

A New Look at Mutual Fund Performance

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Abstract

This study goes beyond the scope of the typical analysis of mutual fund performance by considering a broader set of fund-specific factors uniquely categorized in terms of their impact on returns. Also unique to this study is a detailed exposition of the linkages between fund characteristics and performance. Traditional regression techniques explore these relationships in an attempt to predict fund performance, while the sample of funds examined is screened for survivor bias in a non-conventional fashion. The results suggest that our unique categories of fund popularity, agility, and growth, as well as the standard cost and managerial factors are relevant in explaining fund performance. Finally, after controlling for survivorship bias and benchmark error, the results refute the performance persistence phenomenon.

A New Look at Mutual Fund Performance

I. Introduction and Purpose

Allocation of wealth across asset classes and specific investments has become a timely topic as recent trends in the management of personal assets as well as retirement planning has heightened investment awareness. As a result, investment companies have become an effective conduit for current income generation, capital appreciation and the benefits derived through diversification. Mutual funds clearly offer significant diversification benefits, however, the performance of these funds is volatile. Thus the selection of superior performing funds is an issue that even the academic literature after several decades of debate has been unable to resolve.

This study goes beyond the scope of the typical analysis of mutual fund performance by considering a broader set of fund-specific factors uniquely categorized in terms of their impact on returns. Also unique to this study is a detailed exposition of the linkages between fund characteristics and performance, although we use traditional regression techniques to explore these relationships in an attempt to predict fund performance. To accomplish this task of prediction, we analyze a large sample of funds, free of survivorship bias, and we also employ a methodology that appropriately adjusts for risk in consideration of benchmark issues. This allows us to provide comprehensive and definitive results regarding fund performance and specific performance-related characteristics.

II. Literature Review

Paralleling the rapid growth in the mutual fund industry, the number of academic studies on fund performance has been equally explosive. While initially dealing with the

timing/investment abilities of fund managers (and the obvious implications for market efficiency), recent efforts have addressed the more subtle factors that may impact fund performance. These include potential measurement errors from survivorship bias and mis-specification of the benchmark, the impact of fund expenses and economies of scale, and the personal characteristics of fund managers. Despite the growth in the traditional mutual fund literature over the past several decades, academics still reach contradictory conclusions regarding the ability of fund managers to consistently outperform the market and the fund-specific organizational and managerial factors that impact performance.

In one of the earliest studies of mutual fund performance, Jensen (1968) examined 115 funds from the period 1945 through 1964. He documents that expense-adjusted fund returns are significantly lower than randomly selected portfolios of equivalent risk, thus supporting the notion of efficient markets. This result also confirms the findings of Treynor (1965) and Sharpe (1966), and that form the basis for the general conclusion prevalent in the early literature. Specifically, professionally managed funds do not beat a risk-adjusted index portfolio suggesting that managers do not appear to possess private information.

Several subsequent studies on the topic, however, contradict the early findings. Ippolito's (1993) summary piece, suggests that mutual fund returns, after expenses (but before loads), are equivalent or superior to those available from a risk-adjusted market index, which implies that mutual fund managers may have access to useful private information where they may generate excess returns sufficient to cover expenses. Grinblatt and Titman (1992), Hendricks, Patel and Zeckhauser (1993), Goetzmann and Ibbotson (1994) and Volkman and Wohar (1995) provide further support for market inefficiency by finding evidence of repeated winners among fund managers and positive performance persistence. In

a recent study, Wermers (2000) decomposes mutual fund returns into stock picking talent, characteristics of stock holdings, trading costs and expenses; he finds that funds' stock picking enables them to cover their costs.

In contrast, the studies of Elton, Gruber, Das and Hlavka (1993), Malkiel (1995) and Carhart (1997) reaffirm the original conclusions of Jensen (1968). In eliminating survivorship bias, Carhart (1997) demonstrates that those common factors driving stock returns also explain persistence in mutual fund performance. Elton et al (1993) corrects for benchmark error and take issue with Ippolito's (1993) findings, while Malkiel (1995) considers both benchmark error and survivorship bias in concluding that the results of prior studies suggesting market inefficiency are contaminated by these factors. (Although finding some evidence of performance persistence during the 1970s, Malkiel notes that this does not continue in the 1980s.)

Other studies that address the survivorship issue include Elton, Gruber and Blake (1996), Grinblatt and Titman (1994), and Brown, Goetzmann, Ibbotson and Ross (1992) with the general conclusion being that the fund returns used in other studies may be overstated thus creating only the appearance of performance persistence. Improper benchmark specification is also cited for causing errors in fund performance evaluation as noted in Lehman and Modest (1987), Grinblatt and Titman (1989), and Dellva, DeMaskey and Smith (2001), as well as the previously cited Malkiel (1995), Elton et al (1993) and Carhart (1997).

As the above articles suggest, most of the mutual fund literature focuses on the controversial issue of fund performance relative to that of the overall market, while the related issue regarding fund-specific factors and performance has thus far not been thoroughly

addressed. Some studies that provide important insights include Sharpe (1966) who finds that funds with lower expenses realize better performance and more recently Golec (1996) who suggests that fees are generally associated with negative excess returns. Ippolito (1989), however, finds no significant relationship between performance, after expenses, and turnover and investment fees. In a study of load and no-load funds, Hooks (1996) concludes that low expense load funds do sufficiently outperform average expense no-load funds over a 15-year holding period. In contrast, Dellva and Olson (1998) find that funds with front-end load charges earn lower risk-adjusted returns.

Since performance may be negatively related to fund expenses, a number of studies have focused upon the various expense components as they relate to total expenses and other fund characteristics. Both Ferris and Chance (1987) and McLeod and Malhotra (1994) find that 12-b1 fees increase expense ratios. Re-affirming this relationship, Malhotra and McLeod (1997) also find that fund expense ratios are positively related to turnover, but negatively related to fund size and age. Livingston and O'Neal (1996) report that brokerage commissions of the fund are unrelated to its load status but positively related to its expense ratio. Finally, Latzko (1999) examines the economies of scale for fund expenses and documents a rapid decrease in average costs associated with fund growth up to approximately \$3.5 billion in total assets.

Other studies address the impact of portfolio turnover and other fund characteristics on performance. For example, Friend, Blume and Crockett (1970) find a slightly positive relation between portfolio turnover and performance. Both Malkiel (1993, 1995) and Carhart (1997) report a negative impact for portfolio turnover and total fund expenses on fund returns. In contrast, Wermers (2000) and Grinblatt and Titman (1994) demonstrate a positive

relationship between performance and turnover, suggesting that those funds engaged in more active trading may be finding underpriced securities. In reaching this conclusion, the latter study notes the standard survivorship bias. In contrast, the recent efforts of Sirri and Tufano (1998) examining mutual fund flows and Chevalier and Ellison (1999) analyzing the impact of personal managerial characteristics on fund performance have attempted to correct for survivorship bias on a sub-sample of their data with mixed results. Other recent studies acknowledging the survivorship issue typically contend that the problem may not be severe when examining funds over a short period of time.

The present study distinguishes itself from the standard mutual fund literature by making several unique contributions. First, we derive an extensive list of fund-specific characteristics that have been linked to mutual fund performance in addition to a persistence measure. The characteristic variables are then logically grouped into the four broad categories of popularity (agility), growth (risk), cost and management. To eliminate the confounding effect of the contemporaneous measurement of performance and characteristic variables, this study employs fund-specific variables that are measured in the period preceding the performance variable estimation. While updating the previous literature by examining funds in existence during the latter half of the 1990s up through the year 2000 thus capturing the current conditions and explosive growth of the mutual fund industry, this study also includes young funds (funds with one to three years of operating history). Unlike most traditional research on the determinants of fund performance, the data used in this study is free from survivorship bias. Finally, we address the benchmark issue and test the robustness of our model by examining several risk-adjusted returns using different market indexes.

The main findings of our study generally support the hypothesized relationship between performance and the explanatory variables. After taking into consideration general market conditions and a fund's investment objective, the broad categories of popularity, growth, cost and management significantly affect mutual fund performance, while risk in terms of fund diversification does not. Of the significant characteristic variables, those within the growth category have a positive impact on performance and those within the other three categories negatively impact performance. Furthermore, using non-overlapping periods for performance measurement, our results refute performance persistence in favor of mean reversion.

III. Data and Methodology

Equity mutual fund data including performance information and fund characteristics is obtained from *Morningstar Principia Pro (MS)* year-end data with performance details and specific fund characteristics collected separately each year over the period 1996-2000. Within this five-year period, our cross-sectional and time series analysis considers over 5,000 distinct equity funds where equity funds are defined as those with at least 50 percent investment in equity securities. The sample of funds spans seven different *MS* investment objectives, specifically, aggressive growth, growth, growth and income, equity and income, small company, foreign, and global. Excluded from our analysis are hybrid funds (asset allocation and balanced funds), all specialty funds, and those multi-asset funds whose year-end equity holdings fall below 50 percent. Table 1 identifies the seven fund categories based on investment objective and also includes the number and percentage of funds in each

category from 1996-2000. This table reveals that the relative mix of funds across categories has remained fairly constant over the five-year period with the largest proportion of funds in the growth category and the smallest proportions in the aggressive growth and global categories.

[INSERT TABLE 1 ABOUT HERE]

Our study also addresses two important empirical issues that have plagued many of the previous mutual fund studies. First, we reduce the impact of survivorship bias by collecting time series data each year from all of the funds in existence in a given year.¹ By creating a sample of mutual fund data that contains all funds listed in an investment category for a given year, our sample includes funds that subsequently cease to exist either through merger or complete liquidation, as well as those funds that survive. Second, to control for multiple asset categories and the possible correlation between characteristics and omitted benchmarks, we estimate the performance measure α_p and factor sensitivities, β_j 's by employing the following four-factor model:

$$R_{pt} - R_{Ft} = \alpha_p + \beta_{pL}(R_{Lt} - R_{Ft}) + \beta_{pS}(R_{St} - R_{Ft}) + \beta_{pF}(R_{Ft} - R_{Ft}) + \beta_{pB}(R_{Bt} - R_{Ft}) + \varepsilon_{pt}$$

- R_{pt} is the return on the fund being evaluated in period t,
- R_{Ft} is the return on the riskless asset in period t (3-month T-bill),
- β_{ij} is the sensitivity to benchmark j,
- R_{jt} is the return on the benchmark in period t,
- L is a large stock index (S&P 500),
- S is a small stock index (S&P 600),
- F is a foreign stock index (MSCI World),
- B is a bond index (Lehman Brother's LT Govt/Corp Bond),
- ε_{pt} is the random error

The Performance-Characteristic Equation

¹ Rather than using the 1999 year-end data to collect historical performance information for the years 1996-1998, we use the 1999 year-end data for gathering only the 1999 performance and characteristic information. Similarly,

The primary aim of this study is to identify a complete list of fund specific characteristics that explain mutual fund performance. We attempt to explain performance with a generalized multi-factor model that takes into consideration performance persistence, fund popularity (agility), growth (risk), operating costs, and managerial features, while controlling for intertemporal economic factors, differential investment styles and the interaction of these two variables. The general relationship is represented by Equation (1).

$$\begin{aligned}
 \text{PERF}_t = & \alpha_0 + \sum_{i=1}^3 \beta_i \text{YEAR}_t + \sum_{j=4}^9 \beta_j \text{INVOBJ}_t + \sum_{k=10}^{30} \beta_k \text{INVOBJ}_t * \text{YEAR}_t + \beta_{31} \text{PERSIST}_{t-1} \quad (1) \\
 & + \sum_{m=32}^n \beta_m \text{POPULARITY}_{t-1} + \sum_{o=n+1}^p \beta_o \text{GROWTH}_{t-1} + \sum_{q=p+1}^r \beta_q \text{COST}_{t-1} + \sum_{s=r+1}^t \beta_s \text{MANAGEMENT}_{t-1}
 \end{aligned}$$

The performance variable, PERF_t , in Equation 1 represents the risk-adjusted excess return for a fund in period t and serves as the dependent variable. The risk-adjusted return measure analyzed in this model is a modified Jensen's alpha, which is estimated using the *MS* monthly return information. All mutual fund returns are calculated net of expenses. The variables that represent economy-wide and investment style effects are contemporaneous to the performance estimate, while the fund characteristic variables and persistence are from the period preceding the estimate.

Variable Description

a) Base Model Variables

The first three parameters on the right-hand-side of Equation 1 form a base model, where year of observation (YEAR_t), investment objective (INVOBJ_t), and the interaction between the year and the investment objective ($\text{INVOBJ}_t * \text{YEAR}_t$) are used as control factors.

Previous studies have found that investment objective significantly influences fund returns in

a given year, although the direction of the impact may change from year to year. By incorporating dummy variables, our base model controls for the impact of both investment objective and year of observation. Specifically, the use of dummies for investment objective and for the interaction between investment objective and year allows for changes in both the slopes of the regression lines as well as their intercepts.

b) Persistence and Characteristic Variables

Beyond the base model we consider a number of other factors that may impact fund performance with the first of these being performance persistence. As noted in the literature review, several previous studies document persistence in fund performance, while others suggest such findings may be the result of survivorship bias and/or benchmark error. We directly address this issue by including a lagged performance ($PERF_{t-1}$).

In addition to the base model and the persistence factor, we include four broad categories of parameters to identify and measure specific fund attributes and characteristics. The *MS* database enables us to examine an exhaustive list of attributes corresponding to the four general model categories; popularity (agility), growth (risk), costs and management variables from Equation 1.

Popularity (agility) variables measure the demand for a fund or fund category as reflected in buying or selling pressure and the adaptive ability of the fund in response to such pressure. In addition to past performance, the popularity of a fund may be conditional on the perceived ability of the fund to meet the investment objectives outlined in a fund's prospectus. Therefore, popularity may be reflected in variables that measure 1) fund size, 2) fund agility and 3) investors' desire for a particular fund attribute. Proxies for popularity include the

following: total fund assets, market capitalization, total assets to market capitalization, net asset value (NAV) of the fund, NAV relative to average NAV by fund objective.

Total fund assets represent the total dollar value of a single fund's assets. It is equal to the fund's NAV (price per share) multiplied by the number of shares outstanding. A positive relationship between total fund assets and performance may be indicative of increased demand and positive net flows leading to asset growth for a fund that has recently performed well. Alternatively, a negative relationship may be indicative of the potentially detrimental impact of fund size on its ability to implement a particular investment style; it is possible that a fund becoming too large may be forced to take on investments with diminishing marginal returns. This variable is thus a proxy for strong demand as in the first scenario or lack of agility/flexibility in the alternative case.

Market capitalization of a fund's equity portfolio provides a measure of the size of the companies in which the fund invests. *MS* calculates this figure by first ranking the stocks in a fund's portfolio by their market capitalization and then calculating a weighted-average market capitalization for those stocks falling in the middle quintile of the ranked stocks. This variable provides a measure of fund agility in conjunction with growing assets. For example, given that funds are restricted from purchasing more than ten percent of any one company's voting securities, the ability of a growing fund to maintain an investment objective of targeting small firms may be precluded. As fund size increases and additional investments are considered, funds may be forced to target larger market capitalization firms relative to the target firm size that led to their previous success. This reduction in flexibility suggests a negative relationship between market capitalization and performance.

Total assets to market capitalization is the ratio of the fund's total assets to the market capitalization (as defined above). This is a relative measure of agility that attempts to capture the ability of a fund to pursue a particular investment objective based on firm size. A fund's total assets relative to the firm size of the fund's investments may provide a better measure than market capitalization alone, because it considers these size attributes simultaneously. A larger value for this variable may reflect too large a fund relative to its holdings, and again, given the ten percent ownership restriction, this potentially reduces investment choices for the fund and thus flexibility. Therefore, this variable is expected to have a negative impact on performance.

Net asset value (NAV) represents the fund's price per share and is influenced by the fund's performance. Since investments in mutual funds are made in dollar increments, popularity of a fund should not be contingent on an accepted NAV (optimal share price trading range). However, the more successful funds with larger NAV's may realize improved future performance (i.e. winners repeat) thus indicating a positive relationship between NAV and performance.

Relative NAV can be used to further address the issue of share price optimality by measuring individual fund deviations from the average fund price. As an extension of NAV, Relative NAV is calculated as $|1 - \text{NAV Ratio}|$ where the NAV Ratio is the fund's NAV divided by the average NAV for the funds within the same investment objective. If, as expected, no optimal trading range exists, then we hypothesize no significant relationship between this variable and fund performance.

Growth (risk) variables measure those factors that impact the future performance or growth prospects of a fund with the general expectation being that growth factors positively

influence performance. In addition to using risk-adjusted performance measures and including dummy variables to distinguish between investment objectives, we also consider factors such as diversification level, relative holding, price earnings ratio, price to book ratio and price to cash ratio.

Diversification level is measured by the percentage of the fund's total assets invested in the top-ten holdings, where a smaller percentage indicates a greater level of diversification. This measure directly impacts risk in that diversification serves to reduce the variability of returns, which, in turn, results in lower expected returns. We hypothesize, however, that level of diversification should hold no additional explanatory power, because the performance measures properly captures relevant risk.

Relative Holding also considers the impact of diversification by measuring the ratio of the different equity issues held by the fund relative to the average holdings for funds within an investment objective. This measure is calculated as $|1 - \text{holding ratio}|$. If there is an optimal level of diversification as measured by average number of issues held for the fund group, then performance will be negatively related to this relative holding measure, however, again no relationship is hypothesized if the performance measure properly captures risk.

Price earnings (PE), price-to-book value (PB), price-to-cashflow (PC) compare share price to relevant variables that affect value, such as earnings, book value and cash flow. The price earnings ratio (PE) for a fund is the weighted average of the PE ratios for the stocks in the fund's portfolio. This ratio reflects the growth opportunities of a fund's investments and provides information regarding the fund's investment strategy. Funds with high PEs, associated with growth oriented investment strategies, would also carry greater risk; conversely, low PE funds would tend to be value oriented and thus less risky. Since the

performance measure properly adjusts for risk and the base model captures differences across investment objectives, the PE ratio captures a fund's ability to select investments with the potential for above average growth, and thus PE should be positively related to performance.

Similarly, the price-to-book value ratio (PB) and price to cash ratio (PC) for a fund are the weighted averages of the PB ratios and PC ratios, respectively, for the stocks in the fund's portfolio. PB excludes the value of intangible assets and indicates the price being paid for the company's tangible assets based on historical values. A low PB ratio implies a liquidation value of the assets close to the current market prices, and therefore, a portfolio of low PB issues is indicative of a low risk, value-oriented investment style as opposed to a high PB or a high risk, growth-oriented style. The PC ratio reflects the ability of firms in the fund's portfolio to generate cash flow thus providing a measure of liquidity and solvency as well as a source for undertaking investments. A high PC is consistent with expectations of strong future growth in operational cash flows relative to current levels, and thus PCs are also positively correlated with growth expectations.

Cost variables measure the overall expenses of the fund that are incurred during the normal course of business. These measures include expense ratios and 12b-1 fees, loads, relative turnover and assets of fund complex. The following discussion explains these measures and provides an economic rationale for their inclusion as costs variables.

Expense ratio represents the percentage of fund assets paid as management fees. These include manager's compensation and operating expenses such as research support, 12b-1 fees, administrative fees and all other asset-based costs incurred by the fund excluding brokerage charges. The expectation is that if these expenses effectively support research, marketing and managerial expertise, then they should positively impact performance.

12b-1 fees are annual charges deducted from a fund's assets reflecting distribution and marketing costs. We consider these fees separately because they have been shown to significantly affect performance in previous studies. Although these expenses are designed to support marketing efforts, their impact on fund performance may be questionable, since the direct impact of 12b-1 fees is to generate short-term sales.

Loads are sales charges either at the time of initial investment or at the time of redemption. A front-end load represents a one-time charge at the initial investment and serves as a commission to brokers, while a deferred load or redemption charge is a sales fee imposed as money is taken out of a fund. Unless loads serve to offset other expenses, the expectation is that loads negatively impact performance.

Relative turnover measures the trading activity of a fund relative to the average activity of all funds within the investment objective. This measure involves a two-step calculation: first, is the turnover ratio for a fund, which is the lesser of monthly purchases or sales of securities divided by average monthly assets; then this individual fund turnover ratio is divided by the mean turnover ratio for all funds with the same investment objective. Funds with high relative turnover incur greater transaction costs, such as brokerage fees and the cost associated with the bid-ask spreads suggesting that fund performance is negatively related to the relative turnover ratio.

Assets of fund complex measures the dollar value of the total assets of all funds within the same fund family and represents the ability of individual funds to realize economies of scale afforded by the complex as a whole. This measure may be a better gauge for measuring economies of scale than the absolute measure of total assets of the individual fund. For example, a relatively small fund may realize economies of scale similar to large funds through

its fund family association. If economies of scale are greater for large complexes and are shared with all funds in the family, then larger values for this measure would positively impact performance.

Management variables attempt to capture managerial and organizational attributes as well as monitoring mechanisms that bond managers to stated fund objectives, all of which ultimately impact fund performance.

Turnover is a measure of trading activity or the propensity of a manager to trade. Dividing the lesser of annual purchases or sales of long-term securities by average annual assets provides this measure. While funds with higher turnover incur greater transaction costs, such as brokerage fees and the impact of bid-ask spreads, trading may be a signal that a manager is gathering and trading on information. Thus, even though it increases costs, turnover may have a positive impact on performance provided that managers are acting on good information.

Funds under management represents simply the number of funds under a sole manager or team of managers where the managers are identified. If managers with superior stock picking or market-timing abilities are afforded the opportunity to manage multiple funds, a positive relationship between performance and funds under management is expected. Similarly, a positive relationship is expected if economies of scale are likely to exist in the management of multiple funds. Alternatively, a negative relationship may be an indication that a manager is spread too thin, thus reducing his effectiveness.

Tenure provides a measure of managerial experience and success and is measured by the number of years that the manager has been with a fund. Long tenure may be indicative of satisfactory ability and performance as well as the ability to survive the demands of the industry; however, it may merely indicate a mediocre performance record and the fact that the

manager has few external opportunities. Thus, tenure may be subject to an optimal length of time, and this may best be captured by a relative measure of tenure.

Relative tenure attempts to address this issue of optimal management tenure. Relative tenure is measured as $|1 - \text{tenure ratio}|$ where the tenure ratio is the fund manager's tenure divided by the average tenure for all funds within an investment objective. By measuring the individual fund manager's time on the job as it deviates from the average, relative tenure thus captures the impact of entrenched or inexperienced management with the expectation that such deviations would negatively impact performance.

Age of fund provides a measure of the fund's longevity or ability to survive in a highly competitive environment and is simply the number of years that a fund has been in operation.

It is likely that older funds generate a loyal following of investors based on past performance and thus benefit from a prestigious image. If this is the case, then performance may be positively related to fund age. Alternatively, younger funds may be under pressure to attract fund inflows, which is best achieved by a strong performance in the initial years of operation, while older, established funds may more easily withstand some periods of net outflows. In this case younger funds may actually outperform the older ones, and thus performance would be negatively related to fund age.

Minimum initial purchase captures the potential for external monitoring by financial institutions. It is the smallest investment amount accepted to establish a new account, thus providing information on investor type. Higher minimum purchases are associated with funds that have an institutional following, and institutional investors may be able to monitor management more closely and thus favorably impact performance.

Sole manager, team management (ID) (with managers specified) and team management (anonymous individuals) variables identify the organizational structure that impacts the decision-making process and accountability for the fund. Although anonymous teams may lack accountability, multiple manager structures should realize synergistic benefits as well as broadened expertise in specialized areas. Alternatively, sole managers may be more directly accountable and should also be able to reach decisions more quickly.

Table 2 (Panels A, B, and C) present summary statistics on the general return and risk information for funds as well as characteristic variables listed according to the model categories of fund popularity (agility), growth (risk), cost and management for all funds from 1996-1999. Panel A contains the means, medians, standard deviations, minimum and maximum values for the characteristic variables and reveals an apparently broad mix of funds in the sample as is evident from the wide range of values for the fund attributes.

[INSERT TABLE 2 ABOUT HERE]

Panel B of Table 2 presents the same summary statistics for all funds on a year-by-year basis over the four-year study period, while Panel C presents the summary information by investment objective for the 1999 funds. An analysis of the data from Panel B shows that, in general, average total assets have increased by approximately five percent per year with a far greater increase in the market capitalization of issues in which funds are investing. These trends reflect the stock market appreciation over the study period. Furthermore, the volatility of fund returns has increased over time as measured by the standard deviation of returns. This is consistent with the investment in issues with increasing PE's, PC's and PB's as indicated in those price variables. The cost variables appear to be fairly constant over the

time period analyzed. While front-end loads have decreased somewhat, deferred loads have increased to compensate, thus leaving the total load at approximately the same level.

Panel B further reveals that the management variables of turnover, tenure, and minimum initial investment appear to be fairly constant over time, while the average fund age has fallen from 8.06 years in 1996 to 7.08 years in 1999. This drop in age is consistent with the general growth in the number of mutual funds as documented in Table 1. Even more pronounced is the change in management structure during the study period. In 1996 for example, 57 percent of funds were individually managed, while 43 percent were team managed; by 1999, these figures converge to 50 percent for both structures of management. Additionally, managers are handling more funds with an average of 18 funds per manager in 1996 doubling to 36 funds per manager in 1999. This may be out of necessity as fund complexes increase their offerings in the face of a limited managerial pool, or alternatively, a movement to team management may enable the average manager to oversee more funds.

Table 2 (Panel C) presenting 1999 data reveals some interesting similarities and differences in the summary statistics for funds categorized by investment objective. Consistent with expectations is the relative similarity in the characteristic variables for the Foreign (FO) and Global (WO) funds as these two fund types differ only with respect to holdings of US securities. The Global funds stand out as unique, however, with their heavy reliance on team management (67 percent). Although Small Company (SC) funds are logically the smallest in total assets and market capitalization, the level of diversification for these funds is the highest with the largest average number of holdings and the smallest percentage of assets in their top-ten. By contrast, Growth (GR) funds have the lowest average number of total holdings with a high percentage of assets in their respective top-ten, suggesting a lower

level of diversification. Also notable are the relatively large size of the Aggressive Growth (AG) funds as measured by total assets and NAV, although their market capitalization is relatively small. This group has the distinction of claiming the highest return for 1999 and also the highest risk.

IV. Results

Table 3 (Panels A and B) present the Ordinary Least-Squares Regression (OLS) results including the base model, persistence and those characteristic variables from the four main categories; popularity (agility), growth (risk), cost and management, respectively.² This analysis considers all observations in one pooled, cross-sectional regression with Panel A reporting the estimates for the base variable coefficients. These results demonstrate the importance of economy-wide factors impacting the general level of the stock market and the success of any given fund's investment strategy. Although the investment objective coefficients are statistically significant in all but two cases, the interaction term ($INVOBJ_t * YEAR_t$) suggests that differential performance within and across investment objectives varies from year to year. For example, while AG funds generally perform well over the entire sample period, this wasn't the case in 1997 when their performance was significantly worse than that of all the other fund objectives. Alternatively, the poor performing EI funds had a relatively good year in 1997. Thus, while the investment objective variables directly impact performance, they cannot be used to select funds that will

² The results presented in Table 3 are robust to the statistical methodology employed. For example, an estimation of the model using the Generalized Method of Moments (GMM) technique results in only minor differences in the coefficient estimates, standard error terms and overall explanatory power of the model

subsequently realize abnormal performance, because common market factors also affect the impact of investment objective on performance.

[INSERT TABLE 3 ABOUT HERE]

Panel B of Table 3 reports the coefficient estimates for the remainder of the variables that comprise the full regression including the persistence and characteristic variables from the four main categories. The full model analyzing 11,600 observations results in an F-value of 15 and an R-square of 0.07. The negative and significant coefficient estimate of $PERF_{t-1}$ does not support the winners repeat hypothesis, and in fact our results suggest that mutual fund performance is more likely to exhibit a reversal pattern. This result is in contrast to those studies that document persistence and provides evidence that it may indeed be an artifact of survivorship bias and/or benchmark error.

Among the popularity variables the median market capitalization coefficient is negative and statistically significant suggesting that the targeting of small-cap firms leads to superior performance. Additionally, as the total assets of a successful fund increase, its ability to continue a successful strategy focusing on small cap investments may be precluded. This hypothesized reduction in flexibility of a fund is further supported by the negative coefficient estimates for total fund assets and total assets to market capitalization. Although these estimates are not statistically significant, their signs reinforce the direction of the impact of the median market capitalization coefficient.

The negative coefficient estimate for total fund assets stands in contrast to previous studies that find a positive relationship between fund size and performance. Previous studies' results may be driven by the contemporaneous measurement of the performance and characteristic variables and raises an issue of causality. Such confounding effects are absent

from our study since the measurement of the characteristic variables are calculated from the period preceding the performance estimates and thus there is no overlap in data or in dependent and independent characteristic variables. Finally, as hypothesized, the popularity of a fund is not contingent on an optimal share price trading range as indicated by the insignificant coefficient estimates for net asset value and relative net asset value.

Within the growth (risk) variable category, Table 6 (Panel B) reveals that the coefficient estimates for PE and cash-flow-to-book-value (CB) are positive and statistically significant, while those for diversification level and relative holding are not significant. The impact of the price ratio variables lends support for the positive influence of growth opportunities. For example, the positive coefficient of the PE implies that funds holding high PE stocks tend to outperform those that invest in low PE's. Exhibiting the highest level of significance, the CB variable's positive sign is also consistent with the growth hypothesis. The fact that actual cash flow strongly impacts subsequent performance is understandable given that cash flow generation is necessary for supporting growth opportunities. The greater significance of cash flow compared to PE may be justified in that stock prices contain some elements of investor sentiment whereas cash flow is tangible and readily available. Also consistent with expectations is the insignificant effect of both diversification level and relative holding. These risk-related variables were hypothesized to have no significant impact on a performance measure already adjusted for risk.

Panel B further indicates that the cost variables, expense ratio and load are negatively related to fund performance. The significantly negative estimate for the expense ratio coefficient suggests that asset-based expenditures are not used to effectively support research, marketing, and managerial expertise. The negative coefficient indicates

unsatisfactory performance and reflects the fact that investors overcompensate fund managers given their poor results. This finding is consistent with several previous studies including Sharpe (1968), Elton et al (1993), Golec (1996) and Dellva and Olson (1998).

Within the management variables category in Panel B, the number of funds under management has a significant impact on performance. The negative coefficient indicates that focus is important, and the effectiveness of management expertise declines as the manager attempts to cover more funds. This reduction in effectiveness associated with spreading oneself too thin outweighs any benefits (i.e. economies of scale, etc.) arising from managing multiple funds. The coefficient estimates for turnover and tenure are positive although not statistically significant. The positive impact of these characteristics on performance is consistent with prior studies; for example, Friend et al (1970), Grinblatt and Titman (1994) and Wermers (2000) finds a positive relationship between turnover and performance, while Golec (1996) finds a positive relationship between tenure and performance.

Among the other management variables, minimum initial purchase has a positive, but insignificant coefficient. This may reflect the extremely competitive nature of the industry thus suggesting that the monitoring provided by institutional investors may be redundant. In terms of the fund age variable, we report a negative, but not significant coefficient estimate. In contrast to Golec (1996) this result suggests that although an older fund may have achieved past success, the past does not necessarily secure future performance. Finally, in terms of management structure, neither sole management nor team management structures play a significant role in determining performance. This suggests that the advantages of an autonomous decision-making process of a sole manager may be offset by the synergistic benefits of team managers.

In summary, the results from Table 6 (Panel B) are generally consistent with the hypothesized impacts of the explanatory variables upon performance. In addition, fund-specific characteristics that proxy for the categories of popularity, growth, cost and management are all represented in terms of significance suggesting these broad factors serve to explain fund performance. Not surprisingly, the risk variables that assess fund diversification are insignificant. This finding is consistent with the accurate specification of a benchmark and implies that the performance measure used in the regression analysis properly considers risk. Finally, the results document a mean reverting performance pattern.

V. Conclusions

This study takes a new look at mutual funds performance by comprehensively analyzing a large set of funds and a unique list of fund-specific characteristics. Given the varying performance of different mutual funds and the conflicting findings of traditional research in the area, the purpose of our study is to identify fund specific factors that explain excess returns. This effort further distinguishes itself from the standard mutual fund literature by making several unique contributions. These include the use of unconventional factor categories such as popularity, agility and growth; a detailed discussion of the relationship between mutual fund performance and fund-specific factors; a larger, more recent data set of both mutual funds and fund characteristics to explore the proposed relationships; and the records of young funds. Mutual fund performance is related to an extensive list of specific fund and/or management characteristics. While prior studies have considered approximately five to eight characteristics, our analysis includes four broad categories of factors (popularity, growth, cost and management) and 19 individual factors or characteristics.

This study also provides a significant update to the traditional mutual fund literature by examining funds in existence during the latter half of the 1990s up through the year 2000, thus capturing the recent conditions and explosive growth of the mutual fund industry over that period. Unlike most prior research on the determinants of fund performance, the data used in this study is free of survivorship bias. Additionally, we address the benchmark issue by considering a performance measure estimated from a multiple benchmark model. Finally, the regression estimates of the performance-characteristic equation are the result of noncontemporaneous measurement of the dependent and independent variables.

The results indicate that the hypothesized relationship between performance and the explanatory variables are generally upheld. After taking into consideration general market conditions and a fund's investment objective, the specific factors that significantly affect mutual fund performance include the price, cash flow and expense ratios, market capitalization and the number of funds under management. Furthermore, using non-overlapping periods for performance measurement, our results refute the performance persistence phenomenon.

**Table 1 Number of Funds (Percentage of Total) Based on
Investment Objective over the Years 1996-1999**

Investment Objective¹	1999	1998	1997	1996
Aggressive Growth (AG)	109 (3.2)	110 (3.3)	97 (3.5)	89 (4.2)
Growth (GR)	1164 (34.3)	1063 (31.9)	887 (32.1)	678 (31.9)
Growth and Income (GI)	549 (16.2)	563 (16.9)	453 (16.4)	378 (17.8)
Equity and Income (EI)	172 (5.1)	181 (5.4)	136 (4.9)	120 (5.6)
Small Company (SC)	470 (13.9)	478 (14.4)	408 (14.7)	288 (13.6)
Foreign (FO)	660 (19.4)	647 (19.4)	539 (19.5)	384 (18.1)
Global (WO)	267 (7.9)	289 (8.7)	246 (8.9)	187 (8.8)
Total # Funds	3391	3331	2766	2124

1. Investment objective as defined in prospectus

AG - funds seeking rapid growth of capital by leveraging, shortselling, investing in IPO's, emerging-markets growth companies, without specification of a market capitalization range.

GR - funds seeking capital appreciation with little or no consideration to current income.

GI - funds seeking growth of capital and current income are equal objectives.

EI - funds seeking current income by investing at least 65% of assets in dividend paying securities.

SC - funds seeking capital appreciation by investing primarily in the equity of companies with a market capitalization of less than \$1 billion.

FO - funds seeking investment primarily in equity securities of issuers located outside of the US.

WO - funds seeking global equity investments without regional exclusions, but maintaining a US component between 25% and 50%.

Table 2 Overall Summary Statistics on Fund Characteristics

Mean, median, standard deviation, minimum and maximum values for fund variables classified by the model categories of popularity, growth, cost and management.

Panel A

Variable	Mean		Median	Std. Deviation
	Min	Max		
General Information:				
Return (%)		20.36	18.72	21.50
-64.75	264.49			
Std. Dev. (%)		19.73	18.54	8.04
2.75	92.94			
Beta		0.94	0.92	0.25
-1.40	2.54			
Alpha		-1.43	-1.35	8.58
-45.65	156.20			
Popularity Variables (Agility):				
Total Fund Assets (\$MM)		610	76.3	2,483
0.1	69,545			
Market Cap. (\$MM)		18,133	9,568	23,760
33	181,774			
NAV (\$)		19.73	16.69	14.30
0.12	492.71			
Growth Variables (Risk):				
Diversification Level		30.67	28.24	16.72
0.56	808			
Number of Holdings		138	87	194
1.0	3869			
PE		29.68	27.80	8.75
8.5	60.0			
PB		6.03	5.10	3.41
0.5	26.4			
PC		19.15	17.6	7.10
2.1	40			
Cost Variables: (%)				
Expense Ratio		1.53	1.44	0.71
0.02	20.34			
12b-1		0.38	0.25	0.41
0	1.0			
Front-end Load		1.38	0	2.27
0	9.0			
Deferred Load		0.91	0.00	1.76
0	6.0			
Assets of Fund Complex(\$MM)		18,160	4,225	40,316
0.2	293,818			
Management Variables:				
Turnover (%)		84.24	66	87.12
1.0	4263			
Funds Under Management		27.98	21	24.65
1	103			
Tenure (years)		4.16	3	3.50
1	47			
Age of Fund (years)		7.48	4.33	9.65
1	75.75			
Min. Initial Purchase (\$)		360,691	1,000	5,474,618
0	250,000,000			
Sole Manager *		0.53	1.0	0.50
0	1			
Team ID *		0.38	0	0.49
0	1			
Team *		0.09	0	0.29
0	1			

* management structure variables represent the percentage of funds that have either sole managers, team managers (identified), or unidentified team managers.

Note: not included are variables that are derived from the variables listed above (i.e. total assets to market cap., relative NAV, relative market cap., relative holding, cash-flow to book-value, relative turnover and relative tenure).

Table 2 Summary Statistics on Fund Characteristic Variables by Year (1996-1999)
Mean values for popularity, risk, cost and management variables for each year.

Panel B

Variable	1999	1998
1997	1996	
General Information:		
Return (%)		
18.24	17.71	31.73
Std. Dev. (%)		
15.83	12.94	25.02
Beta		
0.91	0.92	0.96
Alpha		
-3.01	-1.86	0.95
		-2.45
Popularity Variables (Agility):		
Total Fund Assets (\$MM)		
651	557	640
Market Cap. (\$MM)		
10,680	7,771	31,264
NAV (\$)		
18.18	18.17	23.17
		18.53
Growth (risk) Variables:		
Diversification Level		
29.60		32.86
Number of Holdings		
144	142	132
PE		
26.06		35.38
PB		
4.65		25.77
PC		
16.83		8.40
		4.28
		23.25
		14.79
		19.69
Cost Variables:		
Expense Ratio(%)		
1.53	1.53	1.56
12b-1(%)		
0.37	0.34	0.39
Front-end Load(%)		
1.41	1.50	1.32
Deferred Load(%)		
0.88	0.78	1.0
Assets of Fund Complex(\$MM)		
17,556	12,154	23,560
		17,005
Management Variables:		
Turnover (%)		
81.79	81.33	87.39
Funds Under Management		
23.20	17.98	35.92
Tenure (years)		
4.31	4.16	4.05
Age of Fund (years)		
7.65	8.06	7.08
Min. Initial Purchase (\$, median)		
1,000	1,000	1,000
Sole Manager*		
0.55	0.57	0.50
Team ID*		
0.38	0.25	0.45
Team*		
0.07	0.18	0.05
		0.09

* management structure variables represent the percentage of funds that have either sole managers, team managers (identified), or unidentified team managers.

Note: not included are variables that are derived from the variables listed above (i.e. total assets to market cap., relative NAV, relative market cap., relative holding, cash-flow to book-value, relative turnover and relative tenure).

Table 2 Summary Statistics on Fund Characteristic Variables by Investment Objective for 1999
Mean values for popularity, risk, cost and management for 1999. Investment objectives include Aggressive Growth (AG), Equity Income (EI), Foreign (FO), Growth and Income (GI), Growth (GR), Small Company (SC) and Global (WO).

Panel C

Variable			AG	EI	FO	GI	GR
	SC	WO					
General Information:							
Return (%)			59.05	4.47	49.99	13.51	
30.54	31.85		35.48				
Std. Dev. (%)			35.37	16.67	26.64	19.89	
26.10	28.65		21.57				
Beta			1.29	0.73	0.84	0.88	1.04
1.07	0.82						
Alpha(%)			8.37	-4.76	0.65	-3.14	2.26
4.57	0.91						
Popularity Variables (Agility):							
Total Assets (\$MM)			1,328	459	350	885	753
302	788						
Market Cap. (\$MM)			19,487	31,181	20,932	49,137	
42,726	2,471		25,631				
NAV (\$)			36.23	17.28	18.06	23.06	
26.36	23.12		20.63				
Growth Variables (Risk):							
Diversification Level			37.40	29.91	32.72	31.42	
36.25	28.06		29.81				
Number of Holdings			122	106	138	153	93
184	173						
PE			47.21	24.94	35.94	31.71	
38.60	31.72		35.79				
PB			14.77	5.39	5.57	7.79	
10.59	7.90		7.34				
PC			33.11	16.00	20.02	21.20	
26.83	22.61		21.69				
Cost Variables: (%)							
Expense Ratio			1.60	1.36	1.92	1.23	1.47
1.55	1.88						
12b-1			0.45	0.41	0.40	0.37	0.39
0.36	0.52						
Front-end Load			1.45	1.44	1.32	1.29	1.31
1.12	1.64						
Deferred Load			1.19	1.12	1.02	0.95	0.95
0.91	1.26						
Assets of Fund Complex(\$MM)			33,012	21,661	28,882	19,367	
21,114	13,742		44,240				
Management Variables:							
Turnover (%)			115.15	65.30	82.88	63.74	
101.94	85.21		90.46				
Funds Under Management			44.74	37.62	38.38	33.18	
33.11	31.50		50.77				
Tenure (years)			3.72	4.50	3.78	4.39	4.09
3.92	3.95						
Age of Fund (years)			8.32	7.65	5.46	9.29	7.41
5.98	6.15						
Min. Initial Purchase (\$, median)			1,000	1,000	1,000	1,000	
1,000	1,000		1,000				
Sole Manager*			0.56	0.58	0.49	0.51	0.53
0.47	0.33						
Team ID*			0.42	0.36	0.46	0.43	0.43
0.47	0.63						

Team*			0.02	0.06	0.05	0.06	0.04
	0.06	0.04					

* management structure variables represent the percentage of funds that have either sole managers, team managers (identified), or unidentified team managers.

Note: not included are variables that are derived from the variables listed above (i.e. total assets to market cap., relative NAV, relative market cap., relative holding, cash-flow to book-value, relative turnover and relative tenure).

Table 3

Regression Results for Base Variables

Included in this table are the coefficient estimates and corresponding standard errors and t-statistics.

$$(\text{Alpha}_t = \alpha_0 + \sum \alpha_i \text{YEAR}_t + \sum \alpha_j \text{INVOBJ}_t + \sum \alpha_k \text{INVOBJ}_t * \text{YEAR}_t + \alpha_l \text{Perf}_{t-1} + \alpha_m \text{Popularity}_{t-1} + \alpha_n \text{Growth}_{t-1} + \alpha_o \text{Cost}_{t-1} + \alpha_p \text{Management}_{t-1} + e_t)$$

Panel A

	Parameter Estimate	Standard Error	t-stat
Intercept (1997,WO,Team)	19.826***	5.992	3.31
1998	6.025***	2.067	2.91
1999	5.986***	2.052	2.92
2000	0.414	2.013	0.21
Aggressive Growth(AG)	-13.143***	2.813	-4.67
Equity Income(EI)	7.626***	2.495	3.06
Foreign(FO)	-3.796**	1.805	-2.10
Growth and Income(GI)	3.684**	1.864	1.98
Growth(GR)	-2.033	1.702	-1.20
Small Co.(SC)	-2.723	2.070	-1.32
1998AG	15.431***	3.702	4.17
1998*EI	-15.504***	3.392	-4.57
1998*FO	2.509	2.493	1.01
1998*GI	-8.505***	2.543	-3.34
1998*GR	2.115	2.337	0.91
1998*SC	-2.205	2.661	-0.83
1999*AG	27.431***	3.847	7.13
1999*EI	-20.463***	3.322	-6.16
1999*FO	9.979***	2.459	4.06
1999*GI	-10.516***	2.508	-4.19
1999*GR	1.526	2.313	0.66
1999*SC	6.528**	2.666	2.45
2000*AG	10.994***	3.617	3.04
2000*EI	-3.691	3.225	-1.14
2000*FO	0.297	2.362	0.13
2000*GI	-1.399	2.409	-0.58
2000*GR	5.563**	2.203	2.48
2000*SC	6.281**	2.577	2.44

Table 3 Regression Results for Persistence and the Characteristic Variables

Included in this table are the coefficient estimates and corresponding standard errors and t-statistics.

$$(\text{Alpha}_t = \alpha_0 + \alpha_1 \text{YEAR}_t + \alpha_2 \text{INVOBJ}_t + \alpha_3 \text{INVOBJ}_t * \text{YEAR}_t + \alpha_4 \text{Perf}_{t-1} + \sum \alpha_m \text{Popularity}_{t-1} + \sum \alpha_n \text{Growth}_{t-1} + \sum \alpha_o \text{Cost}_{t-1} + \sum \alpha_p \text{Management}_{t-1} + e_t)$$

Panel B³

	Parameter Estimate	Standard Error	t-stat
Persistence	-0.043***	0.015	-2.86
Popularity (Agility)			
Total Fund Assets(TA) ^a	-0.157	0.120	-1.31
Market Cap.(MC) ^a	-1.015***	0.262	-3.88
TA to MC	-0.406	0.377	-1.08
NAV ^a	-0.374	0.556	-0.67
Relative NAV	0.134	0.373	0.36
Growth (Risk)			
Diversification Level ^b	0.017	0.012	1.41
Relative Holding	-0.207	0.215	-0.96
PE	0.060*	0.035	1.71
Cash-Flow-to-Book-Value (CB) ^c	15.70***	3.534	4.44
Cost			
Expense Ratio	-1.822***	0.340	-5.36
Load ^d	-0.056	0.094	-0.59
Management			
Turnover	0.0008	0.002	0.34
Funds Under Management	-0.025***	0.009	-2.74
Tenure	0.039	0.063	0.61
Age of Fund	-0.006	0.025	-0.22
Min. Init. Purchase ^a	0.038	0.075	0.52
Sole Manager	-0.733	0.745	-0.98
Team ID	-0.032	0.770	-0.04
Adj. R ²	0.07		
F-value	14.48		
# observations	11,600		

* significant at .10 level

** significant at .05 level

*** significant at .01 level

^a measured in logarithmic terms

^b diversification level is measured as the % of the funds total assets invested in their top-ten holdings

^c CB=PB/PC

^d front and deferred loads combined into total load

³ Low correlations of most of the variables listed in Table 2 suggest that multicollinearity is not a severe issue. In those cases where correlations are high, we adjust or eliminate variables. Thus the final model considers 18

Bibliography

- Brown, S.J., and W.N. Goetzmann, 1995. Performance persistence, *Journal of Finance* 50, 679-698.
- Brown, S.J., W.N. Goetzmann, R.G. Ibbotson and S.A. Ross, 1992. Survivorship bias in performance studies, *Review of Financial Studies*, 5, 553-580.
- Carhart, M.M., 1997. On persistence in mutual fund performance, *Journal of Finance* 52, 57-82.
- Chevalier, J., and G. Ellison, 1999. Are some mutual fund managers better than others? Cross-sectional patterns in behavior and performance, *Journal of Finance* 54, 875-889.
- Dellva, W.L. and G.T. Olson, 1998. The Relationship Between Mutual Fund Fees and Expenses and Their Effect on Performance, *Financial Review*, 33(1), 85-104.
- Dellva, W.L., A.L. DeMaskey and C.A. Smith, 2001. Selectivity and Market Timing Performance of Fidelity Sector Mutual Funds, *Financial Review*, 36(1), 39-54.
- Elton, E.J., M.J. Gruber and C.R. Blake, 1996. Survivorship bias and mutual fund performance, *Review of Financial Studies*, 9, 1097-1120.
- Elton, E.J., M.J. Gruber, S. Das and M. Hlavka, 1993, Efficiency with costly information: A reinterpretation of evidence for managed portfolios, *Review of Financial Studies* 6(1), 1-22.
- Ferris, S.P., and D.M. Chance, 1987. The effect of 12b-1 plans on mutual fund expense ratios: A note, *Journal of Finance*, 42, 1077-1082.
- Friend, I., M. Blume and J. Crockett, 1970. Mutual funds and other institutional investors, McGraw-Hill, New York, New York.
- Goetzmann, W.N., and R.G. Ibbotson, 1994. Do winners repeat? Patterns in mutual fund performance, *Journal of Portfolio Management*, 20, 9-18.
- Golec, J.H., 1996. The effects of mutual fund managers' characteristics on their portfolio performance, risk, and fees, *Financial Services Review* 5(2), 133-148.
- Grinblatt, M., and S. Titman, 1989. Mutual fund performance: An analysis of quarterly portfolio holdings, *Journal of Business* 62, 394-415.
- Grinblatt, M., and S. Titman, 1992. The persistence of mutual fund performance, *Journal of Finance* 47, 1977-1984.

Grinblatt, M., and S. Titman, 1994. A study of monthly mutual fund returns and portfolio performance evaluation techniques, *Journal of Financial and Quantitative Analysis* 29(3), 419-444.

Hendricks, D., J. Patel and R. Zeckhauser, 1993. Hot hands in mutual funds: Short-run persistence of relative performance, 1974-88, *The Journal of Finance* 48, 93-130.

Hooks, Jon A., 1996. The effects of loads and expenses on open end mutual fund returns, *Journal of Business Research* 36, 199-202.

Ippolito, R.A., 1989. Efficiency with costly information: A study of mutual fund performance, 1965-84, *Quarterly Journal of Economics* 104, 1-23.

Ippolito, R.A., 1993. On studies of mutual fund performance, 1962-1991, *Financial Analysts Journal* 49, 42-50.

Jensen, M.C., 1968. The performance of mutual funds in the period of 1945-1964, *Journal of Finance* 23, 16-26.

Kon, S., 1982. The market timing performance of mutual fund managers, *Journal of Business*, 56, 323-347.

Latzko, D.A., 1999. Economies of scale in mutual fund administration, *Journal of Financial Research*, 22(3), 331-339.

Lehman, B., and D. Modest, 1987. Mutual fund performance evaluation: A comparison of benchmarks and benchmark comparisons, *Journal of Finance*, 42, 233-265.

Livingston, M. and E.S. O'Neal, 1996. Mutual fund brokerage commissions, *Journal of Financial Research*, 19, 273-292.

Malhotra, D.K. and R.W. McLeod, 1997. An empirical analysis of mutual fund expenses, *Journal of Financial Research*, 20, 175-190.

Malkiel, B.G., 1993. The regulation of mutual funds: An agenda for the future, in Modernizing U.S. securities regulation, Lehn, K., and Kamphis, R., eds., Irwin, Homewood, Illinois.

Malkiel, B.G., 1995. Returns from investing in equity mutual funds 1971-1991, *Journal of Finance*, 549-572.

McLeod, R.W. and D.K. Malhotra, 1994. A re-examination of the effect of 12b-1 plans on mutual fund expense ratios, *Journal of Financial Research*, 17, 231-240.

Sharpe, W.F., 1966. Mutual fund performance, *Journal of Business*, 39, 119-138.

Sirri, E.R., and P. Tufano, P., 1998. Costly search and mutual fund flows, *Journal of Finance*, 53, 1589-1622.

Treynor, J.L., 1965. How to rate management of investment funds, *Harvard Business Review*, 63-75.

Volkman, D.A., and M.E. Wohar, 1995. Determinants of persistence in relative performance of mutual funds, *Journal of Financial Research*, 18(4), 415-430.

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.