

# Does Asset Allocation Policy Explain 40, 90, or 100 Percent of Performance?

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*Disagreement over the importance of asset allocation policy stems from asking different questions. We used balanced mutual fund and pension fund data to answer the three relevant questions. We found that about 90 percent of the variability in returns of a typical fund across time is explained by policy, about 40 percent of the variation of returns among funds is explained by policy, and on average about 100 percent of the return level is explained by the policy return level.*

**D**oes asset allocation policy explain 40 percent, 90 percent, or 100 percent of performance? The answer depends on how the question is asked and what an analyst is trying to explain. According to well-known studies by Brinson and colleagues, more than 90 percent of the variability in a typical plan sponsor's performance over time is the result of asset allocation policy.<sup>1</sup> So, if one is trying to explain the variability of returns *over time*, asset allocation is very important.

Unfortunately, the Brinson et al. studies are often misinterpreted and the results applied to questions that the studies never intended to answer. For example, an analyst might want to know how important asset allocation is in explaining the variation of performance *among funds*. Because the Brinson studies did not address this question, the analyst can neither look to them to find the answer nor fault them for not answering it correctly.<sup>2</sup> A different study is required.

Finally, an analyst might want to know what percentage of the *level* of a typical fund's return is ascribable to asset allocation policy. Again, the Brinson studies do not address this question. A different study is needed.

Thus, three distinct questions remain about the importance of asset allocation:

1. How much of the variability of returns *across time* is explained by policy (the question Brinson et al. asked)? In other words, how much of a fund's ups and downs do its policy benchmarks explain?
2. How much of the variation in returns *among funds* is explained by differences in policy? In other words, how much of the difference between two funds' performance is a result of their policy difference?
3. What portion of the *return level* is explained by policy return? In other words, what is the ratio of the policy benchmark return to the fund's actual return?

Much of the recent controversy about the importance of asset allocation stems from treating the answer that Brinson et al. provided to Question 1 as an answer to Questions 2 and 3.

The purpose of our study was to ask and answer all three questions. To do this, we examined 10 years of monthly returns to 94 U.S. balanced mutual funds and 5 years of quarterly returns to 58 pension funds. We performed a different analysis for each question.

## Framework

Our data consisted of the total return for each fund for each period of time (a month or a quarter). The first step in our analysis was to decompose each total return,  $TR$ , into two components, policy return and active return, as follows:

$$TR_{i,t} = (1 + PR_{i,t})(1 + AR_{i,t}) - 1,$$

where

$TR_{i,t}$  = total return of fund  $i$  in period  $t$

$PR_{i,t}$  = policy return of fund  $i$  in period  $t$

$AR_{i,t}$  = active return of fund  $i$  in period  $t$

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Policy return is the part of the total return that comes from the asset allocation policy. Active return is the remainder. Active return depends on both the manager's ability to actively over- or underweight asset classes and securities relative to the policy and on the magnitude and timing of those bets.

The asset allocation policy of each fund can be represented as a set of asset-class weights that sum to 1. For the pension funds in this study, these weights were known in advance. For the mutual funds, the policy weights were determined by return-based style analysis, which is described in the "Data" section. The policy return of the fund over a given period of time can be computed from the policy weights and returns on asset-class benchmarks as follows:

$$PR_{i,t} = w_1 R_{1,t} + w_2 R_{2,t} + \dots + w_k R_{k,t} - c,$$

where

$w_1, w_2, \dots, w_k$  = policy weights of fund  $i$

$R_{1,t}, R_{2,t}, \dots, R_{k,t}$  = returns on the asset classes in period  $t$

$c$  = approximate cost of replicating the policy mix through indexed mutual funds, as a percentage of assets

Thus, in addition to fund returns, we needed policy weights for each fund and total returns on asset-class benchmarks. Given the total returns to the funds and the estimated policy returns of the funds, we solved for the active returns.

In our time-series analysis, we used the period-by-period returns. In our cross-sectional analysis, we used the compound annual rates of return over the period of analysis. For each fund,

we computed the compound annual total return over the entire period as follows:

$$TR_i = \sqrt[N]{(1 + TR_{i,1})(1 + TR_{i,2}) \dots (1 + TR_{i,T})} - 1,$$

where

$TR_i$  = compound annual total return on fund  $i$  over the entire period of analysis

$TR_{i,t}$  = total return of fund  $i$  in period  $t$

$T$  = number of period returns

$N$  = length of the entire period of analysis, in years

Similarly, we computed the compound annual policy return over the entire period as follows:

$$PR_i = \sqrt[N]{(1 + PR_{i,1})(1 + PR_{i,2}) \dots (1 + PR_{i,T})} - 1,$$

where  $PR_i$  is the compound annual policy return on fund  $i$  over the entire period of analysis and  $PR_{i,t}$  is the policy return to fund  $i$  in period  $t$ .

## Data

For the mutual fund portion of this study, we used 10 years of monthly returns for 94 U.S. balanced funds. The 94 funds represent all of the balanced funds in the Morningstar universe that had at least 10 years of data ending March 31, 1998. Policy weights for each fund were estimated by performing return-based style analysis over the entire 120-month period.<sup>3</sup> Table 1 shows the asset-class benchmarks used and the average fund exposure to each asset class.

In calculating the policy returns for each fund, we assumed that the cost of replicating the policy mix through index mutual funds would be 2 basis points a month (approximately 25 bps annually).

**Table 1. Asset Classes and Benchmarks for Balanced Mutual Funds**

Asset Class	Benchmark	Average Allocation
Large-cap U.S. stocks	CRSP 1–2 portfolio <sup>a</sup>	37.4%
Small-cap U.S. stocks	CRSP 6–8 portfolio <sup>a</sup>	12.2
Non-U.S. stocks	MSCI Europe/Australasia/Far East Index	2.1
U.S. bonds	Lehman Brothers Aggregate Bond Index	35.2
Cash	30-day U.S. T-bills <sup>b</sup>	13.2

<sup>a</sup>Constructed by CRSP. CRSP excludes unit investment trusts, closed-end funds, real estate investment trusts, Americus trusts, foreign stocks, and American Depository Receipts from the portfolios. CRSP uses only NYSE firms to determine the size breakpoints for the portfolios. Specifically, CRSP ranks all eligible NYSE stocks by company size (market value of outstanding equity) and then splits them into 10 equally populated groups, or deciles. The largest companies are in Decile 1, and the smallest are in Decile 10. The capitalization for the largest company in each decile serves as the breakpoint for that decile. Breakpoints are rebalanced on the last day of trading in March, June, September, and December. CRSP then assigns NYSE and Amex/Nasdaq companies to the portfolios according to the decile breakpoints. Monthly portfolio returns are market-cap-weighted averages of the individual returns within each of the 10 portfolios. The 1–2 portfolio is the combination of Deciles 1 and 2, and the 6–8 portfolio is the combination of Deciles 6, 7, and 8.

<sup>b</sup>Ibbotson Associates (1998).

Stevens, Surz, and Wimer (1999) provided the same type of analysis on quarterly returns of 58 pension funds over the five-year 1993–97 period.<sup>4</sup> We used the *actual* policy weights and asset-class benchmarks of the pension funds, however, rather than estimated policy weights and the same asset-class benchmarks for all funds. In each quarter, the policy weights were known in advance of the realized returns.<sup>5</sup> We report the pension fund results together with our analysis of the mutual fund returns in the next section.

## Questions and Answers

Now consider the original three questions posed by the study: How much of the variability of return across time is explained by asset allocation policy, how much of the variation among funds is explained by the policy, and what portion of the return level is explained by policy return?

**Question #1: Variability across Time.** The Brinson et al. studies from 1986 and 1991 answered the question of how much of the variability of fund returns is explained by the variability of policy returns. They calculated the result by regressing each fund's total returns ( $TR_{i,t}$  in our notation) against its policy returns ( $PR_{i,t}$ ), reporting the  $R^2$  value for each fund in the study, then examining

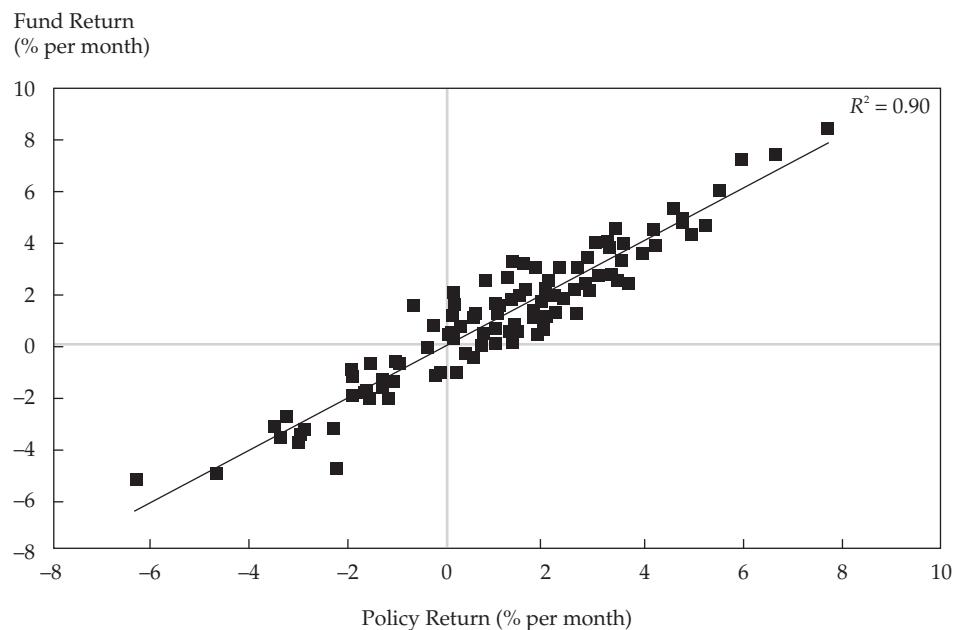
the average, median, and distribution of these results.

**Figure 1** illustrates the meaning of the time-series  $R^2$  with the use of a single fund from our sample. In this example, we regressed the 120 monthly returns of a particular mutual fund against the corresponding monthly returns of the fund's estimated policy benchmark. Because most of the points cluster around the fitted regression line, the  $R^2$  is quite high. About 90 percent of the variability of the monthly returns of this fund can be explained by the variability of the fund's policy benchmark.

In the first Brinson et al. study (1986), the authors studied quarterly returns over the 1974–83 period for 91 large U.S. pension funds. The average  $R^2$  was 93.6 percent. In the second Brinson et al. study (1991), they studied quarterly returns over the 1978–87 period for 82 large U.S. pension funds. The average  $R^2$  was 91.5 percent. Based on these results, the authors stated that more than 90 percent of the variability of the average fund's return across time is explained by that fund's policy mix.

The Brinson et al. results show that strategic asset allocation explains much of the variability of pension fund returns because plan sponsors select a long-term strategic target and tend to stick to it.

**Figure 1. Time-Series Regression of Monthly Fund Return versus Fund Policy Return: One Mutual Fund, April 1988–March 1998**



*Note:* The sample fund's policy allocations among the general asset classes were 52.4 percent U.S. large-cap stocks, 9.8 percent U.S. small-cap stocks, 3.2 percent non-U.S. stocks, 20.9 percent U.S. bonds, and 13.7 percent cash.

If plan sponsors were more active, the  $R^2$ s would be lower.

The results from our analysis of both the mutual fund and the pension data are presented in **Table 2**, together with the Brinson et al. results. Our results confirm the Brinson result that approximately 90 percent of the variability of a fund's return across time is explained by the variability of policy returns. The result in our study for the median mutual fund was 87.6 percent, and the result for the median pension fund was 90.7 percent. The mean results in our study were slightly lower (81.4 percent and 88.0 percent, respectively) because they were skewed by the effect of a few outlier funds. These results are consistent with the notion that pension fund managers as a group are less active than balanced mutual fund managers.

**Table 2. Comparison of Time-Series Regression Studies**

Measure	Brinson 1986	Brinson 1991	Mutual Funds	Pension Funds
<i>R</i> <sup>2</sup>				
Mean	93.6%	91.5%	81.4%	88.0%
Median	NA	NA	87.6	90.7
Active return <sup>a</sup>				
Mean	-1.10	-0.08	-0.27	-0.44
Median	NA	NA	0.00	0.18

NA = not available.

<sup>a</sup>Active return is expressed as a percentage per year.

**Table 3** displays the range of outcomes in our study and shows that the mutual funds were more active than the pension funds. The mutual fund at the 5th percentile of  $R^2$  had only 46.9 percent of the variability of returns explained by the variability of returns of the policy, whereas for the fund at the 95th percentile, the  $R^2$  was 94.1 percent. For the pension funds, the  $R^2$ s are in the tighter range of 66.2 percent at the 5th percentile and 97.2 percent at the 95th percentile.

We next considered that the time-series  $R^2$  may be high simply because funds participate in the capital markets in general and not because they

**Table 3. Range of Time-Series Regression  $R^2$  Values**

Percentile	Mutual Funds	Pension Funds
5	46.9%	66.2%
25	79.8	94.1
50	87.6	90.7
75	91.4	94.7
95	94.1	97.2

follow a specific asset allocation policy. We explored this idea by regressing each mutual fund's total returns against the total returns to a common benchmark (rather than each against the returns to its own policy benchmark). For common benchmarks, we used the S&P 500 Index and the average of all of the policy benchmarks shown in Table 1.

The results are shown in **Table 4**. With the S&P 500 as the benchmark for all funds, the average  $R^2$  was more than 75 percent and the median was nearly 82 percent. With the average policy benchmarks across funds as the benchmark, the average  $R^2$  was nearly 79 percent and the median was more than 85 percent. These results are relatively close to those obtained when we used each specific fund's benchmark. Hence, the high  $R^2$  in the time-series regressions result primarily from the funds' participation in the capital markets in general, not from the specific asset allocation policies of each fund. In other words, the results of the Brinson et al. studies and our results presented in Table 2 are a case of a rising tide lifting all boats.

**Table 4. Explaining a Mutual Fund's Time Series of Returns Using Different Benchmarks**

<i>R</i> <sup>2</sup>	S&P 500	Average Policy	Fund's Policy
Mean	75.2%	78.8%	81.4%
Median	81.9	85.2	87.6

Hensel, Ezra, and Ilkiw (1991) made a similar point in their study of the importance of asset allocation policy. In their framework, a naive portfolio had to be chosen as a baseline in order to evaluate the importance of asset allocation policy. They pointed out that in the Brinson et al. studies, the baseline portfolio was 100 percent in cash. In other words, the Brinson studies were written as if the alternative to selecting an asset allocation policy were to avoid risky assets altogether. When we used a more realistic baseline, such as the average policy benchmark across all funds, we found that the specific policies explain far less than half of the remaining time-series variation of the funds' returns.

**Question #2: Variation among Funds.** To answer the question of how much of the variation in returns among funds is explained by policy differences, one must compare funds with each other through the use of cross-sectional analysis. Many people mistakenly thought the Brinson studies answered this question. If all funds were invested passively under the same asset allocation policy, there would be no variation among funds (yet 100

percent of the variability of returns across time of each fund would be attributable to asset allocation policy). If all funds were invested passively but had a wide range of asset allocation policies, however, all of the variation of returns would be attributable to policy.

To answer the question of how much of the variation in returns among funds is explained by policy differences, we compared each fund return with each other fund's return. We carried out a cross-sectional regression of compound annual total returns,  $TR_i$ , for the entire period on compound annual policy returns,  $PR_i$ , for the entire period. The  $R^2$  statistic of this regression showed that for the mutual funds studied, 40 percent of the return difference was explained by policy and for the pension fund sample, the result was 35 percent.

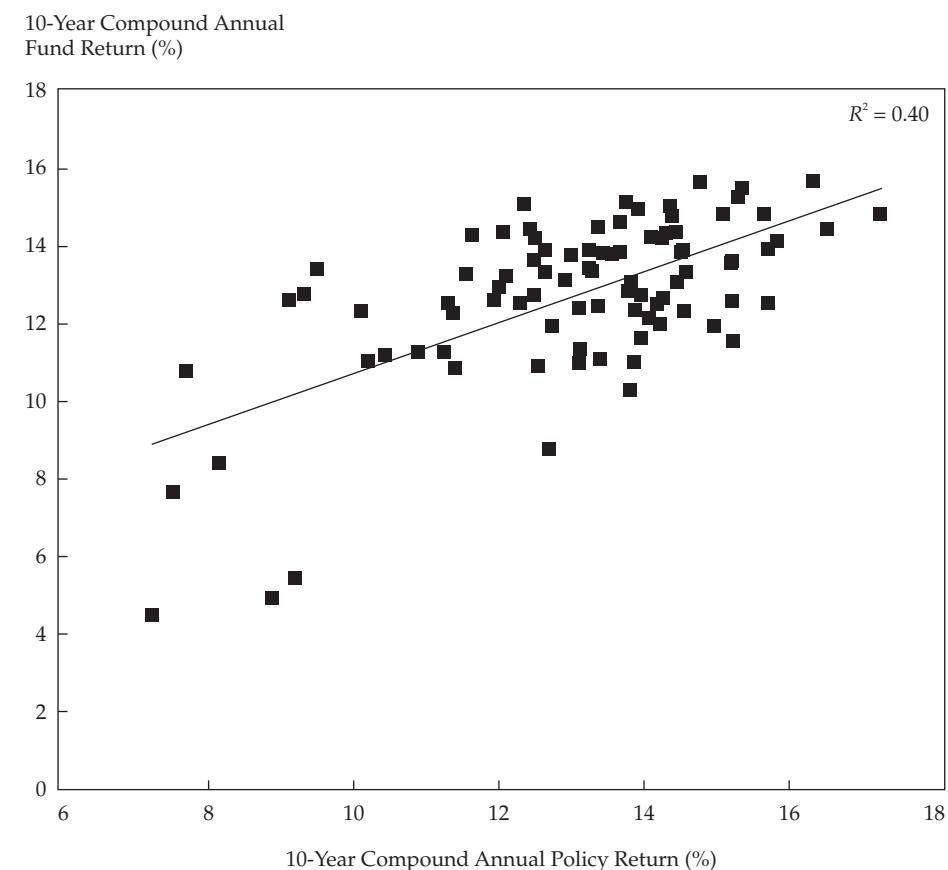
**Figure 2** is the plot of the 10-year compound annual total returns against the 10-year compound annual policy returns for the mutual fund sample. This plot demonstrates visually the relationship between policy and total returns. The mutual fund result shows that, because policy explains only 40

percent of the variation of returns across funds, the remaining 60 percent is explained by other factors, such as asset-class timing, style within asset classes, security selection, and fees. For pension funds, the variation of returns among funds that was not explained by policy was ascribable to the same factors and to manager selection.

The cross-sectional  $R^2$  depended on how much the asset allocation policies of funds differed from one another and on how much the funds engaged in active management. To see how much asset allocation policies differed, we examined the cross-sectional distributions of the style weights. **Table 5** presents the cross-sectional averages, standard deviations, and various percentiles of the style weights of the mutual funds. The last column presents these statistics for the total style allocation to equity. The large standard deviations and spreads between the percentiles indicate large variations in asset allocation policies among the funds.

Given how diverse the asset allocation policies are among these mutual funds, the relatively low  $R^2$  of 40 percent must be the result of a large degree

**Figure 2. Fund versus Policy: 10-Year Compound Annual Return across Funds, April 1988–March 1998**



**Table 5. Cross-Sectional Distributions of Balanced Mutual Fund Policy Weights**

Measure	Large-Cap U.S. Stocks	Small-Cap U.S. Stocks	Non-U.S. Stocks	U.S. Bonds	Cash	Total Equities
Average	37.4%	12.2%	2.1%	35.2%	13.2%	51.6%
Standard deviation	17.0	7.6	2.3	14.4	15.9	16.0
Percentile						
5	1.2	1.1	0.0	12.8	0.0	23.3
25	29.9	7.1	0.0	26.6	1.0	44.5
50	40.2	11.0	1.5	35.2	7.7	54.5
75	48.8	16.5	3.1	45.1	17.5	62.0
95	56.2	24.8	6.4	56.7	47.3	74.1

of active management. To see how the degree of active management can affect the cross-sectional  $R^2$ , we calculated the cross-sectional  $R^2$  between the 10-year annual returns of the policy benchmarks and the 10-year annual returns of a set of modified fund returns. Each modified fund return was a weighted average of the actual fund return with the return on the policy benchmark so that the degree of active management was adjusted as follows:

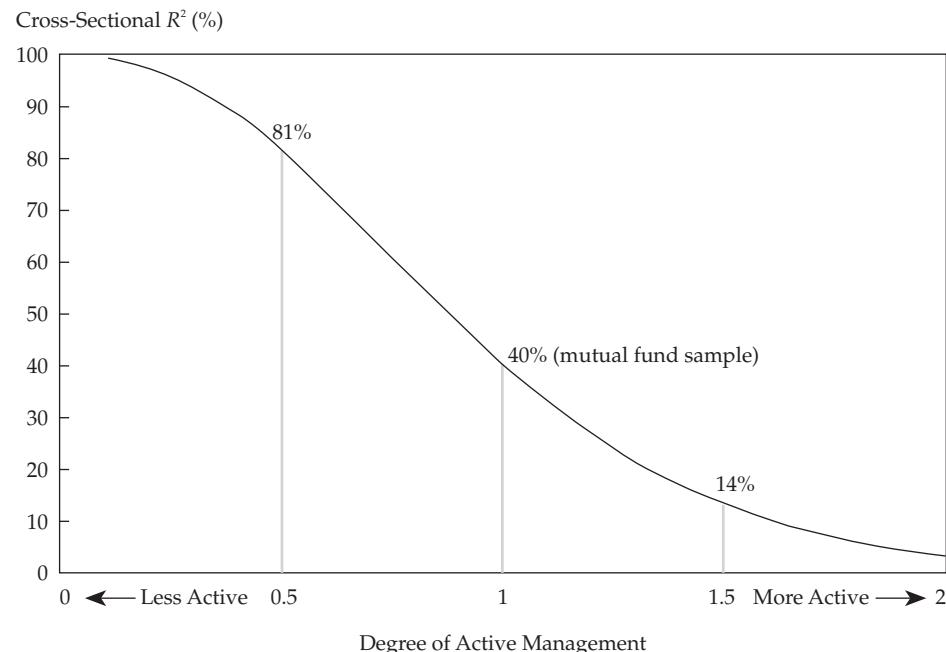
$$TR_{i,t}^* = xTR_{i,t} + (1-x)PR_{i,t},$$

where the value of  $x$  sets the level of active management. Setting  $x$  equal to 1 gives the sample result. Setting  $x$  less than 1 reduces the level of active management below what the funds actually did. Setting  $x$  greater than 1 shorts the benchmark and takes a levered position in the fund, thus increasing

the level of active management beyond what the funds actually did.

The compound annual return of modified fund returns,  $TR_{i,t}^*$ , was calculated the same way as the compound annual return of actual fund returns (i.e., as the geometric mean of the modified annual returns).

**Figure 3** shows the cross-sectional  $R^2$  from regressing the modified compound annual returns on compound annual policy returns for various values of  $x$ . At  $x = 1$ , the cross-sectional  $R^2$  is our original result, 40 percent. If the funds had been half as active ( $x = 0.5$ ), the  $R^2$  would have been much higher, 81 percent. On the other hand, if the funds had been one-and-a-half times as active ( $x = 1.5$ ), the  $R^2$  would have been only 14 percent. Thus, this approach shows how the degree of active management affects the cross-sectional  $R^2$ .

**Figure 3. Degree of Active Management versus Cross-Sectional  $R^2$ , April 1988–March 1998**

**Question #3: Return Level.** Many people also mistakenly thought the Brinson et al. studies were answering what portion of the return level is explained by asset allocation policy return, with an answer indicating nearly 90 percent. Brinson and his co-authors were not, however, addressing this question. We can address the question by using the Brinson data and the new data from our pension fund and mutual fund studies. We calculated the percentage of fund return explained by policy return for each fund as the ratio of compound annual policy return,  $PR_i$ , divided by the compound annual total return,  $TR_i$ . This ratio of compound returns is really simply a performance measure. A fund that stayed exactly at its policy mix and invested passively will have a ratio of 1.0, or 100 percent, whereas a fund that outperformed its policy will have a ratio less than 1.0.

**Table 6** shows the percentage of fund return explained by policy return for the Brinson studies and the two data sets used in this study. On average, policy accounted for a little more than all of total return. The one exception is the pension fund sample in this study, where the mean result was 99 percent. The pension data did not have any expenses subtracted, however, so if we included external manager fees, pension staff costs, and other expenses, the result would probably be close to 100 percent, meaning that no value was added above the benchmark. On average, the pension funds and balanced mutual funds are not adding value above their policy benchmarks because of a combination of timing, security selection, management fees, and expenses. Moreover, results for both groups here may even be better than expected because the timing component might include some benefit from not rebalancing (letting equities run), which would have helped returns in the sample period's nearly continuous U.S. equity bull market.

The range of percentage of fund return explained by policy return is shown in **Table 7**. The mutual funds have a wider range because they are more willing to make timing and selection bets against the benchmark.

These results were anticipated by Sharpe (1991). He pointed out that because the aggregation of all investors is the market, the average perfor-

**Table 6. Percentage of Total Return Level Explained by Policy Return**

Study	Average	Median
Brinson 1986	112%	NA
Brinson 1991	101	NA
Mutual funds	104	100%
Pension funds	99	99

NA = not available.

**Table 7. Range of Percentage of Total Return Level Explained by Policy Return**

Percentile	Mutual Funds	Pension Funds
5 (best)	82%	86%
25	94	96
50	100	99
75	112	102
95 (worst)	132	113

mance before costs of all investors must equal the performance of the market. Because costs do not net out across investors, the average investor must be underperforming the market on a cost-adjusted basis. The implication is that, on average, more than 100 percent of the level of fund return would be expected from policy return. Of course, this outcome is not assured for subsamples of the market, such as balanced mutual funds or pension funds.

In our analysis, a fund's policy return measures the performance of the asset classes in which that fund invests. Therefore, based on Sharpe's thesis, we would predict that, on average, a little more than 100 percent of the level of total return would be the result of policy return.<sup>6</sup> Our results confirm this prediction.

This is not to say that active management is useless. An investor who has the ability to select superior managers before committing funds can earn above-average returns. If, as Goetzmann and Ibbotson (1994) suggested, superior performance and inferior performance persist over time, one need only invest in the funds that have outperformed in the past. Nevertheless, the average return across all funds in the market cannot be greater than the return on the market.

## Conclusion

We sought to answer the question: What part of fund performance is explained by asset allocation policy? If we think of this issue as a multiple-choice question with "40 percent," "90 percent," "100 percent," and "all of the above" as the choices, our analysis shows that asset allocation explains about 90 percent of the variability of a fund's returns *over time* but it explains only about 40 percent of the variation of returns *among funds*. Furthermore, on average across funds, asset allocation policy explains a little more than 100 percent of the *level* of returns. So, because the question can be interpreted in any or all of these ways, the answer is "all of the above."

*This article grew out of discussions with Ron Surz. We thank Dale Stevens for providing the pension fund data and Mark Wimer of Ibbotson Associates for his able assistance.*

## Notes

1. Brinson, Hood, and Beebower (1986); Brinson, Singer, and Beebower (1991).
  2. The essence of Jahnke's (1997) critique of the Brinson et al. studies is that they used time-series  $R^2$ s to address the question of cross-sectional variability. This critique is unfair because the Brinson studies never addressed the cross-sectional question.
  3. Return-based style analysis was first proposed by Sharpe (1992). See Lucas (1998) for a detailed discussion.
  4. The results are reported in Stevens, Surz, and Wimer, together with the mutual fund results reported here.
  5. The average allocations among the general asset classes used in the pension fund study were 43.7 percent U.S. stocks, 38.0 percent U.S. bonds, 5.0 percent cash, and 13.3 percent other asset classes.
  6. We have taken out the cost of indexing from the policy return, so the average underperformance of the fund is less than what Sharpe's analysis would suggest.
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