0.42) | (-1.44) | (-2.69) | (2.38) |
| Proportion of funds with positive mean (%) | 100 | 21.46 | 3.64 | 23.48 | 100 |

B. Trended benchmark for normal portfolio weights (equation (5))

| | Normal | Security selection | Market timing | Residual | Total |
|---|---|---|---|---|---|
| Mean return | **13.967** | -0.089 | **-1.051** | **-0.395** | **12.431** |
| (t-value) | (2.73) | (-0.15) | (-1.71) | (-3.09) | (2.38) |
| Proportion of funds with positive mean (%) | 100 | 27.93 | 2.02 | 17.41 | 100 |

C. Cross-sectional average weights (equation (6))

| | Normal | Security selection | Market timing | Residual | Total |
|---|---|---|---|---|---|
| Mean return | **12.916** | -0.356 | 0.000 | **-0.129** | **12.431** |
| (t-value) | (2.43) | (-0.61) | N/A | (-2.59) | (2.38) |
| Proportion of funds with positive mean (%) | 100 | 15.38 | N/A | 25.1 | 100 |

D. World market capitalization weights (equation (7))

| | Normal | Security selection | Market timing | Residual | Total |
|---|---|---|---|---|---|
| Mean return | **13.279** | 0.215 | -0.363 | -0.699 | **12.431** |
| (t-value) | (2.52) | (0.26) | (-0.20) | (-1.40) | (2.38) |
| Proportion of funds with positive mean (%) | 100 | 74.9 | 49.8 | 15.38 | 100 |

Notes: 1. For each fund, the monthly stock returns were decomposed into returns from normal asset allocation, security selection, market timing, and a residual (c.f. Brinson et al (1986)). Then the mean of each component across the funds was calculated; t-values for the means were computed using the time-series standard errors of the returns components as in Fama and MacBeth (1973) and are reported in parentheses.

2. The results assuming a trended benchmark for the normal portfolio weights adjust the normal portfolio weights for a linear trend using the initial and terminal portfolio weights. World market weights were computed based on the capitalization of the markets.

3. Returns that are significantly different from zero at the ten percent critical level are bold-faced.

4. The sample covers 247 UK pension funds over the period 1991:1 - 1997:12.

Table 3. Comparison of total and international investment performance

| | Normal | Security selection | Market timing | Residual | Total |
|---|---|---|---|---|---|
| A. Constant benchmark for normal portfolio weights (equation (4)) | | | | | |
| Total portfolio | | | | | |
| mean return | | | | | |
| - percentage points | **12.31** | 0.01 | **-0.34** | 0.06 | **12.03** |
| (*t*-value) | (2.29) | (0.02) | (-2.16) | (1.00) | (2.29) |
| - percent of total | 102.25 | 0.08 | -2.84 | 0.51 | 100 |
| International equity portfolio | | | | | |
| mean return | | | | | |
| - percentage points | **13.51** | -0.24 | -0.59 | **-0.24** | **12.43** |
| (*t*-value) | (2.52) | (-0.42) | (-1.44) | (-2.69) | (2.38) |
| - percentage of total | 108.68 | -1.96 | -4.78 | -1.94 | 100 |
| B. Trended benchmark for normal portfolio weights (equation (5)) | | | | | |
| Total portfolio | | | | | |
| mean return | | | | | |
| - percentage points | **12.26** | 0.03 | **-0.30** | 0.04 | **12.03** |
| (*t*-value) | (2.30) | (0.05) | (-1.64) | (0.69) | (2.29) |
| - percentage of total | 101.90 | 0.26 | -2.49 | 0.34 | 100 |
| International equity portfolio | | | | | |
| mean return | | | | | |
| - percentage points | **13.97** | -0.09 | **-1.05** | **-0.40** | **12.43** |
| (*t*-value) | (2.73) | (-0.15) | (-1.71) | (-3.09) | (2.38) |
| - percent of total | 112.36 | -0.72 | -8.46 | -3.18 | 100 |

Notes:
1. The table is based on the same decomposition of returns as in Table 2, using the constant benchmark (Panel A based on equation (4)) and the trended benchmark (Panel B based on equation (5)) for normal portfolio weights. The figures for the international equity portfolio decomposition are derived from panels A and B of Table 2.
2. The figures for the total portfolio decomposition are derived from panel A, Table 6 in Blake, Lehmann, and Timmer (1999). The data in that table are based on a panel of 306 UK pension funds monitored by the WM company over the period 1986:1 - 1994:12. The total portfolio includes domestic and international assets.
3. Returns that are significantly different from zero at the 10 percent critical level are bold-faced.

Table 4. Tests for outperformance in security selection and market timing: Bonferroni bounds.

| | Security selection | Market timing |
|---|---|---|
| A. Constant normal weights (equation (4)) | | |
| Minimum t-statistic | -2.45 | **-4.16** |
| (p-value) | (1.000) | (0.004) |
| Maximum t-statistic | **4.40** | 0.36 |
| (p-value) | (0.001) | (1.000) |
| B. Trended normal weights (equation (5)) | | |
| Minimum t-statistic | -3.03 | -2.79 |
| (p-value) | (0.309) | (0.651) |
| Maximum t-statistic | 2.63 | 1.00 |
| (p-value) | (1.000) | (1.000) |
| C. Cross-sectional average weights (equation (6)) | | |
| Minimum t-statistic | -2.90 | -3.09 |
| (p-value) | (0.468) | (0.246) |
| Maximum t-statistic | **3.98** | 1.87 |
| (p-value) | 0.009 | (1.000) |
| D. World market capitalization weights (equation (7)) | | |
| Minimum t-statistic | -1.59 | -1.00 |
| (p-value) | (1.000) | (1.000) |
| Maximum t-statistic | 2.30 | 1.47 |
| (p-value) | (1.000) | (1.000) |

Notes: 1. For each fund, the monthly stock returns were decomposed into returns from normal asset allocation, security selection, market timing, and a residual (c.f. Brinson et al (1986)). Then the mean of each component across the funds was calculated; t-values for the means were computed using the time-series standard errors of the returns components as in Fama and MacBeth (1973) and are reported in parentheses.
2. Bonferroni bounds test whether the fund that produced the largest (or smallest) t-statistic was genuinely an outperformer after controlling for arbitrary correlation patterns across the full set of funds in our sample. Results that are significantly different from zero at the ten percent critical level are bold-faced.
3. The sample covers 247 UK pension funds over the period 1991:1 - 1997:12.