www.joim.com

Journal Of Investment Management, Vol. 5, No. 1, (2007), pp. 29–49

MEASURING THE TRUE COST OF ACTIVE MANAGEMENT BY MUTUAL FUNDS*

Ross M. Miller[a,b]

This article derives a rigorous method for allocating fund expenses between active and passive management that enables one to compute the implicit cost of active management. Computing this active expense ratio requires only a fund's published expense ratio, its R^2 relative to a benchmark index, and the expense ratio for a competitive fund that tracks the index. This method is then applied to the Morningstar universe of large-cap mutual funds and active expense ratios are found to average nearly 7%. The cost of active management for other classes of mutual funds is also found to be substantial.

During the last 20 years, an era marked by the rise of both index and hedge funds, investors of all stripes have gazed with increasing skepticism toward investment managers. Once indexes had become investable, these bogeys made the jump from theoretical benchmarks to viable, low-cost investment alternatives. Then, the introduction of style analysis by 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 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.[1]

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 US. stocks continued. Indeed, Morningstar

*Mary O'Keeffe and David Smith provided extremely useful comments on an earlier draft of this article. The author also benefited from feedback provided by Clifford Asness, Christophe Faugère, Victor Niederhoffer, Jeff Rollert, Hany Shawky, Richard Spady, Pamela van Giessen, and an anonymous referee.

[a]Miller Risk Advisors, 2255 Algonquin Road, Niskayuna, NY 12309-4711, USA. Tel: 518-346-0781; e-mail: millerrm@alumni.caltech.edu

[b]Visiting faculty member at the State University of New York (SUNY) at Albany.

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%. This makes the fund seem relatively inexpensive until its fees are compared with the 0.18% that Vanguard charges for pure indexing (or the even lower rates of some of its indexing rivals, including Fidelity). Magellan was not alone; many mutual funds have engaged to one degree or another in so-called shadow or closet indexing—charging their investors for active management while providing them with little more than an indexed investment.[2]

This article develops a method for uncovering the true costs as well as the associated 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.[3] 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, which we call the *active expense ratio*. 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.

Asness (2004a, b) has approached this decomposition problem by assuming that the asset-by-asset holdings of funds are known. He then uses these holdings to construct a implied long/short portfolio as the fund's active component by literally netting the index out of the portfolio. Hence, fund holdings that are underweighted relative to the index become short positions in the active portfolio and those that are overweighted constitute the long position. While this analysis demonstrates that the active management provided by mutual funds is more costly than the fund's expense ratio would indicate, it does not deal with issues related to leverage. This method can only be applied to funds that have a beta of one relative to the benchmark and does not produce a unique value for the cost of active management because it depends on the amount of leverage employed by the long/short fund.

An alternative to an asset-by-asset rearrangement of a fund's assets into indexed and active components is to replicate the overall risk and return characteristics of the fund without regard to specific holdings. Under the usual assumptions of modern portfolio theory, in which assets can be leveraged up and down by borrowing at the risk-free rate, this method applies to all funds regardless of their beta.

The indeterminancy inherent in the Asness approach is addressed by limiting the leverage that can be applied to the active component of the portfolio to that implicit in the portfolio as a whole. This solution to the problem has the desirable property that the active expense ratio is independent of the portfolio's beta and is generally a conservative estimate of the cost of active management.

The calculation of the active expense ratio can be demonstrated using Fidelity Magellan Fund as it was at the end of 2004. Based on monthly data from the preceding 3 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 retail investors), Magellan might be seen as charging investors a premium of 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. Therefore, 5.87% is the active expense ratio for Magellan.

This number 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%.[4] 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 3 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*[5] 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 5–7% 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 the cost of active management in a single number. This measure can be readily applied not just to mutual funds, but also 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 ratio and active alpha (from a single index) can then be computed directly from data available for free over the Internet.

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 and acceptance of "portable alpha" and related strategies (see Arnott, 2002; Litterman, 2003; Asness, 2004a, b; 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 leveraged assets—can be viewed as independent of the manager's allocation (either intentional or unintentional) between passive and active management.

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 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.

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 the retail market and those that target institutional investors. The article concludes with an examination of how the techniques developed in this article can be refined. Such refinements will generally increase the estimated value of the active expense ratio because they will tend to increase the amount of leverage applied to the active component of the portfolio and will increase the computed value of R^2.

1 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 the fund's expenses can be written as following weighted sum:

$$C_P = (1 - w_A)\, C_I + w_A C_A \tag{1}$$

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:

$$C_A = C_I + \frac{C_P - C_I}{w_A} \tag{2}$$

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. Furthermore, in an effort to keep a cap on "style drift," many managers are restricted from deviating too far from their benchmark as measured by the tracking error relative to that benchmark.

These arguments can be addressed in three ways. First, they simply reinforce 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 either will 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:

$$r_P = \alpha_P + \beta_P r_I + \varepsilon_P \tag{3}$$

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 3–5 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 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 α_P, β_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 Eq. (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:

$$\sigma_{\mathrm{P}}^2 = \beta_{\mathrm{P}}^2\sigma_{\mathrm{I}}^2 + \sigma^2(\varepsilon_{\mathrm{P}}) \tag{4}$$

Equation (4) has the effect of decomposing the portfolio variance, σ_{P}^2, into two parts. The first part, $\beta_{\mathrm{P}}^2\sigma_{\mathrm{I}}^2$, 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, $\sigma^2(\varepsilon_{\mathrm{P}})$, is the variance not explained by the index, that is, 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.

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 Eq. (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 $r_{\mathrm{I}'}$ and of its active return $r_{A'}$ as follows:

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

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 Eq. (5), we get:

$$\sigma^2_{P'} = (1 - w_A)^2\sigma^2_{I'} + w^2_A\sigma^2_{A'} \tag{6}$$

where $\sigma^2_{I'}$ is the passive variance and $\sigma^2_{A'}$ 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:

$$\frac{(1 - w_A)^2\sigma^2_{I'}}{\sigma^2_{P'}} = R^2 \tag{7a}$$

while for the active component we have:

$$\frac{w^2_A\sigma^2_{A'}}{\sigma^2_{P'}} = 1 - R^2 \tag{7b}$$

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

$$\frac{w^2_A\sigma^2_{A'}}{(1 - w_A)^2\sigma^2_{I'}} = \frac{1 - R^2}{R^2} \tag{8}$$

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 $\sigma^2_{A'}/\sigma^2_{I'}$. 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 $\sigma^2_{A'}/\sigma^2_{I'}$.

Recall that the amount of leverage required for the index component of the replicating portfolio was entirely dictated by the magnitude of beta. Since the active component contributes only to the portfolio's variance and not to beta, we can make w_A as small as necessary by either borrowing funds or investing in a sufficiently volatile zero-beta fund, thereby making $\sigma^2_{I'}$ as large as we desire. In order to eliminate this indeterminacy, we limit the leverage available for the active component so that it is the same as that used in the passive component, We therefore restrict the leverage applied to the active component by enforcing the constraint that $\sigma^2_{A'}/\sigma^2_{I'} = 1$.

In practice, substantially greater leverage has been available (especially to institutional investors), either directly through the purchase of highly leveraged hedge funds or by financing their purchase with borrowed funds, so the resulting value of the active expense ratio can be viewed as a conservative estimate of the cost of active management. From a theoretical standpoint, the restrictions on the use and limitations on leverage are required so that the active expense ratio, like other portfolio measures, depends only on the attributes of the portfolio and not those of its investors.

Substituting $\sigma^2_{A'}/\sigma^2_{I'} = 1$ into Eq. (8) and taking the square root of each side, we get:

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

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

$$w_A = \frac{\sqrt{1-R^2}}{R+\sqrt{1-R^2}} \tag{10}$$

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

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

Notice that Eq. (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:[8]

$$\alpha_P = w_A\alpha_A - (1-w_A)C_I \tag{12}$$

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

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

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.

2 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.[9]

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.[10] 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%.[11] 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.

The sample was not strictly limited to no-load funds; however, funds with either a front- or back-end load of greater than 1% were excluded.[12] Funds not generally available to the public and with expense ratios less than 30 basis point, such as GE's S&S Program Fund and Elfun Fund, were also eliminated from the sample because they are effectively nonprofit funds. 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 this screening, 4754 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 US equity funds had the most clear-cut 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 not be specified correctly.

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—retail 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 retail funds. Under this criterion, there were 36 institutional funds and 116 retail 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 cost of indexing for the retail funds and the 0.05% expense ratio for Vanguard's Institutional S&P 500 Index Fund was used for the institutional funds.[13]

Table 1 gives summary statistics for the 152 large-cap funds as well as the broader universe of 4754 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.[14] The active expense ratio for each fund was computed using Eq. (11) and active alpha was computed using Eq. (13).

As one would expect, institutional large-cap funds have lower average expense ratios than retail funds.

Table 1 Properties of the large-cap mutual fund samples and the Morningstar universe of funds.

	Sample mean							
					Expense ratio		Alpha	
Category	Funds in sample	Net assets in $million	R^2	Active share w_A	Overall C_P	Active C_A	Overall α_P	Active α_A
Institutional large-cap funds	36	334.23	96.86	14.52	0.77	5.14	−1.34	−7.71
Retail large-cap funds	116	1615.22	95.91	15.87	1.26	7.57	−1.55	−9.42
All large-cap funds	152	1311.83	96.14	15.55	1.15	6.99	−1.50	−9.01
Morningstar reference universe	4754	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: Derived from Morningstar data. 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.

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 retail funds. (It is interesting that the mean R^2 for both institutional and retail 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%.[15]

In the broader sample of 4754 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 retail 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, on average, undistinguished. Institutional funds only perform slightly better than retail 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.

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.[16]

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	2125.4	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 US 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

Table 2 (*Continued*)

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
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 US 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	1003.2	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	1653.3	98
Lazard Equity Instl	LZEQX	Large value	7.49	0.98	16.03	1.96	117.0	98
JP Morgan Tax Aw US 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: Derived from Morningstar data. 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

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 3-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 retail investors is much wider than their institutional brethren. The lowest active expense ratios for retail funds are only somewhat higher than the ratios of low-cost institutional funds; however, the high-end of the retail funds is much higher than the most expensive institutional funds. The retail funds with the greatest active expense ratios are dominated by the Class C shares of funds with high expense ratios and R^2s. The retail 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 retail 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 retail 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.

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.

Table 3 Retail large-cap mutual funds with the 10 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	5666.4	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	12915.4	96
Fidelity Growth & Income	FGRIX	Large blend	2.91	0.69	−3.93	−0.88	32106.1	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	5403.9	93.20

Note: Expense ratios, alphas, and R^2 are given in percent (%).
Source: Derived from Morningstar data. 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 Retail large-cap mutual funds with the 10 highest active expense ratios.

Fund name	Ticker symbol	Morningstar category	Expense ratio		Alpha		Net assets in \$ million	R^2
			Active C_A	Overall C_P	Active α_A	Overall α_P		
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	2125.4	99
UBS US 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: Derived from Morningstar data. 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 Retail 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	63295.8	5.87	0.70	−27.45	−2.67	99
Fidelity Growth & Income	FGRIX	Large blend	32106.1	2.91	0.69	−3.93	−0.88	95
Fidelity Dividend Growth	FDGFX	Large blend	19422.3	3.70	0.89	−10.34	−2.23	94
Fidelity Equity-Inc II	FEQTX	Large value	12915.4	2.89	0.64	21.47	3.49	96
Fidelity	FFIDX	Large blend	10812.2	3.46	0.59	−8.74	−1.25	98
Hartford Stock HLS IA	HSTAX	Large blend	5666.4	2.25	0.49	−22.45	−3.51	97
Dreyfus Appreciation	DGAGX	Large blend	4435.7	3.44	0.96	−5.61	−1.48	91
AmCent Inc & Growth Inv	BIGRX	Large value	3972.5	4.26	0.69	17.98	2.09	98
Scudder Growth & IncAARP	ACDGX	Large blend	2730.4	5.14	0.80	−8.82	−1.26	98
Scudder Growth & Inc S	SCDGX	Large blend	2374.2	5.94	0.90	−9.22	−1.31	98
Mean			15773.1	3.99	0.74	−5.71	−0.90	96.40

Note: Expense ratios, alphas, and R^2 are given in percent (%).
Source: Derived from Morningstar data. 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 Morningstar Cost	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	63295.8	5.87	0.70	−27.45	−2.67	99
PIMCO Total Ret Instl	PTTRX	LB US Univ Bond	0.15	Intermed−term bond	44845.3	2.02	0.43	0.45	−0.06	97
Fidelity Contrafund	FCNTX	S&P Midcap 400	0.20	Large growth	44484.5	2.70	0.98	9.17	2.72	83
Fidelity Low-Priced Stk	FLPSX	Russ 2000 Value	0.25	Small blend	35976.1	3.41	0.97	16.22	3.50	92
Fidelity Growth & Income	FGRIX	S&P500	0.18	Large blend	32106.1	2.91	0.69	−3.93	−0.88	95
Vanguard Windsor II	VWNFX	Russ 1000 Value	0.20	Large value	29015.9	1.06	0.36	2.69	0.34	95
Fidelity Equity-Inc	FEQIX	Russ 1000 Value	0.20	Large value	26371.7	4.20	0.70	−17.32	−2.34	98
Fidelity Growth Company	FDGRX	PSE Tech 100	0.20	Large growth	25180.3	3.58	0.83	−11.02	−2.22	95

Table 6 (*Continued*)

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 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 WdxUSN	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: Derived from Morningstar data. 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.

3 Refinements of the model

The formulas for the active expense ratio and active alpha can be easily computed and naturally interpreted; however, for certain applications, greater precision and less conservatism 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 limitation on the leverage available for the active component is another area where it may be desirable to refine the model for certain applications. This assumption makes the active expense ratio a useful tool for retail investors looking for a relative gauge of fund expenses. Indeed, this measure of fund costs is arguably better than the traditional expense ratio because it explicitly recognizes the cost of indexed alternatives.

Institutional investors, on the other hand, may be able to invest in low-beta active alternatives with even greater leverage and so they may wish to alter the formula to take into account the cost and availability of leverage. Because such investors presumably have an advantage in predicting future fund excess returns, consideration of cost may be secondary to them.

It is possible that the active expense ratio could aid in the prediction of mutual fund returns. 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 *et al.* (1993) and Wermers (2000) provide evidence that market timing and stock picking are more important than expenses in determining 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.

Notes

1. Although it could be considered a misnomer, the convention of referring to indexed investments as "passive" is followed in this article. The composition of most indexes changes significantly over time and that updates to indexes are made in an active effort to keep the index both relevant to the market and competitive as an investment.
2. The managers of a fund with a high R^2 will, on occasion, point out that the fund's industry composition differs significantly from that of its benchmark. Because portfolio returns are driven more by the underlying risk factors contained in the portfolio than by any arbitrary classification scheme, it is easy to shadow an index without mirroring its composition on many dimensions, including industry make-up.
3. 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.
4. 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. Neither hedge funds nor mutual funds include commissions and other trading-related expenses in their fees; however, these are reflected in fund performance.
5. This use of the term "active alpha" is distinct from that used by Litterman (2003) to refer to a specific portfolio strategy.
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.
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 may underestimate alpha for many of the larger index funds that employ successful enhancement strategies to recoup some or all of their expenses.
9. 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.

[10] Note that any fund that was not in existence during the entire 3-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.

[11] 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.

[12] 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.

[13] Vanguard's institutional index fund requires an initial investment of $10,000,000, which is also the cutoff for the funds under consideration. 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.

[14] 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.

[15] 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.

[16] 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.

References

Arnott, R. D. (2002). "Risk Budgeting and Portable Alpha." *Journal of Investing* **11**(2), 15–22.

Asness, C. (2004a). "An Alternative Future." *Journal of Portfolio Management* (September), 94–103.

Asness, C. (2004b). "An Alternative Future: Part II."*Journal of Portfolio Management* **31**(1), 8–23.

Bogle, J. C. (1999). *Common Sense on Mutual Funds.* New York: John Wiley & Sons.

Carhart, M. (1997). "On Persistence in Mutual Fund Performance." *Journal of Finance* **52**(1), 57–82.

Dybvig, P. H. (2003). "The Fallacy of Large Numbers and a Defense of Diversified Active Managers." Washington University in Saint Louis Working Paper.

Dybvig, P. H. and Ross, S. A. (1985). "Differential Information and Performance Measurement Using a Security Market Line." *Journal of Finance* **40**(2), 383–399.

Hendricks, D. Patel, J. and Zeckhauser, R. (1993). "Hot Hands in Mutual Funds: Short-Run Persistence of Relative Performance, 1974–1988." *Journal of Finance* **48**(1), 93–130.

Kung, E. and Pohlman. L. (2004). "Portable Alpha: Philosophy, Process, and Performance." *Journal of Portfolio Management* **30**(3), 78–87.

Litterman, B. (2003). "Active Alpha Investing." Goldman Sachs Asset Management, available at http://activealpha.gs.com/.

Sharpe, W. F. (1992). "Asset Allocation: Management Style and Performance Measurement." *Journal of Portfolio Management* **18**(2), 7–19.

Swedroe, L. E. (2001). *What Wall Street Doesn't Want You to Know*. New York: St. Martin's Press.

Wermers, R. (2000). "Mutual Fund Performance: An Empirical Decomposition into Stock-Picking Talent, Style, Transaction Costs, and Expenses." *Journal of Finance* **55**(4), 1655–1695.

Keywords: Mutual fund expense ratios; active portfolio management; shadow indexing; mutual fund performance