Measuring the True Cost of Active Management by Mutual Funds

by

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ABSTRACT

Recent years have seen a dramatic shift from mutual funds into hedge funds even though hedge funds charge management fees that have been decried as outrageous. While expectations of superior returns may be responsible for this shift, this article shows that mutual funds are more expensive than commonly believed. Mutual funds appear to provide investment services for relatively low fees because they bundle passive and active funds management together in a way that understates the true cost of active management. In particular, funds engaging in “closet” or “shadow” indexing charge their investors for active management while providing them with little more than an indexed investment. Even the average mutual fund, which ostensibly provides only active management, will have over 90% of the variance in its returns explained by its benchmark index. This article derives a method for allocating fund expenses between active and passive management and constructs a simple formula for finding the cost of active management. Computing this “active expense ratio” requires only a fund’s published expense ratio, its R-squared relative to a benchmark index, and the expense ratio for a competitive fund that tracks that index. At the end of 2004, the mean active expense ratio for the large-cap equity mutual funds tracked by Morningstar was 7%, over six times their published expense ratio of 1.15%. More broadly, funds in the Morningstar universe had a mean active expense ratio of 5.2%, while the largest funds averaged a percent or two less.

During the last twenty years, an era marked by the rise of both index funds and hedge funds, investors of all stripes have gazed with increasing skepticism toward investment managers. As soon as it became practical for investors to “own” stock indexes, these bogeys went from benchmarks of largely theoretical interest to viable investment vehicles. Then, the introduction of style analysis by William Sharpe and others and its popularization in a simplified form by Morningstar fundamentally changed the way that the performance of traditional money managers was assessed. Either by a count of rating stars or through the use of more sophisticated measures, managers were given credit only for performance that they were determined to have actively earned. Sharpe (1992) would show that 97.3% of the variance in returns of what was then the mutual fund with the most assets under management, Fidelity’s Magellan Fund, could be attributed to “passive” style choices, with only the remaining 2.7% of variance attributed to the “active” selections of its manager.

In the years since Sharpe’s analysis of Magellan first appeared, the fund’s portfolio has become more passive as its steady drift into large capitalization U.S. stocks continued. Indeed, Morningstar reported at the end of 2004 that 99% of the variance in Magellan’s returns could be traced to a single index, the Standard & Poor’s 500 Composite Stock Price Index (S&P 500). Between 1992 and 2004, Magellan’s expense ratio fell by a full third—from 1.05% of assets under management to 0.70%—however, when compared with the alternative of paying 18 basis points for Vanguard’s S&P 500 Index Fund or (more recently) 10 basis points for Fidelity’s comparable index fund, 70 basis points cannot be considered a bargain. Magellan was not alone; many mutual funds have engaged to one degree or another in “closet” or “shadow” indexing—charging their investors for active management while providing them with little more than an indexed investment.

This article develops a method for uncovering the true costs and benefits of active fund management. While analysts have typically focused on how the portfolio’s variance is allocated among its investments, the techniques developed here look at the allocation of the implied shares of funds being passively and actively managed.[1] In essence, we take the portfolio and decompose it into a purely passive component, which is equivalent to an investment in one or more index funds, and a purely active component, which is equivalent to an investment in a portfolio that is uncorrelated with the index. From this decomposition we can estimate the true cost of management for the active component of the fund.[2] By isolating this active component, we can also adjust the portfolio’s performance measures, such as alpha, to remove any dilution caused by the passive component.

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[1] Swedroe (2001, pp. 68–69) constructs an example that uses a variance decomposition to compute directly the passive and active shares of funds under management. This approach tends to overestimate the implied expense ratio for the active component because it generates passive and active shares that are inconsistent with a proper replicating portfolio.

[2] An alternative to the decomposition method presented here is the overlay method proposed by Asness (2004a and 2004b). Although the overlay method provides another strong argument for the proposition that the cost of active management is greater than a fund’s overall expense ratio, it only allows one to compute this cost in the special case where the beta of the fund relative to the benchmark is unity.

Consider, for purposes of illustration, the Fidelity Magellan Fund at the end of 2004. Based on monthly data from the preceding three years, an investor could have replicated the risk and return characteristics of the fund (including its R^2 of 99%) by placing 90.87% of his or her assets in an index fund that tracks the S&P 500 and the remaining 9.13% in an appropriately chosen market-neutral investment. In this new portfolio, 99% of the variance of this portfolio is explained by the index and we can leverage it in a way that Magellan's beta and variance are also replicated. If we then take 18 basis points as the expense ratio for the passive component of Magellan (the same ratio as the version of Vanguard's S&P 500 index fund marketed to individual investors), Magellan might be seen as "overcharging" investors by 52 basis points on the passive component of its portfolio. If we were to assess those 52 basis points against the 9.13% of the portfolio that is actively managed, we would find that annual expenses account for 5.87% of those funds.

The 5.87% annual cost of the active management implicitly provided by Magellan's management, which we will call its *active expense ratio*, could be justified on economic grounds if the fund provided superior returns to its investors. For purposes of comparison, a hedge fund that charges the standard annual fee of 2% of funds under management plus 20% of its positive returns would have to earn 19.35% on the actively managed assets (and provide investors with a net return of 15.48%) in order to earn a total of 5.87%.[3] Unfortunately, not only did Magellan fail to post that performance on the active portion of its portfolio, it managed to lose substantially more than that on an annual basis over the three years from 2002 through 2004. When Magellan's alpha of –2.67% per year over that period is allocated solely to the active component of its portfolio, it has an *active alpha*[4] of –27.45%.

While Magellan performed worse than the average mutual fund did between 2002 and 2004, its active expense ratio was in line with the mean of both large-cap mutual funds and the broader universe of mutual funds. The average mutual fund achieves an active expense ratio in the range of 5% to 7% that is consistent with an overall expense ratio of about 1.25% and a passive component that explains at least 90% of the variance in its returns. Like overall expense ratios, active expense ratios tended to be lower on average for the very largest funds.

The active expense ratio has the virtue of providing a meaningful measure of true cost of active management in a single number. This measure can be readily applied not just to mutual funds, but to most investments that have a passive component to them. All that is required to perform a virtual decomposition of a fund's assets into a passive component and an active component is a fund's R^2 (explained variance) relative to one or more market indexes. Both the active expense

[3] Any direct comparison of fees between hedge funds and mutual funds is complicated by the fact that hedge fund expenses are structured to include a sizeable incentive component. Many mutual funds, including Fidelity Magellan Fund, have provisions that link fees to performance; however, these incentive payments are typically small relative to the standard for hedge funds. This difference in incentive structures might also be expected to induce managers who were more confident of outperforming the market to work for hedge funds. Mutual fund expenses can include fees that are not technically management fees. Both hedge funds and mutual funds do not include commissions and other trading-related expenses in their fees; however, these are reflected in fund performance.

[4] This use of the term "active alpha" is distinct from that used by Litterman (2003) to refer to a specific portfolio strategy.

ratio and active alpha (from a single index) can then be computed directly from data available for free over the Internet from services such as Morningstar and finance portals such as Yahoo! Finance.

This approach to portfolio decomposition was inspired by the financial engineering approach to asset management that has its roots in the Black-Scholes-Merton model and that has recently influenced the growing use of “portable alpha” strategies (see Arnott, 2002; Litterman, 2003; and Kung and Pohlman, 2004). While the decomposition employed here is quite different from that used to price options, it shares with option pricing models the important feature that beta literally does not enter into the equation. Thus, a fund manager’s decision about how much leverage to employ—either directly through borrowing or indirectly by choosing to hold more highly levered assets—should be viewed as independent of the manager’s allocation (either intentional or unintentional) between passive and active management.

Portable alpha enters the picture because it encapsulates the idea that passive and active risk from different asset classes can be “mixed and matched.” For example, if an investor believes that outperformance is too expensive or difficult to achieve in the equity market, he might find it worthwhile to replace his traditional equity investments with a combination of a passive investment in an equity index fund and an active investment in real estate. In this way he can “port” relatively cheap alpha in real estate over to equity. The idea of decoupling the acquisition of alpha from the asset allocation decision launched if not a thousand hedge funds, at least a few hundred of them.

A mutual fund investor can view himself as a captive holder of an active portfolio that could, in principle, be swapped for another, more suitable, active portfolio. By isolating the active element of any traditional investment, not just equity mutual funds but in any type of security where indexing is possible, its costs and performance can be more directly compared with other active investments in either bundled or unbundled form. Performance considerations aside, when one looks at the active management provided by market-neutral or other predominantly active hedge funds in a world with inexpensive passive alternatives, their supposedly outrageous fees are not so outrageous when compared with obtaining the same amount of active management through more traditional means.[5]

This article begins by deriving the formulas for computing the implied share of assets under active management, which in turn allow us to compute the active expense ratio and active alpha. These measures are then applied to a class of assets that best illustrates the power of this method—large-cap stock mutual funds. Large-cap funds have a single, natural benchmark, which is the S&P 500. We divide large-cap funds into two groups for the purpose of this analysis, those aimed at individuals and those that target institutional investors. The article concludes with an examination of how the techniques developed in this article can be extended.

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[5] In an August 2001 article critical of hedge funds, *Fortune* magazine (Clash, Lenzner and Maiello, 2001) repeatedly characterize hedge fund fees as “outrageous.”

Deriving the Active Expense Ratio and Active Alpha

A fund's reported R^2 relative to one or more passive investment alternatives does not directly give us the share of funds being passively managed; rather, it gives the share of variance in returns that can be explained by these investments. If we are able to model explicitly the sources of variance in the portfolio, then we can derive a formula for the active share of funds. In turn, this share can be used to derive formulas for the active expense ratio and active alpha.

Ideally, we would like to isolate the active component of a fund's portfolio by dividing its assets into two disjoint parts such that the passive part was perfectly correlated with the benchmark index and the active part was entirely uncorrelated with it. Having done this we could find the expense ratio for the active part by noting that fund's expenses can be written as following weighted sum:

$$C_P = (1 - w_A)\, C_I + w_A C_A \qquad (1)$$

where C_P is the portfolio expense ratio for portfolio P, C_I is the passive expense ratio, C_A is the active expense ratio, and w_A is the proportion of the portfolio being actively managed.

The passive expense ratio, C_I, is taken to be the expense ratio for a competitive index fund that is used as the benchmark. While judgment must be exercised to place a value on C_I, the computations that use it are relatively insensitive to its value. C_I is currently 50 basis points or less per annum for all but the most obscure or difficult to match indexes. Expense ratios can be nearly zero for institutional purchases of the most popular indexes and are about 20 basis points for the other major indexes. For all but a tiny proportion of funds that have their expenses subsidized, C_P for a fund is substantially greater than its corresponding C_I.

We can solve (1) for the C_A, the active expense ratio, to get:

$$C_A = C_I + \frac{C_P - C_I}{w_A}, \qquad (2)$$

with $0 < w_A \leq 1$. The active weight of the portfolio, w_A, will only be zero when the portfolio's returns correlate perfectly with those of the index and then C_A will be undefined. In the usual case where $C_P > C_I$, the active expense ratio can be seen to exceed the expense ratio for both the index and the portfolio.

As noted above, we can compute C_A directly if we can find a partition of the portfolio into distinct passive and active parts. In that case, w_A is simply the proportion of assets invested in the active part. Unfortunately, such a clear-cut separation of assets is virtually impossible to achieve in practice. Generally, most of a fund's holdings will contribute to both active and passive elements to the portfolio in a fundamentally inseparable way.

One could use this holographic nature of the active and passive elements of the typical portfolio to argue that it is inadvisable to penalize a manager for holding the passive component of his portfolio because it came along for the ride with the active component. Indeed, the portfolio manager could be seen as merely passing along the passive component that is already bundled into the assets he acquires and, moreover, any diversification required to make the portfolio more efficient will legitimately increase the passive component.

This argument can be addressed in three ways. First, it simply reinforces the larger point that active management does not come cheaply. Desirable active positions are rarely the found objects of the marketplace; instead, they must be refined out of the raw material available to asset managers and the refining process costs money. Second, it is reasonable to believe that some managers take on positions that are more passive than necessary to establish their active positions. Some techniques for "gaming the benchmark" can lead to taking a more passive posture than investors might desire. Third, and finally, the economics of the situation dictate that the true economic cost of anything, including portfolio management services, is determined by the cost of the best available alternatives. If traditional active managers find themselves in the position of being inefficient providers of active asset management for any reason, they will either adapt or eventually be forced out of business.

The inability to divide a fund's portfolio literally into a passive and an active part; however, does not mean that one cannot derive a decomposition that achieves the desired separation. In fact, we do not need to define the decomposition on an asset-by-asset basis. Instead, we need only ascertain the statistical properties that this decomposition must satisfy. Considering that few mutual funds provide timely information on their holdings, this is a desirable property. From a single assumption about how variance is distributed throughout the fund's portfolio, we can specify the properties of the decomposition without knowing the fund's holdings. The only information that is necessary is the R^2 from the regression of the fund's returns against those of the index, which is equal to the proportion of the variance in returns explained by the index.

The standard linear regression equation for portfolio returns can be written as:

$$r_P = \alpha_P + \beta_P r_I + \varepsilon_P, \qquad (3)$$

where r_P is the return of the portfolio and r_I is the return of the index. (The letter I is used as the subscript here rather than the more standard M because we do not wish to imply that the index represents the "market" as a whole.) Equation (3) is commonly estimated by commercial services using monthly returns over a period of three to five years. If the returns are taken to be the returns in excess of the risk-free rate of return[6], which we will assume they are, then beta (β_P) is the amount of index-related risk contained in the portfolio and alpha (α_P), also known as Jensen's alpha, is an index-adjusted measure of the portfolio's performance. Lastly, ε_P is the

[6] Although excess returns are used throughout this article for consistency with the Morningstar data and standard practice, the analysis can also provide a useful decomposition if only gross returns are considered.

residual return, the return not explained by the index that is usually taken to be normally distributed with zero mean and a constant variance. A standard property of least-squares regression makes the residual returns uncorrelated with the returns of the index. To reduce notational overhead, whenever we use $\alpha_P, \beta_P,$ and ε_P in the remainder of this article, we will be referring to the regression estimates of these parameters.

The usual caveats for linear regressions apply here. In particular, regressions involving asset returns assume that a portfolio with constant risk/return characteristics (i.e., constant regression parameters) is being analyzed over the entire period. While this is an innocuous assumption for most funds, it precludes the possibility of substantial shifts in portfolio make-up that could result from a fund manager who practices market timing or asset rotation.[7] Furthermore, since the past statistical properties of the fund are intended to be used to make decisions about ownership of the fund, the risk profile of the fund during the estimation period should carry over into the present and, one should hope, into the immediate future.

With those caveats in mind, we can convert equation (3) into a variance decomposition equation by taking the variance of both sides of it while taking into account that alpha and beta are constants and that the covariance between r_I and ε_P is zero to get:

$$\sigma_P^2 = \beta_P^2 \sigma_I^2 + \sigma^2(\varepsilon_P) \qquad (4)$$

Equation (4) has the effect of decomposing the portfolio variance, σ_P^2, into two parts. The first part, $\beta_P^2 \sigma_I^2$, is the variance explained by the index. The R^2 for the regression equation (3) is, by definition, the variance explained by the index divided by the overall portfolio variance. The second part, $\sigma^2(\varepsilon_P)$, is the variance not explained by the index, i.e., the residual variance. The residual variance divided by the overall portfolio variance is then seen to be $1–R^2$.

The index component can be considered purely passive because it could be achieved by investing in the index and leveraging or deleveraging that investment as indicated by beta. The residual component, on the other hand, represents the largest amount of the variance that can be attributed to the active participation of the fund manager. One possible source of variance that cannot be attributed to the actions of the manager is the “noise” associated with the inability of the manager to diversify away fully those elements of idiosyncratic risk that are tied to the manager’s active bets. In large portfolios, this “noise” is likely to be small and we will give the manager the benefit of the doubt that entire residual term comes from active management.[8]

[7] Dybvig and Ross (1985) and Dybvig (2003) explore the limitations of static performance measures when applied to a dynamic setting such as a fund manager who engages in information-based asset selection strategies.
[8] This assumption tends to make the estimate of the active expense ratio a conservative one. Later, we discuss a way to relax it.

The coefficient β_P in regression equation (3) captures the degree of influence that the index has on the portfolio. This becomes β_P^2 when expressed in terms of variance. The influence of the active component, however, is not separated out—there is no coefficient for the "active portfolio" in equation (3), just the residual term, ε_P.

To achieve the desired separation between the passive and active components of portfolio *P*, we will imagine what such a decomposition would entail if it were possible. We start by assuming that the only things that we know about the portfolio are the index (I) used to estimate regression (3), the estimated coefficients in that regression, and its R^2. We will assume that we do not know the actual holdings in the portfolio.

Now consider how we might construct a synthetic portfolio *P´* that has the same risk and return characteristics (alpha, beta, variance and its decomposition, etc.) as portfolio *P* but with a clear separation between the assets invested in its passive and active parts. We will construct the passive part of *P´*, which we will call *I´*, so that it is a leveraged version of the index *I*. This passive component, which is known as the fund's tracking portfolio, is nothing more than a portfolio that holds the index and either levers it down by holding excess cash or levers it up using borrowed funds or index futures. On the other hand, the active component, which we will call *A´*, is not constructed directly; instead, its properties are inferred from those of the fund's portfolio. Knowing these properties, we can determine the costs that should be allocated to the active component (the fund's active expense ratio) and the excess returns associated with it (the fund's active alpha).

Recall that w_A is the proportion of the portfolio *P* that we are taking to be actively managed, so the returns of the portfolio *P´* can be written as the weighted sum of its passive return $r_{I'}$ and of its active return $r_{A'}$ as follows:

$$r_{P'} = (1 - w_A) r_{I'} + w_A r_{A'} \qquad (5)$$

In order for the beta of *P´* to match that of *P*, we must have:

$$r_{I'} = \frac{\beta_P}{1 - w_A} r_I .$$

Therefore, the leverage factor for the passive component *I´* is $\beta_P / (1 - w_A)$. A typical value for this leverage factor in the Morningstar universe is 1.15, so for the purposes of this analysis it is reasonable to assume that the cost of achieving this leverage is sufficiently small that it can be safely ignored. Note that whenever the original portfolio's beta is greater than one that there will never be a way to replicate it without employing leverage, so this decomposition will not necessarily "conserve assets."

By construction, the returns of the active component of the portfolio ($r_{A'}$) are uncorrelated with those of the passive component ($r_{I'}$). Taking this into account to compute the variance from (5) we get:

$$\sigma_{P'}^2 = (1 - w_A)^2 \sigma_{I'}^2 + w_A^2 \sigma_{A'}^2 \qquad (6)$$

where $\sigma_{I'}^2$ is the passive variance and $\sigma_{A'}^2$ is the active variance. Since we want the proportion of variance explained by the passive and active components to be the same for P' as it was for P, for the passive component we have:

$$\frac{(1 - w_A)^2 \sigma_{I'}^2}{\sigma_{P'}^2} = R^2 , \qquad (7a)$$

while for the active component we have:

$$\frac{w_A^2 \sigma_{A'}^2}{\sigma_{P'}^2} = 1 - R^2 . \qquad (7b)$$

If we divide each side of (7b) by the corresponding side of (7a), the variance $\sigma_{P'}^2$ cancels out, giving:

$$\frac{w_A^2 \sigma_{A'}^2}{(1 - w_A)^2 \sigma_{I'}^2} = \frac{1 - R^2}{R^2} \qquad (8)$$

Equation (8) then implicitly gives the value of w_A in terms of R^2 and the ratio of the active to the passive variance, which is $\sigma_{A'}^2 / \sigma_{I'}^2$. We have assumed that we know the value of R^2; however, it will take one additional assumption about the portfolio in order to pin down $\sigma_{A'}^2 / \sigma_{I'}^2$.

In the absence of any information about the portfolio beyond R^2 and the estimated coefficients of the regression equation, the natural assumption to make is that the active and passive components have the same variance, so that $\sigma_{A'}^2 / \sigma_{I'}^2 = 1$. This assumption can be viewed as equivalent to assuming that the leverage attributable to the passive side of the portfolio, as reflected by β_P, carries over to the active side. Because factor model studies such as Fama and French (1992) have stripped the standard beta of any special significance, it is reasonable to believe that in a single factor model it serves as something like a proxy for leverage or firm size and, as such, should apply uniformly throughout the portfolio. The effects of relaxing or changing this assumption are discussed at the end of this article.

If we then substitute $\sigma^2_{A'}/\sigma^2_{I'} = 1$ into (8) and take the square root of each side, we get:

$$\frac{w_A}{(1-w_A)} = \frac{\sqrt{1-R^2}}{R} \qquad (9)$$

Solving (9) for the value of the w_A, the weight of the active share in the portfolio, yields:

$$w_A = \frac{\sqrt{1-R^2}}{R+\sqrt{1-R^2}} \qquad (10)$$

Having solved for the weight, we now go to back and substitute into equation (2) to compute the active expensive ratio C_A as follows:

$$C_A = C_P + \frac{R(C_P - C_I)}{\sqrt{(1-R^2)}}\,. \qquad (11)$$

Notice that equation (11) allows us to derive the active expense ratio knowing only R^2 and the expense ratios for the portfolio and the index. The active expense ratio increases with both an increase in the fund's expense ratio and its R^2 relative to the index. When the cost of indexing rises, the active expense ratio will decline as a larger proportion of the fund's costs are consumed by passive management. Beta, as noted above, does not enter at all into the calculation of the active expense ratio.

The alpha of the active component is computed in a similar manner. The following equation gives the portfolio alpha, α_P, as a weighted sum of the active alpha, α_A, and the passive alpha, which we will assume to be the negative of the cost of indexing, C_I :[9]

$$\alpha_P = w_A\alpha_A - (1-w_A)C_I \qquad (12)$$

Substituting from (10) into (12) and solving for the active alpha yields:

$$\alpha_A = \alpha_P + \frac{R(\alpha_P + C_I)}{\sqrt{1-R^2}} \qquad (13)$$

[9] This may tend to underestimate alpha for many of the larger index funds because they tend to employ successful enhancement strategies that recoup some fraction of their expenses.

All other things being equal, an increase in the portfolio's alpha raises the alpha of the active part as one would expect. As the active share of the portfolio declines (with an increase in R^2), active alpha becomes more sensitive to changes in the portfolio's alpha. Finally, the more that the implicit cost of indexing reduces the portfolio's alpha, the greater active alpha becomes.

Applying the Formulas to Large-Cap and Other Mutual Funds

Having developed the machinery for isolating the active component of the typical mutual fund's portfolio from publicly available data, we will now look at values of the active expense ratio and active alpha computed from the January 2005 annual release of the Morningstar mutual fund database. This database contains comprehensive information on 17,411 funds through December 31, 2004. Morningstar computes its regression-based measurements for funds—alpha, beta, and R^2—from monthly excess returns over the previous 36 months. Fund expense ratios in the Morningstar database constitute the most recently reported figures.[10]

Morningstar categorizes funds in three ways—using its own style system, using the objective stated in each fund's prospectus, and using the benchmark which provides the best fit to the fund's returns as measured by R^2. In this study the prospectus objective was not used because of its subjective, and potentially misleading, nature.

Given our focus on active management, the first step was to prune the database by eliminating any fund that was either explicitly identified as an index fund or that had an R^2 of 100% relative to its best-fit index.[11] Since Morningstar rounds R^2 to the nearest percentage point, funds with a stated R^2 of 100% can include funds whose actual R^2 was as low as 99.5%.[12] While this screen may have eliminated the most egregious closet indexers from the sample, it mainly excludes index funds that were not flagged as such. Also removed from the sample were funds reporting less than $10 million of assets under management. Such small funds were more likely to have anomalous expense structures either because they had too few assets over which to allocate expenses or because they were new funds whose expenses were being temporarily subsidized.

[10] Actual expenses over the previous 36 months are not reported. Given the general stability of expense ratios, it seems safe to assume for the purposes of this analysis that the reported expense ratio is representative of the entire 36-month period.

[11] Note that any fund that was not in existence during the entire three-year period was automatically excluded from this study because R^2 would not be available for it. Because the vast majority of money invested in mutual funds is in established funds, any survivorship bias is not considered to be a significant issue here.

[12] Rounding error is greater for mutual funds with higher values of R^2. In the absence of evidence that fund managers systematically game the value of R^2 in either direction, there is no reason to adjust these values. A more conservative measure when singling out a single fund would involve subtracting 0.5% from it; however, the results when averaged over many funds can be expected to be more accurate if the published figures for R^2 are used and so that is the approach taken here.

The sample was not strictly restricted to no-load funds; however, funds with either a front-end or back-end load of greater than 1% were excluded.[13] Funds with expense ratios of 30 basis points or less, which constituted about 1% of the sample, were also excluded. The only equity funds that were affected were those whose investors were limited to employees of the fund manager's company, such as GE's S&S Program and Elfun funds. (Funds with broader target audiences such as AARP and TIAA-CREF were retained in the sample because their fees were not deemed low enough to raise a red flag.) As noted above, funds with sufficiently low expense ratios usually have their expenses subsidized in some manner.

Finally, funds classified by Morningstar as either "Moderate Allocation" or "Conservative Allocation" were dropped from the sample. These funds were considered more likely to have market timing and asset rotation issues that would affect their active expense ratio, active alpha, and overall alpha. After all screening was completed, 4,752 of the 17,411 original funds remained.

An examination of how well Morningstar's categorization scheme matched up against their reported "best-fit index," the index with which the fund had the highest R^2, led to the conclusion that large-cap U.S. equity funds had the least ambiguous benchmark—the S&P 500 Index. Choosing the "wrong" benchmark index can create two kinds of problems. First, it can reduce the estimated share of the fund under active management (which also reduces its active expense ratio) since the R^2 relative to that index will tend to understate the fund's passivity. Second, the estimated value of alpha that is used as the primary input into the estimate of the fund's active alpha will be misspecified.

Only funds that Morningstar placed in one of its three large-cap style categories—Large Blend, Large Value, and Large Growth—were included in the sample of 152 large-cap funds. This eliminated "bear" funds that provide investors with returns that are *negatively* correlated with the S&P 500 and a few other funds with correlations that appeared spurious. The large-cap funds were then divided into two groups—individual and institutional. Funds were considered institutional when they had a minimum initial investment requirement of $100,000 or more—a dividing line that basically agrees with the data provided by Morningstar and deals with the few cases where a fund's name and its Morningstar designation do not match. Funds requiring less than a $100,000 initial investment were taken to be individual funds. Under this criterion, there were 36 institutional funds and 116 individual funds. The two groups were treated identically except that the 0.18% expense ratio for Vanguard's S&P 500 Index Fund was assigned as the

[13] The expense ratio for funds with small loads was not adjusted to include the load. The lack of an unbiased method to adjust expense ratios for loads led to the exclusion of funds with significant loads from the sample. This is less of a problem for funds with multiple classes since one of the classes (Class C) normally has little or no load and so can represent the fund in the sample; however, the other classes may provide lower expenses for some long-term investors. The 1% cutoff was deliberately selected so that Class C shares would be included. No effort was made to add this load back into the fund's expenses—it was simply ignored for the purposes of this study.

cost of indexing for the individual funds and the 0.05% expense ratio for Vanguard's Institutional S&P 500 Index Fund was used for the institutional funds.[14]

Table 1 gives summary statistics for the 152 large-cap funds as well as the broader universe of 4,752 funds from which they were drawn. The computed values for the active expense ratio and active alpha for the Morningstar universe are presented to establish rough baseline figures for comparative purposes only. To avoid the problem of finding an appropriate benchmark index as well as a cost of indexing for each fund, a constant indexing cost of 0.30% was assumed for each fund.[15] The active expense ratio for each fund was computed using equation (11) and active alpha was computed using equation (13).

As one would expect, institutional large-cap funds have lower average expense ratios than individual funds. They also have lower active expense ratios even though their mean R^2 of 96.86% is nearly a full percentage point above that of the individual funds. (It is interesting that the mean R^2 for both institutional and individual funds exceeds the 95% threshold that Bogle (1999) and others view as a signal of closet indexing.) With so much of the variance of institutional funds being explained by the S&P 500, it is not surprising that their average active expense ratio of 5.14% runs more than 500% higher than the published expense ratio of 0.77%.

Over the entire sample of 152 large-cap funds, the mean active expense ratio is just under 7% per year. To beat the cost of a purely actively hedge fund that takes an annual 2% off the top and 20% of all positive returns, the manager of the average fund would have to generate a gross active return of 25%.[16]

In the broader sample of 4,752 funds, the mean active expense ratio of 5.20% is only a bit more than the mean for institutional large-cap funds. The overall expense ratio, 1.26%, is the same as that for individual large-cap funds. The broader sample offsets its higher expenses with what is apparently more active management—the mean best-fit R^2 is 90.24%.

The performance of the large-cap funds in the sample as measured both by the standard overall alpha and by active alpha is undistinguished on average. Institutional funds only perform slightly better than individual funds and the mean overall alpha of –1.50% plummets to a mean of –9.01% for active alpha. In essence, large-cap funds taken as a whole consume 7% of the assets being actively managed as expenses and then generate another 2% of losses beyond that.

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[14] Although Vanguard's institutional version of its index fund requires an initial investment of $10,000,000, it was assumed that this would not pose a problem to the typical institutional investor. For investors who are able to post a $25,000,000 initial investment, Vanguard has an institutional S&P 500 index fund with only a 2.5 basis point fee.

[15] The mean values for active share, active expense ratio, and active alpha for the Morningstar universe were computed using a cost of indexing of 30 basis points for all funds, including those funds for which a more precise number would be used when they were analyzed within one of the subsets of funds, for example, the large-cap equity funds.

[16] During the 2002-2004 period, the risk-free rate was largely restricted to a range between 1% and 2%, so the total return of a hedge fund with little or no market risk would be only slightly greater than its alpha.

Table 1. Properties of the Large-Cap Mutual Fund Samples and the Morningstar Universe of Funds

		Sample Mean						
		Net		Active	Expense Ratio		Alpha	
	Funds in	Assets in		Share	Overall	Active	Overall	Active
Category	Sample	$ million	R^2	w_A	C_P	C_A	α_P	α_A
Institutional Large-Cap Funds	36	334.23	96.86	14.52	0.77	5.14	-1.34	-7.71
Individual Large-Cap Funds	116	1,615.22	95.91	15.87	1.26	7.57	-1.55	-9.42
All Large-Cap Funds	152	1,311.83	96.14	15.55	1.15	6.99	-1.50	-9.01
Morningstar Reference Universe	4,752	509.71	90.24	22.05	1.26	5.20	-0.59	-3.19

Note: R^2, Active Shares, Expense Ratios, and Alphas are given in percent (%)
Source: Morningstar. All data covers the 36-month period from January 2002 through December 2004 except for expense ratios, which are the reported numbers as of the end of 2004

It should be noted that large-cap funds vary greatly in their active expense ratios and active alphas. Table 2 provides these numbers as well as the overall measures of cost and performance for each of the 36 institutional large-cap funds in the sample, ordered from the lowest active expense ratio (GE Institutional US Equity at 2.61%) to the highest (PIMCO StocksPlus Administrative at 9.36%). Most of these funds engage in "tilt" or "enhanced index" strategies in which they provide their institutional clients with a large-cap portfolio designed to track the S&P 500 Index while aiming to provide superior performance through the targeting of stocks and sectors or through the use of derivatives to enhance returns.[17]

Among the funds with the best alphas were those sufficiently tilted toward value stocks to warrant a "Large Value" style designation from Morningstar while among those with the worst alphas were funds tilted toward growth stocks with a "Large Growth" style designation. (During the three-year sample period, value stocks outperformed growth stocks in absolute terms by a wide margin.) The only S&P index tracked by Morningstar other than the S&P 500 is the S&P MidCap 400, so neither the S&P/Barra 500 Value nor the S&P/Barra 500 Growth indexes are included in the possible best-fit indexes. Instead, the Russell 1000 Value and Russell 1000 Growth indexes, which include many mid-cap stocks, are used. As noted earlier, failure to use the appropriate index or combination of indexes will tend to understate the active expense ratio.

Tables 3 and 4, which give cost and performance figures for the ten funds with the lowest active expensive ratios and the highest active ratios, respectively, indicate that the range of active expense ratios for large-cap funds geared toward individual investors is much wider than their institutional brethren. The lowest active expense ratios for individual funds are only somewhat higher than the ratios of low-cost institutional funds; however, the high-end of the individual funds is much higher than the most expensive institutional funds. The individual funds with the greatest active expense ratios are dominated by the Class C shares of funds with high expense ratios and R^2s. The individual funds with the lowest active expense ratios in Table 3 are evenly divided between outperformers and underperformers, while those with the highest active expense ratios in Table 4 are dominated by underperformers.

For institutional large-cap funds, assets are evenly distributed across the expense spectrum. With individual funds, however, assets tend to concentrate in funds with low expenses as measured by both the overall expense ratio and the active expense ratio.

Table 5 gives the ten individual large-cap funds in the sample with the most assets under management at the end of 2004. While their stated overall expense ratios are consistently low—all are less than 1%—three of the funds (Fidelity Magellan and two versions of Scudder Growth & Income) have active expense ratios over 5%. Performance of the larger funds is unexceptional as measured by either overall alpha or active alpha, with only the two funds that are in the Morningstar "Large Value" category, Fidelity Equity-Income II and American Century Income & Growth, possessing positive alphas.

[17] Arnott (2002) describes how PIMCO StocksPlus leverages the parent company's fixed-income expertise to implement a portable alpha strategy within that fund to enhance the returns of the S&P 500.

Table 2. All 36 Institutional Large-Cap Mutual Funds

Fund Name	Ticker Symbol	Morningstar Category	Expense Ratio Active C_A	Expense Ratio Overall C_P	Alpha Active α_A	Alpha Overall α_P	Net Assets in $ million	R^2
GE Instl US Equity Inv	GUSIX	Large Blend	2.61	0.37	-5.33	-0.71	417.8	98
GE Instl Value Eqty Inv	GEIVX	Large Blend	2.93	0.41	6.75	0.80	120.3	98
ABN AMRO/Montag Gr I	MCGIX	Large Growth	3.21	0.77	-21.08	-4.84	2,125.4	92
ABN AMRO Equity Plus I	IOEPX	Large Blend	3.26	0.53	-17.57	-2.67	49.8	97
MassMutual Prem Core Gr S	DLBRX	Large Growth	3.30	0.75	-19.70	-4.28	80.8	93
AmCent Inc & Growth Inst	AMGIX	Large Value	3.57	0.49	18.67	2.29	359.8	98
Smith Barney Apprec Y	SAPYX	Large Blend	3.66	0.59	7.97	1.15	641.5	97
Pioneer Y	PYODX	Large Blend	3.79	0.61	3.23	0.44	155.5	97
Morgan Stan Ins Eq	MPEQX	Large Blend	3.86	0.62	1.42	0.17	207.7	97
GE U.S. Equity Y	GEEDX	Large Blend	3.89	0.53	-7.17	-0.94	340.9	98
BlackRock Lg Cap Val Is	PNVEX	Large Value	4.02	0.79	0.81	0.11	117.8	95
Thrivent Lg Cap Stock I	IILGX	Large Blend	4.21	0.57	-19.97	-2.54	121.4	98
Evergreen Strat Val Inst	ESSIX	Large Value	4.36	0.78	5.08	0.82	724.8	96
MFS Mass Inv Trust I	MITIX	Large Blend	4.37	0.59	-8.05	-1.05	121.8	98
GE Instl US Equity Svc	GUSSX	Large Blend	4.61	0.62	-7.41	-0.97	26.1	98
Phoenix-Kayne Ris Div X	PKLFX	Large Blend	4.61	1.19	-9.37	-2.38	94.3	90
Enterprise Growth Y	ENGYX	Large Growth	4.66	1.10	-22.71	-5.21	45.0	92
Nations LgCp Enhan Prim A	NMIMX	Large Blend	4.98	0.50	4.55	0.37	315.2	99
SB Growth & Inc Y	SGTYX	Large Blend	5.01	0.67	-0.93	-0.16	202.3	98
JP Morgan Tax Aw US Eq I	JTUIX	Large Blend	5.25	0.70	-15.09	-1.93	128.3	98
Strong Gr & Inc Instl	SGNIX	Large Blend	5.25	0.70	-6.29	-0.83	37.0	98
Goldman Sachs Cap Gr Ins	GSPIX	Large Growth	5.60	0.99	-15.98	-2.75	308.5	96
Hartford Stock Y	HASYX	Large Blend	5.60	0.88	-24.12	-3.65	91.5	97
Perform Lg Cap Eq Instl	PFEQX	Large Blend	5.71	1.01	-11.38	-1.97	66.5	96
UBS U.S. Allocation Y	PWTYX	Large Blend	5.85	0.58	0.39	-0.01	128.4	99
Goldman Sachs Str Gr I	GSTIX	Large Growth	5.89	1.04	-27.60	-4.72	176.6	96
HSBC Investor Gr&Inc Y	HSGYX	Large Blend	5.97	0.79	-22.21	-2.82	205.2	98
MFS Union Stand Equity I	MUSEX	Large Blend	6.07	0.95	5.03	0.71	33.0	97
BBH Tax-Efficient Eq N	BBTEX	Large Blend	6.21	1.20	-21.43	-4.04	50.2	95
PIMCO StocksPlus Instl	PSTKX	Large Blend	6.62	0.65	12.43	1.09	1,003.2	99
Enterprise Grwth & Inc Y	ENCEX	Large Blend	6.74	1.05	-9.41	-1.45	20.6	97
BNY Hamilton LgCap Gr Is	BNLIX	Large Blend	6.85	0.90	-32.29	-4.08	327.6	98
One Group Divr Eq I	OGVFX	Large Blend	7.09	0.93	-21.41	-2.72	1,653.3	98
Lazard Equity Instl	LZEQX	Large Value	7.49	0.98	16.03	1.96	117.0	98
JP Morgan Tax Aw U.S. Eq	JPTAX	Large Blend	8.70	0.84	-22.28	-2.08	939.8	99
PIMCO StocksPlus Admin	PPLAX	Large Blend	9.36	0.90	8.93	0.77	477.4	99
Mean			5.14	0.77	-7.71	-1.34	334.2	96.86

Note: Expense Ratios, Alphas, and R^2 are given in percent (%)
Source: Morningstar. All data covers the 36-month period from January 2002 through December 2004 except for expense ratios, which are the reported numbers as of the end of 2004

Table 3. Individual Large-Cap Mutual Funds with the Ten Lowest Active Expense Ratios

Fund Name	Ticker Symbol	Morningstar Category	Expense Ratio Active C_A	Expense Ratio Overall C_P	Alpha Active α_A	Alpha Overall α_P	Net Assets in $ million	R^2
State St Exchange	STSEX	Large Blend	2.08	0.59	-5.89	-1.41	299.4	93
Hartford Stock HLS IA	HSTAX	Large Blend	2.25	0.49	-22.45	-3.51	5,666.4	97
Parnassus Equity Inc	PRBLX	Large Blend	2.54	0.95	11.25	3.55	778.1	81
Fidelity Exchange	FDLEX	Large Blend	2.65	0.64	10.97	1.90	238.7	95
Van Kampen Exchange	ACEHX	Large Blend	2.69	0.78	-14.18	-3.53	63.6	91
Fidelity Equity-Inc II	FEQTX	Large Value	2.89	0.64	21.47	3.49	12,915.4	96
Fidelity Growth & Income	FGRIX	Large Blend	2.91	0.69	-3.93	-0.88	32,106.1	95
TIAA-CREF Growth & Inc	TIGIX	Large Blend	2.92	0.43	-18.69	-1.87	523.9	99
Fidelity Discovery Fund	FDSVX	Large Blend	2.94	0.84	2.16	0.38	551.9	91
Fidelity Adv Div Gr I	FDGIX	Large Blend	2.96	0.74	-10.79	-2.32	895.9	94
Mean			2.68	0.68	-3.01	-0.42	5,403.9	93.20

Note: Expense Ratios, Alphas, and R^2 are given in percent (%)
Source: Morningstar. All data covers the 36-month period from January 2002 through December 2004 except for expense ratios, which are the reported numbers as of the end of 2004

Table 4. Individual Large-Cap Mutual Funds with the Ten Highest Active Expense Ratios

Fund Name	Ticker Symbol	Morningstar Category	Expense Ratio Active C_A	Expense Ratio Overall C_P	Alpha Active α_A	Alpha Overall α_P	Net Assets in $ million	R^2
ING Disc LargeCap C	NEICX	Large Blend	22.63	2.23	-16.17	-1.64	417.8	99
Frank Russell Tax LgCp C	RTLCX	Large Blend	19.45	1.94	-19.34	-1.93	120.3	99
Fidelity Adv Gr Opp C	FACGX	Large Blend	17.26	1.74	-17.59	-1.77	2,125.4	99
UBS U.S. Allocation C	KPAAX	Large Blend	16.50	1.67	-10.03	-1.08	49.8	99
SunAmerica Tax Mgd Eq C	TXMTX	Large Blend	15.54	2.10	-29.38	-3.83	80.8	98
PIMCO StocksPlus C	PSPCX	Large Blend	15.18	1.55	3.98	0.20	359.8	99
Hancock Sov Investors C	SOVCX	Large Blend	14.26	1.94	-23.94	-3.15	641.5	98
Principal Ptr Lg BlI J	PPXJX	Large Blend	13.98	1.44	-23.17	-2.28	155.5	99
Dreyfus Prem Lrg Co StkC	DLCCX	Large Blend	13.94	1.90	-24.90	-3.27	207.7	98
T. Rowe Price Cap Opport	PRCOX	Large Blend	13.65	1.41	8.69	0.63	340.9	99
Mean			16.24	1.79	-15.19	-1.81	450.0	98.70

Note: Expense Ratios, Alphas, and R^2 are given in percent (%)
Source: Morningstar. All data covers the 36-month period from January 2002 through December 2004 except for expense ratios, which are the reported numbers as of the end of 2004

Table 5. Individual Large-Cap Mutual Funds with the Most Assets Under Management

Fund Name	Ticker Symbol	Morningstar Category	Net Assets in $ million	Expense Ratio Active C_A	Expense Ratio Overall C_P	Alpha Active α_A	Alpha Overall α_P	R^2
Fidelity Magellan	FMAGX	Large Blend	63,295.8	5.87	0.70	-27.45	-2.67	99
Fidelity Growth & Income	FGRIX	Large Blend	32,106.1	2.91	0.69	-3.93	-0.88	95
Fidelity Dividend Growth	FDGFX	Large Blend	19,422.3	3.70	0.89	-10.34	-2.23	94
Fidelity Equity-Inc II	FEQTX	Large Value	12,915.4	2.89	0.64	21.47	3.49	96
Fidelity	FFIDX	Large Blend	10,812.2	3.46	0.59	-8.74	-1.25	98
Hartford Stock HLS IA	HSTAX	Large Blend	5,666.4	2.25	0.49	-22.45	-3.51	97
Dreyfus Appreciation	DGAGX	Large Blend	4,435.7	3.44	0.96	-5.61	-1.48	91
AmCent Inc & Growth Inv	BIGRX	Large Value	3,972.5	4.26	0.69	17.98	2.09	98
Scudder Growth & IncAARP	ACDGX	Large Blend	2,730.4	5.14	0.80	-8.82	-1.26	98
Scudder Growth & Inc S	SCDGX	Large Blend	2,374.2	5.94	0.90	-9.22	-1.31	98
Mean			15,773.1	3.99	0.74	-5.71	-0.90	96.40

Note: Expense Ratios, Alphas, and R^2 are given in percent (%)
Source: Morningstar. All data covers the 36-month period from January 2002 through December 2004 except for expense ratios, which are the reported numbers as of the end of 2004

Table 6. Mutual Funds from All Categories with the Most Assets Under Management

Fund Name	Ticker Symbol	Best-Fit Index	Index Cost	Morningstar Category	Net Assets in $ million	Expense Ratio Active C_A	Expense Ratio Overall C_P	Alpha Active α_A	Alpha Overall α_P	R^2
Fidelity Magellan	FMAGX	S&P 500	0.18	Large Blend	63,295.8	5.87	0.70	-27.45	-2.67	99
PIMCO Total Ret Instl	PTTRX	LB US Univ Bond	0.15	Intermed-term Bond	44,845.3	2.02	0.43	0.45	-0.06	97
Fidelity Contrafund	FCNTX	S&P Midcap 400	0.20	Large Growth	44,484.5	2.70	0.98	9.17	2.72	83
Fidelity Low-Priced Stk	FLPSX	Russ 2000 Value	0.25	Small Blend	35,976.1	3.41	0.97	16.22	3.50	92
Fidelity Growth & Income	FGRIX	S&P 500	0.18	Large Blend	32,106.1	2.91	0.69	-3.93	-0.88	95
Vanguard Windsor II	VWNFX	Russ 1000 Value	0.20	Large Value	29,015.9	1.06	0.36	2.69	0.34	95
Fidelity Equity-Inc	FEQIX	Russ 1000 Value	0.20	Large Value	26,371.7	4.20	0.70	-17.32	-2.34	98
Fidelity Growth Company	FDGRX	PSE Tech 100	0.20	Large Growth	25,180.3	3.58	0.83	-11.02	-2.22	95
Fidelity Blue Chip Grth	FBGRX	Russ 1000 Growth	0.20	Large Growth	23,578.1	5.35	0.67	-1.62	-0.33	99
Fidelity Diversified Int	FDIVX	MSCI Wd xUSN	0.35	For. Large Growth	23,419.8	5.01	1.22	24.14	4.22	95
Vanguard Primecap	VPMCX	Russ 1000	0.20	Large Blend	22,998.1	1.49	0.46	14.03	2.67	94
AmCent Ultra Inv	TWCUX	Russ 1000	0.20	Large Growth	21,998.4	3.71	1.00	-6.44	-1.62	92
Fidelity Dividend Growth	FDGFX	S&P 500	0.18	Large Blend	19,422.3	3.70	0.89	-10.34	-2.23	94
PIMCO Total Ret Admin	PTRAX	LB US Univ Bond	0.15	Intermed-term Bond	16,889.9	3.41	0.68	-0.94	-0.31	97
Vanguard Windsor	VWNDX	Russ 1000	0.20	Large Value	16,384.7	1.47	0.39	14.31	1.97	97
Mean					29,731.1	3.33	0.73	0.13	0.18	94.80

Note: R^2, Index Cost, Expense Ratios, and Alphas are given in percent (%)
Source: Morningstar. All data covers the 36-month period from January 2002 through December 2004 except for expense ratios, which are the reported numbers as of the end of 2004

Active expense ratios are even lower when the universe of big mutual funds is expanded beyond large-cap equity funds. Table 6 provides the numbers for the fifteen biggest funds for which it is possible to own an index fund that tracks Morningstar's best-fit index for the mutual fund. The expense ratios for these index funds, which appear in the column labeled "Index Cost" and range from 0.15% to 0.35%, were used to compute the active expense ratio and active alpha for each fund. The mean active expense ratio for these funds is 3.32%. The three Vanguard funds are notable for outperforming their benchmarks while sporting an active expense ratio that is more than competitive with hedge funds. The biggest funds also provided investors, on average, with marginally positive overall and active alphas for the sample period.

While most mutual funds have an obvious benchmark index that provides a low-cost alternative for their passive component (even if it is not one tracked by Morningstar), some still do not. This situation is changing, however, as the breadth and number of index funds (including exchange traded funds) grows rapidly. Some funds, however, fall between benchmarks. The next section looks at how the model developed above can be extended to deal with this and other problems.

Extensions to the Model

The formulas for the active expense ratio and active alpha can be easily computed and naturally interpreted; however, for certain applications more precise measures may be desired. The main source of error in the above analysis lies in the measurement of R^2. The imprecision caused by rounding of R^2 by Morningstar and other services (which can be rectified by rerunning the regression using raw returns data) is of secondary concern relative to larger errors that can result from the inappropriate benchmark choice and the misattribution of "noise" or other sources of inefficient investment choice to active management.

There are two fundamental ways in which the estimate of R^2 can be improved. First, the universe of benchmarks can be expanded to cover as much of the investment landscape as possible without concern for whether certain benchmarks overlap. Second, rather than limit funds to a single benchmark at a time, regressions of returns against multiple benchmarks (as is done for Sharpe's style analysis) could be run and the adjusted R^2 could be used as the measure of the variance attributable to the passive part. Then, for example, the passive alternative to a large-cap fund with a propensity to invest in semiconductor companies would be a statistically determined combination of the S&P 500 and a semiconductor index.

The cost of the passive alternative can then be computed as a weighted average of the cost of the index funds that comprise its passive part. These weights can be taken directly from a returns regression or, when costs vary significantly from index to index, be generated by a model that minimizes the cost of indexing subject to various constraints and tradeoffs. Of course, these costs themselves have a subjective element to them given that all the funds that mirror a given index do not have the same fees and the one with the lowest fee may not always represent a practical choice; however, the values of the active expense ratio and active alpha are usually insensitive to reasonable variations in the expense ratio for the passive component of the portfolio.

The use of multiple benchmarks, even using an adjusted value of R^2 in an effort to mitigate any "data snooping" effects, can give the appearance of failing to credit the fund manager with active management simply because a combination of index funds happen to approximate his returns over an extended period of time. Although the manager may intend to provide his investors with 100% active management, his intentions are not the issue when his actions can be replicated at a significantly lower cost via indexing.

Indeed, it may be more important to make adjustments in the other direction so as not to improperly credit the manager for being active when he was simply insufficiently diligent to hedge out unintended bets in his portfolio. Since the noise of inadequate diversification is more pronounced in portfolios with concentrated holdings, one can make adjustments to the active weight in the portfolio that will, in turn, affect the values of the active expense ratio and active alpha. The downside of making such an adjustment is that doing so requires some knowledge of the fund's portfolio. In this case, at least, the timeliness of that knowledge is not likely to be critical.

The role that noise plays in the allocation of weight between passive and active management may be secondary, however, to that played by the assumption that the synthetic passive and active components of the portfolio have the same variance. This assumption provides a way to dodge the question of what the true cost of replicating the fund manager's action that helps to generate a convenient and seemingly natural formula in the process. Some forms of adjustment to the hypothesis—for example, that the active component has a variance that is 10% more or 10% less than the passive component—can be made without sacrificing much in the way of ease of computation; however, such an adjustment should be justified on empirical grounds.

More complex adjustments to the allocation mechanism could take into account not only R^2, but also the portfolio's holdings throughout the evaluation period. While such information is rarely available for publicly traded funds, it can be useful for internal assessments, especially in situations where portfolios are parceled out among managers. It can also be useful when one is looking to evaluate the performance of an index that is expensive to track directly but has one or more indexes that can be used to approximate it at a lower expense.

Beyond its obvious convenience as a cost measure, the active expense ratio might have predictive value. Using only the standard expense ratio, there remains disagreement as to the role of fund expenses in determining a fund's overall performance. Carhart (1997) and Bogle (1999) take the position that expenses are the prime determinant of a fund's performance—with a higher expense ratio leading directly to lower performance—while Hendricks, Patel, and Zeckhauser (1993) and Wermers (2000) provide evidence that market timing and stock picking are more important than expenses in determined fund performance.

Using cost and performance measures that separate out the implicit share of funds being actively managed could help resolve the link between expenses and performance. It is not unreasonable to believe that a manager who is able to provide genuinely inexpensive active management might perform better than one who gives only the appearance of a low expense ratio through closet indexing. The results obtained in this preliminary study hint at the possibility that both the active expense ratio and active alpha may be able to shed additional light on the performance of investment managers.

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