Sources of Portfolio Performance: The Enduring Importance of Asset Allocation

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Executive Summary

A portfolio's performance depends on three interrelated decisions: security selection, market-timing, and an investor's *policy*, or long-term, asset allocation. Once an investor has determined a policy allocation to stocks, bonds, and cash, this allocation can be implemented through a *passive indexing strategy*—which simply aims to mirror the returns of the stock, bond, and cash benchmarks that make up the policy allocation—or through *active management*. An actively managed strategy attempts to exceed the expected return of the policy allocation through *security selection* and/or *market-timing*. In a landmark paper published in 1986, "Determinants of Portfolio Performance," Brinson, Hood, and Beebower concluded that a portfolio's asset allocation is the primary determinant of portfolio return variability, with security selection and market-timing playing minor roles.

Our research builds on this pioneering study using a larger and more robust data set of balanced mutual funds. We conclude that, despite the stock market's increased volatility in bear markets and the popular idea that market-timing should play a significant role in portfolio management,[1] asset allocation remains the investor's most important decision. Our empirical analysis encompasses 40 years of return data, including both the run-up in stock prices during the late 1990s and the subsequent collapse. In none of these very different periods did active strategies, on average, prove to be a significant determinant of performance.

We present an analytical framework for determining the relative importance of active management and asset allocation in portfolio performance. We then present both an intuitive and an empirical case for the importance of asset allocation. Finally, we examine the characteristics of the small number of actively managed balanced mutual funds that have been able to consistently generate actual returns higher than those of their policy returns.

Active Strategies Broadly Defined

Security selection constructs a portfolio of individual securities that are perceived to have the potential to outperform a specified benchmark. *Market-timing strategies* alter a portfolio's asset or sub-asset allocation in an attempt to exceed the expected return of the relevant benchmark.

1. For instance, see the March 17, 2003, issue of *Pensions & Investments* that quotes Peter Bernstein's arguments against using policy portfolios and for market-timing.

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Our conclusions:

- *On average*, 76.6% of the monthly variability of a fund's returns around its average return can be attributed to its asset allocation policy. The actual percentage for any *individual* fund depends on the degree of active management.

  The result from our study is lower than Brinson et al.'s (1986) finding of 93.6% for quarterly variation of pension fund returns. A possible reason for this is that we analyze monthly return variation of a larger number of funds with more varying active management behavior over a longer time period. It is also possible that quarterly returns smooth the monthly volatility of fund returns, resulting in Brinson et al.'s higher numbers. Our result is close to Ibbotson and Kaplan's (2000) finding of 81.4% for monthly variation in balanced fund returns. Ibbotson and Kaplan suggest that their result is lower than Brinson et al's 93.6% because pension fund managers are less active as a group than balanced fund managers. Any such behavioral difference could be partly driving our results, too. The general conclusion in all three studies is that asset allocation is the primary factor in explaining the return variability of a broadly diversified portfolio.

- *On average*, more than 100% of the long-term performance of a fund is determined by its asset allocation policy. Consistent with Ibbotson and Kaplan (2000), we find that market-timing and security selection have been unable to produce enough value to overcome operating expenses and transaction costs for the average actively managed balanced fund. However, a small percentage (7%) of actively managed balanced funds have been able to consistently outperform their policy benchmarks.

- *On average*, a policy portfolio's return volatility is only 86.6% of a fund's *actual* return volatility. That is, the policy portfolio achieves a higher average return with less risk.

- These conclusions held in all time periods and all observed investment environments over the time period, bull market or bear.

We also investigate the characteristics of actively managed funds that have outperformed and underperformed their policy benchmarks. Our analysis finds that:

- Seven percent of the funds in our sample have consistently outperformed their policy benchmarks.[2] However, 41% of funds have consistently earned less than what their policy allocations would have earned. *On average*, funds that consistently outperform have lower expenses and lower turnover than consistently underperforming funds.

- *On average*, the return for funds in the highest-cost quintile is 32% less than their policy return. Whereas, *on average*, the return for funds in the lowest-cost quintile is 7% less than their policy return.

2. Statistically significant at 85%.

Investment Implication

Our findings suggest that establishing an asset allocation consistent with an investor's goals, investment horizon, and risk tolerance should be the first priority. The means of implementing this allocation—through a passively managed approach or through actively managed strategies—is a secondary consideration with a far smaller impact on the risk/return characteristics of a broadly diversified portfolio. The prospects of success with an active approach can be enhanced by selecting funds with low operating expenses and low portfolio turnover.

Analytical Framework

To determine the relative performance of asset allocation policy and active management, we must distinguish between a portfolio's *policy* return—what it would have earned if it simply recreated its policy allocation with unmanaged index funds—and its *actual* return, the real-world returns that reflect a fund's execution of active strategies.

The actual returns used in this analysis are the monthly returns of 420 U.S. balanced mutual funds. These returns reflect the security selection and market-timing strategies that can either add to or detract from the fund's policy return.[3] We must derive the fund's policy return through indirect empirical methods because in a universe of actively managed funds, the policy return is, by definition, not observed in the actual returns. (See "Empirical Methodology" on pages 10 and 11.)

Research Sample

Our data consist of 420 balanced mutual funds from the CRSP Survivor-Bias Free US Mutual Fund Database. These funds operated at any time between 1962 and 2001. The data include monthly returns, annual allocations to asset classes, and some fund characteristics such as expense ratios and turnover. We define a "balanced" fund as a fund with both average long-run equity and bond allocations of more than 20%. International funds or funds with more than 5% of their assets devoted to an asset class other than stocks, bonds, and cash over their lifetime were excluded from the analysis.[4] The calculations of average allocations ignore years with zero allocations (that is, missing data) to all asset classes. To ensure reliability, we analyzed only funds with at least 60 months of return history.[5] If a fund return for a single month was missing, that month was excluded from the analysis.

The percentage of variation in the actual return that is explained by variation in the policy return is measured by the adjusted R^2 from a regression of the fund's actual return against its policy return.[6] A high adjusted R^2 means that monthly variations in the policy return explain a high percentage of the actual variations in return. We also calculate the average return of the fund's asset allocation policy as a percentage of the long-term average return of the fund. We do so by dividing a fund's policy return by its actual return. We also calculate the ratio of a fund's policy volatility to its actual volatility, again simply by dividing the policy volatility by the actual volatility.

3. We cannot reliably differentiate between security selection and market-timing because we only have access to annual fund allocations. Therefore, we only identify active and passive returns.

4. We tested robustness of results to selecting funds differently. Funds were selected based on their 6-year rolling asset allocations. The results of the analysis are very similar to reported results.

5. The analysis was also conducted for funds with longer than 120-month history. The results are very similar to those reported in the paper.

6. Adjusted R^2 modifies R^2 by the number of variables estimated in the regression.

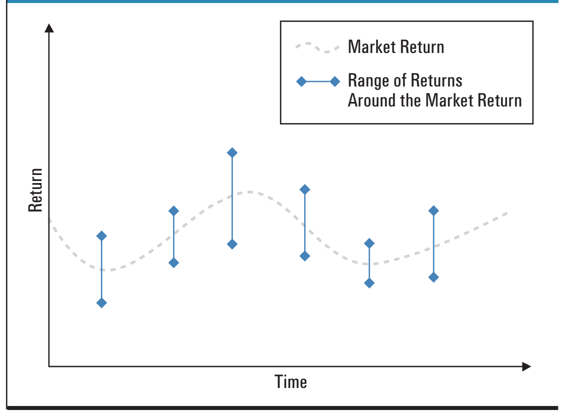
The Intuitive Case

The potential contributions of both asset allocation and active management can be understood intuitively. Consider that the return an investor can receive from each asset class is bounded by the best- and worst-performing security in that asset class. If the best-performing stock in a given period returns 10%, no investor can pick a stock that returns 11%. By the same token, if the worst-performing money market instrument returns 0%, it is impossible to select a money market security that returns –1%.

In Figure 1, the dashed line represents the market return, and the straight vertical lines represent the range of returns, both above and below the market return, produced by security selection, market-timing, or both. For security selection to be a dominant determinant of return in a diversified portfolio, an investor must consistently pick securities that, as a group, perform better or worse than the average security within an asset class. It is, however, extremely difficult to consistently pick the best or worst securities in an asset class. An investor may do so for one period, or even many periods, but doing so consistently over a long time would require both uncommon luck and skill.

It's also possible to consistently outperform or underperform the market return by always investing in the better-performing or worse-performing asset classes—the market-timing solution. Alas, financial theory and practice, not to mention common sense, imply that such a strategy is exceedingly difficult to implement with long-term success. Even successful market-timers in any given period are likely to have long-term portfolio returns similar to those of the asset classes in which they have invested. Consequently, the proportion invested in each asset class within a diversified portfolio should be the dominant force in generating returns for most investors.

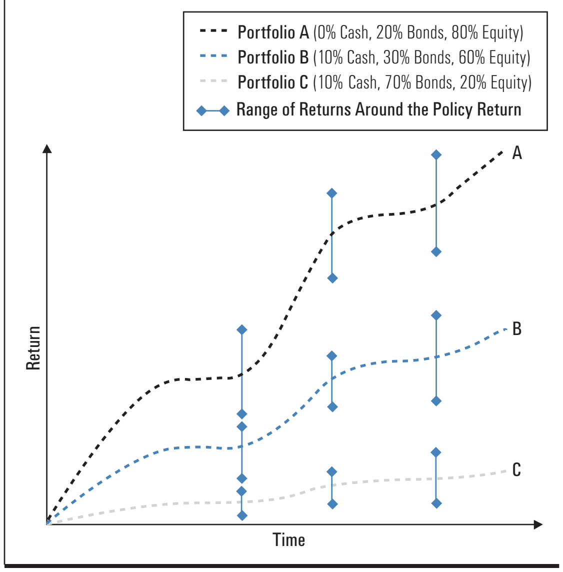
Figure 1 Active Management's Variations Around Market Return



Just as intuition reveals the limits of security selection and market-timing, it provides a good sense of the primacy of asset allocation. In Figure 2, each undulating line represents the cumulative expected return path for a portfolio allocated among three diversified index benchmarks (stocks, bonds, and cash). The straight vertical lines represent the hypothetical range of returns, above and below this passive approach, that can be produced by active strategies.

Although active strategies can clearly have an impact on performance, they play a subordinate role for the average investor. A portfolio with an 80% allocation to stocks is likely to have a very different return path than one with a 20% allocation to stocks. Put another way, you can't expect to earn equity-like returns in a money market fund. Active management can produce variations from a portfolio's policy return, but asset allocation is the primary factor in the cumulative long-run return of a diversified portfolio.

Figure 2 Return Paths Ultimately Reflect Asset Allocation



The Empirical Case

Our empirical analysis confirms what intuition suggests. There are two methods for calculating a fund's policy allocation. The most straightforward approach is to calculate the average of the fund's reported annual asset allocations. However, this approach is not adopted because of problems related to timing, accuracy, and types of reported allocations (see "Limitations of Reported Allocation Data" at right for more detail). The second approach attempts to circumvent these data issues by estimating the fund's asset allocation by using a statistical method called returns-based style analysis. The details appear in "Empirical Methodology" on pages 10 and 11.

Limitations of Reported Allocation Data

Although it would be more direct to simply take an average of a fund's reported annual asset allocations to calculate a fund's policy allocation, this method is not reliable. The allocations in the CRSP database may not be entirely accurate.

A fund's annual allocation reported in the CRSP database for 1995, for example, may in fact pertain to the actual asset allocation as of March 1996 or June 1994, which could be especially problematic if an actively managed fund frequently altered its asset allocation. For the same reason, averaging annual allocations may not be a good approximation for the actual allocation if a fund changed its allocation significantly within the year. The second drawback of this approach is that funds report their allocations across stocks, bonds, cash, and "other," which includes options and futures. Since the composition of this "other" asset class category is unknown, there is no good way of directly modeling returns from this asset class. Similar to Brinson et al. (1986), we distribute the allocation to "other" among cash, stocks, and bonds in proportion to their portfolio weights. Although "other" represents *less than 1%* of the asset values for the average balanced mutual fund in the data set, this conventional approach could be problematic because in any given month "other" could represent a significant portion of the fund's allocation, ranging from –13% to 100%.[7]

7. A negative allocation indicates short selling of the security or the asset class.

Table 1 depicts the benchmarks used for style analysis, the average allocations as reported in the database, and the average policy allocations as estimated with style analysis.[8] Estimated average monthly policy allocations are very close to the average annual reported allocations, and the conclusions based on both sets of data are very similar. Because of their superior reliability, however, our study reports only the results based on policy allocations derived from style analysis.

Once policy return is calculated based on the estimated policy weights, we calculate the relative importance of passive asset allocation and active management as the percentage of the variation in actual returns that is explained by variations in the policy return, as measured by adjusted R^2. Adjusted R^2 is the percentage of month-to-month variation in the return of the fund that could be explained by concurrent variation in policy return.

We also calculate the policy return as a percentage of actual return. When policy return is greater than actual return, this ratio is greater than 100%, implying that active management detracts from the return produced by a passively managed policy allocation.

Finally, we calculate the fund's policy volatility as a percentage of its actual volatility. When actual return volatility is greater than policy volatility, this ratio is smaller than 100%.

Inference of Sub-Asset Classes

Some may argue that the percentage of return variation explained by policy return variation is low due to the use of broad equity market benchmarks, which smooth the cyclical performance of style and capitalization factors. Allocations to sub-asset classes are not available in the CRSP database, but they can be inferred by using style analysis. However, some statistical issues should be addressed due to the high correlation among equity sub-asset classes. To ensure the reliability of statistical analysis, it is desirable that asset class or sub-asset class returns have low correlation and be exhaustive. High correlation reduces the reliability of policy weight estimates. By excluding some of the sub-asset classes, the correlation can be reduced and reliability increased. However, this results in only partial coverage of investment options and reduces the explanatory power of the overall regression, namely the R^2. More importantly, excluding certain asset classes destroys the motivation behind style analysis.

To increase statistical reliability of the results, we compute fund allocations to small-capitalization, medium-capitalization, large-capitalization growth, and large-capitalization value sub-asset classes for longer-lived funds, which have 120 monthly observations. The results are not sensitive to the consideration of sub-asset classes. The adjusted R^2 and the proportion of return level explained increase only marginally (approximately 3%).[9]

Table 1 Average Fund Asset Allocations Based on Reported Allocations and Style Analysis

Asset Class	Benchmark	Average Reported Allocation	Average Estimated Allocation
Stocks	Wilshire 5000 Index	55.36%	54.61%
Bonds	Lehman Aggregate Bond Index	36.05%	33.34%
Cash	3-Month U.S. Treasury Bill	7.75%	12.05%
Other	–	0.86%	–

8. The Wilshire 5000 Index is replaced with the S&P 500 Index for 1962–1970. The Lehman Aggregate Bond Index is replaced with a portfolio of 50% Moody's Aaa Corporate Bond Yield and 50% 10-Year Treasury Bond Constant Maturity Rate for 1962–1975.

9. A similar sub-asset class analysis can be conducted for bonds. However, the bond market has gone though major structural changes over our analysis period. For instance, some sub-asset classes such as mortgage-backed securities and high-yield corporate bonds were not as prominent in the market until the 1980s, and the indexes for these markets were not available until then. Using these sub-asset classes would reduce our period coverage significantly and, based on our equity sub-asset class analysis, not change the results significantly.

Results

We find that, on average, 76.6% of the short-term variability of a fund's returns can be attributed to its asset allocation policy. However, the result for each fund depends on the fund's degree of active management. Our analysis also shows that, on average, more than 100% of long-term performance of a fund is determined by its asset allocation policy. This implies that, on average, market-timing and security selection have been unable to overcome the higher costs, such as increased operating expenses and trading costs, associated with active management. It is also interesting to note that the policy portfolio produces a higher average return, with less risk, than the actual portfolio. On average, the policy portfolio's return volatility is 87% of the actual fund's volatility. These results are presented in Table 2 for both the entire time period and interim periods encompassing different investment environments.

Even in bear markets,[10] asset allocation explains 69.4% of return variability and 100% of return.[11] The same is true in generally rising markets, too. From 1981 to 2001, for example, U.S. capital markets enjoyed secular bull markets in stocks and bonds, with profound changes in the variety of financial instruments available and in portfolio-management techniques. Even so, asset allocation remained paramount, with active strategies making a far less significant impact on portfolio performance.

It's true that some diversified portfolios may invest in securities with somewhat different characteristics than those of the broad market benchmarks used in our style analysis, but the use of more specialized sub-asset class benchmarks such as small-capitalization, value, and growth indexes had little impact on our results. Although this kind of analysis involves significant technical hurdles (see "Inference of Sub-Asset Classes" on page 6), we used style analysis to infer each fund's allocation to small-cap, mid-cap, and large-cap growth and value sub-asset classes for funds with at least 120 monthly observations. The results were insignificantly different from those reported here.

Table 2 The Role of Asset Allocation in Different Market Environments

Period	Number of Funds	Policy Return as % of Actual Return	Policy Volatility as % of Actual Volatility	% of Actual Return Variation Explained by Policy Return Variation
1962–2001	420	113.7%	86.6%	76.6%
1981–2001	404	112.5%	87.3%	77.8%
1962–1980	66	123.9%	85.4%	74.6%
Bear Markets	66	100.1%	82.4%	69.4%

10. The bear market analysis was conducted over the following periods: 1/66–10/66, 12/68–6/70, 4/71–11/71, 1/73–12/74, 9/76–3/78, 11/80–7/82, 10/83–7/84, 8/87–12/87, 6/90–9/90, 1/00–12/01.

11. Under bear market conditions, the ratio of average policy return to average actual return has a negative sign for some funds. Since this is not meaningful for our purposes, we report one-period accumulated value as the effect on average return for this market. It is calculated as the ratio of (1+average return on policy allocation with indexing) to (1+average actual return of the fund).

Characteristics of Funds That Add Value Through Active Management

Although active management, on average, reduces returns and increases return variability, some funds have been able to consistently outperform their policy benchmarks. Figure 3 displays the distribution of relative performance in our universe of balanced funds: 7% of the funds have consistently beaten their policy allocations through active management[12]; 41% of the funds have consistently earned less than what their policy allocations would have earned; and the excess return for the remaining 52% of funds is not statistically different from zero.

On average, the funds that consistently outperformed enhanced their monthly policy returns by 28.7 basis points. Funds that consistently underperformed earned 23.8 basis points less than their policy returns. Outperforming funds have lower R^2 than underperforming funds—that is, a lower proportion of the variability in their returns can be explained by the variability in their policy returns. As depicted in Table 3, outperforming funds achieve higher returns than their policy allocations at the cost of greater risk. On the other hand, underperforming funds earn a lower return than their policy allocations yet they incur a higher level of risk. Table 3 also shows that, on average, funds with consistent outperformance have lower expenses and lower portfolio turnover[13] than consistently underperforming funds. On average, successful funds have expense ratios 15 basis points lower than those of their counterparts, and their portfolio turnover is 10 percentage points lower. They also have significantly more assets under management.

Fund Data Definitions

Expense ratio is the fund's annual operating costs as a percentage of average net assets. *Net assets* is the closing market value of the fund's assets minus its liabilities. *Turnover* is the lesser of aggregate purchases or sales of securities divided by average net assets.

Table 3 Fund Characteristics

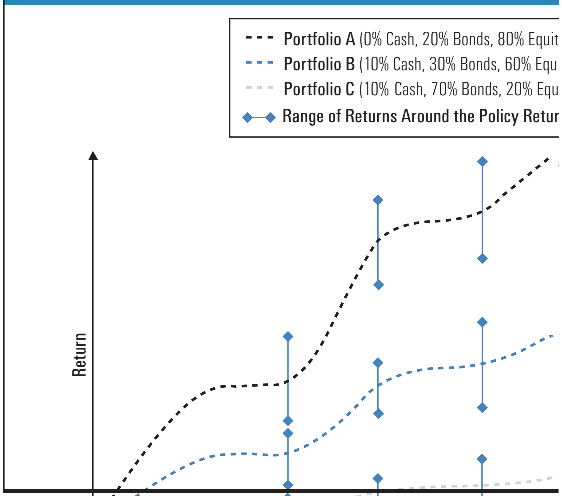
	All Funds	Positive Alpha	Negative Alpha	Zero Alpha
Risk and Return (average across funds)				
Average Alpha (basis points)	–8.7	**28.7**	**–23.8**	–1.9
Policy Return as Percentage of Actual Return	113.7%	**74.7%**	**136.6%**	100.7%
Policy Volatility as Percentage of Actual Volatility	86.6%	**81.4%**	**89.0%**	85.5%
Return Variability Explained by Policy Variability	76.6%	**67.3%**	**80.4%**	74.7%
Average Fund Characteristics				
Expense Ratio	1.28%	**1.20%**	**1.35%**	1.23%
Net Assets (millions)	$296.2	**$887.0**	**$195.6**	$292.4
Turnover	84.4%	80.5%	90.1%	80.4%
Number of Funds	420	31	174	215

Note: The numbers in **bold blue** are statistically significantly different for funds with positive and negative alpha using 90% one-sided t test.

12. Funds with consistent positive excess return (alpha) have statistically significant alpha using 85% one-sided t test for statistical significance.

13. Significant using 83% one-sided statistical significance test.

Figure 3 The Distribution of Alpha



Cost can be an important hindrance to the success of active managers. The average fund in our study lags its policy return by 8.7 basis points after costs. However, the average fund would earn approximately 90 basis points more than its policy portfolio if it incurred the same expense ratio as the indexed policy portfolio.[14] To explore the role of cost, we categorize funds into five groups according to their expense ratios. Table 4 shows that the highest-cost quintile performs 31.6% worse than its policy return, in large part because of the drag of high costs. The lowest-cost quintile, by contrast, lags its policy return by just 6.7%. The percentage of actual return variation explained by policy return variation and return volatility are not significantly different across different cost groups.

Summary

Our research, based on a large and robust data set, reinforces earlier studies showing that asset allocation is the primary determinant of performance, both in short-term variability of return and in long-term level of return, for broadly diversified portfolios. Since the vast majority of investment returns can be attributed to asset allocation policy, investors should make their asset allocation decision the highest priority. Should an investor wish to pursue active management strategies in an attempt to achieve superior returns, this analysis strongly advises an investor to select actively managed funds with low expenses and low portfolio turnover.

Table 4 Risk and Return Characteristics of Cost Quintiles

Cost Groups	Number of Funds	Policy Return as % of Actual Return	Policy Volatility as % of Actual Volatility	% of Actual Return Variation Explained by Policy Return Variation
1 (Lowest)	84	106.7%	88.3%	79.3%
2	84	105.2%	88.2%	79.7%
3	84	109.6%	87.2%	77.0%
4	84	115.2%	82.1%	69.8%
5 (Highest)	84	131.6%	87.2%	77.1%

14. The policy portfolio is assumed to incur an annual cost of 24 basis points for indexing the asset class benchmarks. The average balanced fund in our sample incurs an expense ratio of 128 basis points. If the average fund incurred the same cost as indexing, it would increase the return approximately 104 basis points. Given the after-cost return lag of 8.7 basis points, the gross return on the fund is approximately 95 basis points greater than the policy return.

Empirical Methodology

Our empirical and quantitative analysis includes five primary steps: 1) style analysis, which allows us to infer the funds' policy allocations; 2) a simple calculation of policy returns using asset class benchmarks and policy weights inferred from style analysis; 3) a regression of the funds' actual returns against their policy returns that gives us an adjusted R^2; 4) a calculation of the ratio of the return of a fund's policy allocation to its actual return; and 5) a calculation of the ratio of the standard deviations of a fund's actual and policy returns. The details of each calculation appear below.

1. Estimation of Policy Allocation Using Style Analysis

The policy weights, or asset allocation, for each fund are estimated by performing returns-based style analysis over the entire history of the fund. Style analysis (Sharpe, 1988) is a statistical method for inferring a fund's effective asset mix by comparing the fund's returns with returns of asset class benchmarks. Style analysis is a popular attribution technique because it does not require tabulating the actual asset allocation of each fund for each month over time. Rather, style analysis facilitates return attribution by regressing the return of the fund against the returns of asset class benchmarks. The following regression is estimated:

$$r_t^{fund} = \alpha + w_{Stock}\, r_t^S + w_{Bond}\, r_t^B + w_{Cash}\, r_t^C + \varepsilon_t,$$

where w_{Stock} is the policy allocation to stocks, w_{Bond} is the policy allocation to bonds, w_{Cash} is the policy allocation to cash, r_t^S is the return on equity benchmark in period t, r_t^B is the return on bond benchmark in period t, r_t^C is the return on cash benchmark in period t, α is the excess return on the fund that cannot be attributed to the returns on benchmarks, and ε_t is the residual that cannot be explained by the asset class returns.

For our purposes, style analysis requires not only that asset class weight parameters sum to 1, but also that each asset class weight is positive (no short sales).

2. Calculation of Policy Return

The policy return of the fund is calculated from the policy weights and returns on asset class benchmarks in the following way:

$$r_t^{policy} = w_{Stock}\, r_t^S + w_{Bond}\, r_t^B + w_{Cash}\, r_t^C - cost,$$

where w_{Stock} is the policy allocation to stocks, w_{Bond} is the policy allocation to bonds, w_{Cash} is the policy allocation to cash, r_t^S is the return on equity benchmark in period t, r_t^B is the return on bond benchmark in period t, r_t^C is the return on cash benchmark in period t, and $cost$ is the approximate cost, as a percentage of assets, of replicating the policy mix using indexed mutual funds. The cost is assumed to be 2 basis points each month (approximately 25 basis points annually).

Empirical Methodology (continued)

3. Regression of Actual Returns Against Policy Returns

To compare variation in the policy and actual returns, we calculate an adjusted R^2 for each fund by regressing its actual return against its policy return:

$$r_t^{fund} = \alpha + \beta r_t^{policy} + \varepsilon'_t,$$

where α is the excess return on the fund that cannot be attributed to policy return, β is the sensitivity of changes in fund return to changes in policy return, and ε'_t is the residual that cannot be explained by policy return.

4. The Ratio of Average Policy Return to Average Actual Return

Policy return as a percentage of the actual return of each fund is the ratio of its average policy return to its average actual return:

$$\left(\frac{1}{T}\sum_{t=1}^{T} r_t^{policy}\right) / \left(\frac{1}{T}\sum_{t=1}^{T} r_t^{fund}\right)$$

When average policy return is greater than average actual return, this ratio is greater than 100%.

5. The Ratio of Policy Volatility to Actual Volatility

The policy volatility as a percentage of the actual return volatility of each fund is the ratio of standard deviation of the policy return to the standard deviation of the actual return:

$$\left(\frac{1}{T-1}\sum_{t=1}^{T} [r_t^{policy} - avg(r^{policy})]^2\right)^{.5} / \left(\frac{1}{T-1}\sum_{t=1}^{T} [r_t^{fund} - avg(r^{fund})]^2\right)^{.5}$$

When policy volatility is smaller than actual return volatility, this ratio is smaller than 100%.

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