Predicting Mutual Fund Over-Performance Over A Nine-Year Period

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The purpose of this paper is to determine if, using historical data, it would have been possible to use a buy-and-hold strategy from January 1, 1995 through December 31, 2003 that resulted in a selection of funds that consistently outperformed other mutual funds. This study attempts to address several methodological issues commonly found in mutual fund performance research such as fund mergers, fund liquidations, name changes, and survivorship bias. Results support the hypothesis that low cost mutual funds tend to outperform higher cost funds over multiple time periods, and that short-term performance shows persistence of returns.
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Introduction

Imagine an investor has the opportunity to go back in time to choose an investment portfolio if three conditions are met: the investor can invest only in mutual funds; the investor must use a buy and hold strategy; and the investor can only use past performance data, with no knowledge of future gains or losses.

These conditions are typically faced by mutual fund investors. Experts, both academic (Keown, 2003) and industry (Bogle, 1994), recommend that mutual funds investors use a buy-and-hold strategy. This involves buying a mutual fund, reinvesting dividends and capital gains, and holding the shares for a number of years. Proponents of buy-and-hold argue that this strategy is most effective because it avoids timing the market, which reduces brokerage fees and transaction costs. A buy-and-hold strategy postpones capital gains taxes associated with trading mutual funds, which can also turn investment profits into long-term capital gains that are taxed at a lower rate.

However, the advantages associated with a buy-and-hold strategy do not reduce the risk of choosing a fund that might under-perform its peers over a given number of years. Buying and holding an under-performing mutual fund, even if fees and taxes are reduced, subjects the shareholder to an opportunity cost. In short, the shareholder will capture less return than was otherwise possible given the available choices.

The purpose of this paper is to determine if, using historical data, it would have been possible to use a buy-and-hold strategy, beginning on January 1, 1995 and ending December 31, 2003, that would have resulted in choosing funds that consistently out-perform other mutual funds. This study attempts to address several troubling methodological issues commonly found in mutual fund performance research. Research complications related to fund mergers, fund liquidations, name changes, and consistency among research data are issues faced in this research. As will be discussed later in the paper, steps were taken throughout the research process to reduce effects related to survivorship bias. A secondary objective of this paper is to determine which, if any, mutual fund attributes can be used by investors to consistently choose top performing funds. Results will provide further evidence regarding persistence of mutual fund returns.

Factors Affecting Mutual Fund Performance

The use of mutual funds by individual investors and financial planners has grown significantly over the past 30 years. Mutual funds currently control about $6.3 trillion in investable assets (Koreto, 2003). Empirical testing of mutual fund returns began over 30 years ago (Droms & Walker, 1995). Numerous studies have examined the relationships between and among mutual fund investment performance using parameters such as expenses, turnover, load status, asset size, expense ratios, diversification levels, and portfolio composition (e.g., Droms & Walker, 2001;

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Ippolitio, 1989; Shukla & Trzcinka, 1992; Walker, 1997; Zera & Madura, 2001).

A review of significant findings related to the persistence of fund characteristics as determinants of mutual fund performance over the past decade finds that conclusions have been inconsistent.

Expense Ratios

According to Topkis (1996), "in all but a few cases, fees are the keys to future returns" (p. 191), because fees have the greatest impact on reducing a fund's total return that is distributed to shareholders. Malhotra and Mcleod (1997) and Walker (1997) concluded that funds with lower management fees and expenses maximize fund returns. Elton, Gruber, and Blake (1996), Gunn (1996), and Hooks (1996) also determined that funds with low expenses outperform high expense funds, and that even load funds with low expenses outperform no-load funds with high annual expenses. These findings confirm results presented by Grinblatt and Titman (1993) and Carhart (1997) who determined that fund returns are driven most directly by mutual fund expenses and transaction costs, with expenses having at least a one-for-one negative impact on fund performance. According to Rahman et al. (1991), "if fund managers do have any superior forecasting skills, the benefits are exhausted by the funds' operating expenses and transaction cost" (p. 32). Dellva and Olson (1998) summarized the general consensus regarding fees by concluding that funds with superior performance tend to have lower overall expense ratios.

However, not all conclusions confirm that expense ratios are predictive of fund performance. Droms and Walker (1995) determined that, on average, better performing funds tend to have greater risks and higher expense ratios. The reason for this apparent anomaly was explained by Grinblatt and Titman (1994) who suggested that "funds that spend the most on research and trade the most may, in fact, be uncovering underpriced stocks" (p. 438). In a later study, Golec (1996) also asserted that a relatively high management fee may signal superior investment skills, which lead to better performance.

Loads

Load funds are often sold using a buy-and-hold approach. Investors who purchase load funds are thought to be less likely to sell funds during times of market volatility because of general reluctance to incur commission costs. Load funds, therefore, may offer a performance advantage over no-load funds (Taylor & Yoder, 1997). However, this assumption is not generally supported. Several research studies have found that no-load funds, in general, outperform load funds (Israelsen, 2003; Kihn, 1996). Hooks (1996), Malhotra and Mcleod (1997), and Prochniak (1996) suggested that mutual fund investors should avoid mutual funds with front-end sales loads because these funds do not sufficiently outperform no-load funds. Others, including Droms and Walker (1995), argue that the load does not impact mutual fund returns.

Net Assets

A fund's net asset base is defined as assets minus liabilities. Droms and Walker (1995) determined that portfolios of smaller funds were more risky than larger funds, and that risk and asset size were inversely related. However, smaller funds, although found to be more risky, were also found to outperform larger funds. Malhotra and Mcleod (1997) and Markese (2000) determined, on the other hand, that larger funds, on average, provided investors superior returns. Like most studies focused on determining factors associated with mutual fund performance neutral relationships have been noted. Grinblatt and Titman (1994) found that fund performance was not related to the size of a mutual fund; investors cannot achieve above average performance by screening on the basis of the size of a fund's net assets.

Portfolio Risk

The preponderance of research on mutual fund performance focuses on the relationship between mutual fund returns and historical risk (e.g., Fama & Macbeth, 1973; Fama & French, 1992). As one might expect, the reported relationship between returns and risk is positive. According to Markese (1999), "higher returns come with higher risk" (p. 7). The most common measure of risk is standard deviation (Barber, 1994; Cloonan, 2002). Droms and Walker (1995), using standard deviation as a measure of risk, determined that equity mutual fund performance was most highly correlated with variation in annual fund returns, that is, risk.

Fund Manager Investment Style

Mutual fund manager investment style encompasses multiple management approaches. For example, almost every fund manager has the ability to determine the median market capitalization of securities held within a portfolio. Fund managers also determine the percent of stock held in comparison to cash, bonds, and other asset classes. Fund managers also use diverse investment approaches. Some, for example, apply traditional value based measures to choose fund holdings, while

others focus on momentum trading as a guide for security selection. A common benchmark used to assess a fund manager's investment style is the weighted average price-to-earnings ratio (P/E) of securities held within a portfolio. A value fund average P/E will be lower than a P/E for a growth fund. Finally, fund managers can control the amount of turnover within a portfolio. Some managers prefer a strategic asset allocation approach, which involves lower turnover, while other managers use tactical allocation approaches.

The percent of stock held within a portfolio and the level of diversification within funds has been a subject of interest to researchers. Funds that hold a larger proportion of their assets in equities should outperform funds that hold or switch to cash on a regular basis. According to Fredman (1999) and Burton (1998), diversification within a mutual fund translates into mediocre performance. At the time of his study, Burton determined that the average domestic u.s. Equity fund held at least 130 stocks. Burton suggested that investors who want to increase performance should choose funds that hold fewer securities. In the late 1990s security concentration within portfolios was a growing trend (Fredman, 1999); however, since the bear market of 2000-2003, more funds have taken a broad diversification approach. The results associated with broadening diversification are unknown.

According to Bajkowski (2001), measures such as a P/E ratio have been used by many to assess the underlying values of portfolios. "Measures such as the price-to-book value ratio help identify which stocks may be truly undervalued and neglected" (Bajkowski, p. 13). According to this assumption, value funds –those with low P/E ratios-- are expected to outperform high P/E funds. However, the literature is not supportive of this theory. For example, Daniel et al. (1997) concluded that mutual fund performance could not be evaluated solely on the basis of a fund's historical P/E, price-to-book, or market capitalization characteristics.

Portfolio turnover is another area that mutual fund managers can control. Malhotra and Mcleod (1997) concluded that top performing mutual funds are also ones with minimal levels of security turnover. However, Droms and Walker (1995) found that a fund's portfolio turnover cannot be used to predict actual over-performance in any given period.

Fund Manager Tenure

Another commonly used determinant of mutual fund performance is a fund manager's tenure running the fund. According to Markese (2000), investors should avoid mutual funds with new managers. The argument used to support this advice is that new managers need time to prove their abilities. If a new fund manager does not prove capable, he or she will be fired. One can assume that high performing funds, would be run by managers with long tenures (Golec, 1996).

Survivorship Bias Issues

According to Walker (1997), much of the past mutual fund performance literature has been plagued by misspecification of variables and other problems. The issue of survivorship bias is one such problem that is common to almost all previous research attempts in the area of mutual fund performance prediction. Rekenthaler (2003) described how survivorship bias is present in nearly all studies of mutual fund performance. According to Rekenthaler, "most investors – as well as most finance professors and money managers – use the past as a starting point for evaluating the future. But when you eliminate dead funds from the record books, you get survivorship bias – long-term results reflect the performance of only those funds that survived, making the numbers look better than they really are" (p. 51). The preponderance of published research uses data from the most recent reporting period to explain *past* performance. Previous studies take data from today to predict historical returns. The problem with this approach is that only data from those funds that survived the entire period of analysis are used to predict past performance. The performance of funds that failed, closed, or merged with another fund are lost in this type of analysis.

According to Brown, Goetzmann, Ibbotson, and Ross (1992) "high returns persist" (p. 560). This statistical anomaly exists because managers who take risks and lose have their fund performance eliminated from future industry fund averages. In layman's terms, poor performance disappears, leaving researchers only with funds that have survived. Unfortunately, this makes fund choice rules from previous studies suspect in their validity. Investors who use rules based on studies tainted with survivorship bias cannot be sure that their fund selection will lead them towards high performing funds and away from lost, terminated, or merged funds.

The best solution to avoiding survivorship bias is to account for mutual funds that have been terminated or merged over time (Jayaraman, Khorana, & Nelling, 2002). One way to do this is to use data from a starting point in the past, and use the data to predict subsequent yearly fund performance. This

procedure is complex because it requires that researchers account for funds that have changed names, been liquidated, merged, or otherwise terminated; however difficult, avoiding survivorship bias is essential when developing useful mutual fund selection tools.

Summary

Phelps and Detzel (1997) summarized the state of mutual fund performance research by stating that "it does not appear that there is a reliable strategy for selecting funds expected to have superior future performance, other than to avoid funds with high expense ratios" (p. 62). This result has been confirmed in numerous studies, more so than results for any particular variable (e.g., Burton, 1999; Dellva & Olson, 1998). The only other consistent finding to emerge from a review of the literature deals with survivorship bias. "The fact that poor performers tend to disappear can obscure the empirical estimation of the degree of persistence" (Carpenter & Lynch, 1999, p. 338). The validity of studies that fail to account for returns of merged, deleted, or disappearing funds is suspect. Based on contradictory conclusions and survivorship bias within the literature, it appears that investors' confusion regarding useful mutual fund performance predictors is well grounded.

Methodology

Data for this study were initially obtained from the January 1995 Morningstar Ondisk data file. Funds in the data file were screened to include only u.s. Domestic equity funds. A randomization process, using a random digit number code to select the first and subsequent funds, was used to select a representative sample. Approximately 275 funds were initially chosen from the full domestic equity data file. The premise of the research was that data for the funds could be used to differentiate high performing funds from lower performing funds over the course of one to eight years, and that persistence in predictor variables would be noted.

Once the 275 funds were selected and the relevant fund factor data collected for each fund was summarized, annualized rates of return were obtained from the January 2004 Morningstar Principia Pro data disk to correspond to the list of 275 mutual funds. Geometric means were generated to attain average annualized rates of return for eight yearly periods beginning January 1, 1995 and ending on December 31, 2003. Discriminant function analyses were then used to identify which funds outperformed in each time period. For the purpose of this study the funds were divided into two groups: those funds that placed in the top 30% of all funds in each period of analysis and those that did not.

Confidence Interval Test

Generalizability of findings was premised on the assumption that the randomly chosen funds used in the research represented the domestic equity universe on January 1, 1995. A generalizability test was conducted to compare confidence intervals of sample and universe means. Table 1 shows the mean and standard deviation figures for the mutual fund attributes used in this study for the sample. Means for the 1995 stock universe, from which the sample was randomly generated, are also shown. There were no statistically significant differences between sample means and universe means for the variables used in this study. As such, it was determined that the sample funds were representative of the larger stock universe at the 95% confidence level.

Fund Attrition

The confidence intervals presented in Table 1 provide a degree of assurance that the sample funds were representative of the larger equity fund universe on January 1, 1995. This allows the results from the study to be generalized to the larger fund universe. It is important to note, however, that from January 1, 1995 to December 31, 2003 hundreds of mutual funds disappeared from the Mutual Fund Universe. Some funds changed their names, others were liquidated and others merged with other funds. While matching data were available for the majority of funds from the original 1995 data file, gaps existed in the data. Steps were taken to track each fund that had missing data. In some cases funds had simply terminated business between January 1, 1995 and December 31, 2003. In these cases, returns were recorded for each available year and thereafter termination returns were recorded as zero. In cases where a fund merged with another fund the original fund's data was used until the merger date; at that point data from the surviving merged fund was retained. In several cases no fund data were available for any period. These funds were removed from the final analyses. Terminations, mergers, and missing data reduced the sample by nearly 50% by the ninth year of analysis. This level of attrition, while high, was not unexpected given similar reported attrition rates in the literature (e.g., Carpenter & Lynch, 1999).

Table 1.
Means for Sample and 1995 Mutual Fund Universe

Variables	Sample Mean	(Std. Dev.)	Universe Mean
Expense Ratio	1.35	(.81)	1.36
Front Load	1.77	(2.40)	1.69
Median Market Cap	5014	(4871)	4789
Net Assets	332	(1174)	365.12
P/E Ratio	19.83	(3.99)	19.89
Percent Stock	86.83	(15.78)	86.56
Portfolio risk--3yr.	9.83	(2.81)	9.95
Portfolio risk--10yr.	15.92	(3.48)	16.08
Turnover	72.13	(88476)	75.00
Deferred Load	.57	(1.45)	0.60

Variables
The dependent variable of interest in this study was a fund's average annualized rate of return over a one-, two-, three-, four-, five-, six-, seven-, eight-, and nine-year time period. Ten independent variables, corresponding to the original 1995 data file, were used to predict a fund's average annualized rate or return.

Expense ratio is defined as the fund's operating costs, including management fees, expressed as a percentage of the fund's average net assets for a given time period. The expense ratio used here did not include brokerage costs and various other transaction costs that may also contribute to a fund's total expenses.

Front-end load was used to account for brokerage costs associated with the purchase of a fund. *Median market capitalization*, defined as the geometric mean of the market capitalization for each stock owned within a fund's portfolio on December 31, 1994, was used to classify stocks into large-, mid-, and small-capitalization funds.

Net assets was used to represent the size of the fund. Valuation measures were also used. A fund's price-to-earning's ratio (*P/E ratio*) was used as a measure of the types of stocks owned within a fund's portfolio. Those funds with relatively lower P/E ratios were considered to be 'value' funds while those with higher P/E ratios were classified as 'growth' funds. The reported Morningstar P/E ratio was used. This ratio weights each portfolio holding by the percentage of equity assets it represents, so that larger positions have proportionately greater influence on the fund's final P/E. Other valuation measures were also examined, including a fund's price-to-book ratio, but in each case a high correlation was found. Therefore, the P/E ratio was used as the measure of a fund's investment pattern.

The *percent of stock*, compared to investments in cash and other assets, was measured using Morningstar's reported percentage of stock within the fund's portfolio. *Portfolio risk*, the volatility of the fund's returns, was measured by standard deviation. A three-year standard deviation--a statistical measurement of dispersion about a mean--represents the variability of the fund's returns over a specified period of time. Investors can use this representation of historical performance to predict the range of returns that are most likely for a particular fund. When a fund has a high standard deviation, the predicted range of performance is wide, implying greater volatility (Mayo, 2003).

Manager tenure was represented by the number of years the current manager has been the portfolio manager of the fund. It is assumed that funds being managed by someone with a long track record might outperform funds supervised by relatively new managers.

Turnover ratio is a measure of the fund's trading activity, which was determined by taking the lesser of purchases or sales (excluding all securities with maturities of less than one year) and dividing by average monthly net assets.

Deferred loads are also known as back-end sales charges and are imposed when investors redeem shares. The percentage charged generally declines the longer shares are held. This charge, often coupled with 12b-1 fees as an alternative to a traditional front-end load, tends to diminish over time (Mayo, 2003).

Method of Analysis
Discriminant analysis, using SPSS for Windows, was used for data analysis. Discriminant analysis is a form of regression that allows two or more independent variables to be used to place cases, in this case, mutual funds, into distinct categories (Vogt, 1993). In this case, funds performing in the top 30% of funds for any given period were coded 1, otherwise, zero. A discriminant analysis is appropriate when the dependent variable is measured categorically "There are some situations, however, where discriminant analysis is appropriate even if the dependent variable is not a true categorical variable. We may have a dependent variable that is of ordinal or interval measurement that we wish to use as a categorical dependent variable. In such cases, we would have to create a categorical variable." (Hair,

Anderson, Tatham, and Black, 1995, p. 194) According to Vogt, a successful discriminant analysis enables researchers to predict group membership, based on this categorical grouping. Discriminant analysis is useful as a multivariate analysis method when the possibility of one or more interactions may be present in the data. A successful discriminant analysis allows one to "compare the relative importance of each of the predictor variables" (p. 71). For this study, discriminant analysis was used to predict which funds would be in the top 30% for each of the nine periods using the ten explanatory variables described above.

Findings

Data in Table 2 are useful in describing differences between funds that placed in the top 30% of all funds for each period and those that did not. The mean and standard deviation associated with each predictor variable, for each period, are shown. For example, in 1995 the expense ratio for funds in the top 30% was .93%. Funds that did not make the top 30% in terms of performance had an expense ratio of 1.29%. The difference in mean scores was significantly different at a $p < .01$ level of significance as indicated by the single asterisk. This means that top performing funds had a significantly lower overall expense ratio for the 1995 period. Table 2 provides similar results for each subsequent period.

While data in Table 2 are useful in determining relationships between the independent variables and fund performance --that is, performing in the top 30% of funds for any given period-- the data do not provide predictive power. Mutual fund investors are not only interested in patterns within a time period, they are also interested in the predictive power of a variable. It is not enough to know that a significant difference exists between funds based on, for example, expense ratios. It is more important to know if expense ratios are among the best predictors of over- or under-performance.

Table 3 provides insight into the predictive power of the independent variables. The data presented are within group structured coefficients. "The idea behind the use of structured coefficients is that the variables that share the most variation with a given linear discriminant function should define what attribute the linear discriminant function represents" (Huberty, p. 209). The importance of each variable in predicting over- or under-performance can be judged by the size of the coefficient. The sign preceding the coefficients can be disregarded when evaluating pooled within-group coefficients. For the purpose of determining statistical significance, the conventional cutoff score is between .35 and .40. Scores below this threshold offer less discriminating ability. A summary of results for each of the nine periods is presented in Table 3. Coefficients in bold are those that predict over-performance, that is, performance in the top 30%, during the period.

One-Year Analysis (1995)

During 1995 funds that performed in the top 30% were similar in terms of expense ratios and median market capitalizations. Median market capitalization was the most useful factor when determining if a fund performed in the top 30% within the first of nine years of a buy-and-hold strategy. Funds that performed within the top 30% held stocks with much higher market capitalizations than others. The average expense ratio for over-performing funds was .93 with a standard deviation of .37. This is relatively low compared to the mean for funds that did not perform in the top 30%. Under-performing funds had a mean expense ratio of 1.29 with a standard deviation of .59. Other important predictors of over-performance included percent of stock within the portfolio and portfolio risk. Funds that held more stock and ones with more volatility tended to outperform other funds.

Two-Year Analysis (1995 – 1996)

Two variables, in particular, were found to be significant predictors of over-performance over the two-year annualized time period. Expense ratios and market capitalization were both significant, with the relationships being similar to the one-year analysis. A fund's percentage of stock ownership was also found to be significant, with funds in the over-performance category holding a higher percentage of stock within the portfolio.

Three-Year Analysis (1995 – 1997)

Four of the ten variables turned out to be significant in predicting mutual funds that performed in the top 30% on a three-year annualized basis. Listed in order of significance, these variables include median market capitalization, P/E ratio, expense ratio, and percent of stock within the portfolio. As was the case in the preceding analyses, large funds and those with lower expenses ratios tended to outperform other funds. Value funds – those with lower P/E ratios – were also more likely to outperform over the three-year period.

Table 2.
Univariate Tests of Difference in Predictor Variables

One-Year Average 1995

	In top 30%		Not in top 30%	
Variable	Mean	(Std. Dev)	Mean	(Std. Dev)
Expense ratio*	.93	(0.37)	1.29	(0.58)
Front load	1.96	(2.50)	2.13	(2.55)
Market cap**	7685	(4089)	4157	(6095)
Net assets*	1308	(844)	474	(3063)
P/E ratio	19.92	(4.30)	19.71	(3.47)
Percent stock*	91.58	(8.73)	82.96	(17.94)
Portfolio risk*	10.64	(3.11)	9.30	(2.27)
Tenure	5.96	(7.15)	6.27	(6.08)
Turnover	68.73	(52.43)	62.96	(48.39)
Deferred load	0.13	(0.73)	0.38	(1.22)

Two-Year Average 1995-1996

	In top 30%		Not in top 30%	
Variable	Mean	(Std. Dev)	Mean	(Std. Dev)
Expense ratio**	1.00	(0.39)	1.38	(0.61)
Front load	1.89	(2.39)	2.34	(2.60)
Market cap**	7446	(5995)	4175	(4517)
Net assets	829	(2237)	489	(1230)
P/E ratio	19.04	(3.44)	19.99	(4.14)
Percent stock*	90.19	(9.79)	83.34	(18.66)
Portfolio risk	9.68	(2.56)	9.90	(2.93)
Tenure	5.40	(6.34)	6.18	(5.87)
Turnover	62.04	(44.49)	75.84	(62.54)
Deferred load	0.19	(0.86)	0.42	(1.30)

Three-Year Average 1995-1997

	In top 30%		Not in top 30%	
Variable	Mean	(Std. Dev)	Mean	(Std. Dev)
Expense ratio**	1.04	(0.43)	1.37	(0.61)
Front load	2.19	(2.48)	2.21	(2.58)
Market cap**	7613	(5525)	4029	(4667)
Net assets	903	(2271)	448	(1157)
P/E ratio**	18.16	(2.64)	20.41	(4.26)
Percent stock*	90.37	(9.98)	83.11	(18.70)
Portfolio risk	9.21	(2.22)	10.12	(3.02)
Tenure	5.04	(5.19)	6.36	(6.32)
Turnover	58.86	(44.26)	77.61	(62.51)
Deferred load	0.20	(0.85)	0.42	(1.31)

Four-Year Average 1995-1998

	In top 30%		Not in top 30%	
Variable	Mean	(Std. Dev)	Mean	(Std. Dev)
Expense ratio**	1.00	(0.41)	1.38	(0.60)
Front load	2.52	(2.55)	2.07	(2.54)
Market cap**	8497	(5124)	3769	(4597)
Net assets**	1210	(2732)	333	(583)
P/E ratio	19.06	(3.45)	19.97	(4.13)
Percent stock	90.07	(9.94)	83.46	(18.59)
Portfolio risk	9.44	(2.52)	10.00	(2.93)
Tenure	4.82	(5.53)	6.41	(6.15)
Turnover	67.78	(51.97)	73.30	(60.35)
Deferred load	0.21	(0.88)	0.40	(1.29)

Five-Year Average 1995-1999

	In top 30%		Not in top 30%	
Variable	Mean	(Std. Dev)	Mean	(Std. Dev)
Expense ratio*	1.07	(0.43)	1.34	(0.61)
Front load	1.76	(2.44)	2.38	(2.57)
Market cap**	7829	(5876)	4124	(4549)
Net assets	625	(1619)	579	(1602)
P/E ratio	20.44	(3.78)	19.41	(4.00)
Percent stock	87.70	(17.04)	84.51	(16.64)
Portfolio risk	10.24	(2.83)	9.68	(2.81)
Tenure	4.66	(6.54)	6.45	(5.73)
Turnover	68.58	(51.93)	72.88	(60.23)
Deferred load	0.33	(1.08)	0.36	(1.23)

Six-Year Average 1995-2000

	In top 30%		Not in top 30%	
Variable	Mean	(Std. Dev)	Mean	(Std. Dev)
Expense ratio**	1.05	(0.43)	1.37	(0.61)
Front load	2.36	(2.57)	2.12	(2.53)
Market cap**	7386	(5363)	4064	(4791)
Net assets*	1045	(2559)	367	(699)
P/E ratio	19.68	(3.95)	19.71	(3.98)
Percent stock*	189.88	(10.41)	83.19	(18.79)
Portfolio risk	9.96	(2.71)	9.77	(2.88)
Tenure	4.65	(5.17)	6.59	(6.30)
Turnover	70.21	(52.13)	72.39	(60.77)
Deferred load	0.28	(1.00)	0.38	(1.27)

Seven-Year Average 1995-2001

	In top 30%		Not in top 30%	
Variable	Mean	(Std. Dev)	Mean	(Std. Dev)
Expense ratio**	1.01	(0.61)	1.37	(0.61)
Front load	2.19	(2.59)	2.21	(2.53)
Market cap**	6988	(6072)	4340	(4628)
Net asset	831	(2301)	492	(1196)
P/E ratio*	18.65	(3.22)	20.14	(4.16)
Percent stock*	90.20	(10.44)	83.40	(18.45)
Portfolio risk	9.50	(2.37)	9.98	(2.98)
Tenure	4.95	(3.87)	6.36	(6.67)
Turnover*	54.63	(45.64)	78.80	(61.08)
Deferred load	0.12	(0.64)	0.44	(1.34)

Eight-Year Average 1995-2002

	In top 30%		Not in top 30%	
Variable	Mean	(Std. Dev)	Mean	(Std. Dev)
Expense ratio**	1.06	(0.46)	1.36	(0.61)
Front load	2.01	(2.51)	2.30	(2.57)
Market cap	5812	(5882)	4842	(4845)
Net asset	800.43	(2171)	488.36	(1228)
P/E ratio*	18.67	(3.11)	20.21	(4.23)
Percent stock	88.88	(11.76)	83.69	(18.56)
Portfolio risk	9.53	(2.42)	9.99	(3.00)
Tenure	5.15	(3.83)	6.34	(6.81)
Turnover**	53.45	(46.69)	80.68	(60.90)
Deferred load	0.17	(0.82)	0.44	(1.33)

Nine-Year Average (1995-2003)

	In top 30%		Not in top 30%	
Variable	Mean	(Std. Dev)	Mean	(Std. Dev)
Expense ratio*	1.10	(0.45)	1.34	(0.61)
Front load	2.00	(2.50)	2.31	(2.57)
Market cap	5445	(6201)	4967	(4727)
Net asset	765	(2269)	523	(1233)
P/E ratio*	18.59	(3.22)	20.19	(4.16)
Percent stock	89.57	(10.79)	83.60	(18.55)
Portfolio risk	9.70	(2.29)	9.91	(3.03)
Tenure	4.92	(3.60)	6.42	(6.75)
Turnover*	57.26	(48.51)	78.37	(60.53)
Deferred load	0.09	(0.63)	0.46	(1.35)

T-tests of means statistically significant at **$p<.01$ *$p<.05$

Table 3.
Pooled Within-Group Correlations

Variable	One-Year	Two-Year	Three-Year	Four-Year	Five-Year	Six-Year	Seven-Year	Eight-Year	Nine-Year
Expense Ratio	**-0.42**	**0.63**	**0.46**	**-0.46**	**-0.40**	**-0.50**	**0.59**	**0.58**	**0.45**
Front Load	-0.04	0.16	0.01	0.11	-0.20	0.08	0.01	0.12	0.13
Median Market Cap	**0.48**	**-0.60**	**-0.57**	**0.66**	**0.62**	**0.59**	**-0.47**	-0.20	-0.09
Net Assets	0.30	-0.19	-0.22	**0.37**	0.02	**0.38**	-0.19	-0.21	-0.16
P/E Ratio	0.03	0.22	**0.46**	-0.15	0.21	-0.01	**0.35**	**0.42**	**0.43**
Percent Stock	0.34	**-0.38**	**-0.35**	0.26	0.15	**0.36**	**-0.38**	-0.33	-0.38
Portfolio risk	0.34	0.07	0.25	-0.13	0.16	0.05	0.15	0.17	0.08
Tenure	-0.03	0.12	0.17	-0.17	-0.24	-0.29	0.22	0.21	0.26
Turnover	0.07	0.22	0.26	-0.06	-0.06	-0.03	**0.39**	**0.52**	**0.39**
Deferred load	-0.14	0.18	0.14	-0.10	-0.01	-0.07	0.25	0.24	0.33

Coefficients in **bold** are those that predict over-performance during the period.

A lower P/E ratio meant that funds performing in the top 30% were often investing in companies that were relatively undervalued. The amount of stock, compared to cash and other assets held within a portfolio was also useful in differentiating between funds. Those that held more stock tended to outperform over the three-year period.

Four-Year Analysis (1995 – 1998)
Three of the ten variables were significant in the four-year annualized period. Appearing in order of importance the variables were median market capitalization, expense ratio, and net assets. As might be expected during the late 1990s, funds that held large capitalization stocks tended to outperform. Funds with low expense ratios also outperformed other funds. Large funds, or those with high net asset levels, also outperformed during this four-year period. This finding was consistent with results presented by Zera and Madura (2001) who found an interaction between fund size and expense ratios. They found that larger funds were more efficient than small funds, and as such, expense ratios tended to be lower, resulting in excess performance.

Five-Year Analysis (1995 – 1999)
The variables that proved to be significant in predicting five-year annualized over-performance included median market capitalization and expense ratios. The median market capitalization difference between the top 30% performing funds and the underperformers remained large: $7,829 million versus $4,124 million. Funds with lower expense ratios also, as might be expected, tended to outperform other funds during this period.

Six-Year Analysis (1995 – 2000)
The six-year analysis marked a climax point for the last 20th century bull market. Over this six-year period four variables were effective predictors of funds landing in the top 30%. These variables included median market capitalization, expense ratios, net assets, and percent of stock within a portfolio. Over this time period large company funds dominated small company funds. Lower expense ratios were also found to predict over-performance. Funds with a large asset base and those that stayed heavily invested in stocks during the period also outperformed other funds.

Seven-Year Analysis (1995 – 2001)
The seven-year analysis included fund results from the first year of a cyclical bear market. However, funds that tended to outperform over the seven-year annualized basis shared several similar, and not surprising, characteristics. Low expense funds and those that invested in large capitalization stocks managed to outperform other funds. Funds with lower portfolio turnover, higher proportions of assets invested in stock, and those with lower P/E ratios also tended to outperform.

Eight-Year Analysis (1995 – 2002)
The eight-year annualized return analysis indicated that funds purchased on January 1, 1995 that had lower than average expense ratios, lower portfolio turnover rates, and those that invested in lower P/E ratio stocks tended to outperform all other funds. Over the eight-year period investing in low cost value oriented funds led to over-performance. Expense ratios persisted over the period as the most effective determinant of fund over-performance.

Nine-Year Analysis (1995 – 2003)
Three variables used in the nine-year analysis proved to be significant when predicting mutual fund over-performance: expense ratio, P/E ratio, and portfolio turnover. Outperforming funds over the period tended to have lower overall expense ratios. This result was consistent over all periods of analysis. Funds using a value rather than a growth strategy, as represented by lower P/E ratios, also out-performed

in the period. Funds that exhibited lower overall portfolio turnover initially tended to out-perform in the period. Results from the nine-year analysis mirrored those of the eight-year analysis.

Results and Discussion

The question addressed in this analysis is how an investor should choose mutual funds using a buy-and-hold strategy if only past performance data are available. This is a relevant question because this is what investors are told to do on a regular basis; that is, choose funds for the future using past performance data as a guide to future returns.

The results from this study provide useful insights into answering the question posed above. Results presented in this paper were premised on several assumptions. First, only existing data available on January 1, 1995 could be used to choose funds, with the further assumption that actual future returns would remain unknown. Second, no changes in the fund universe were allowed over the nine-year period, and third, funds that terminated or merged would be accounted for in each analysis. This last point is of special interest. Working under this assumption, steps were taken to reduce the effects of survivorship bias by systematically tracking all fund mergers, fund liquidations, and other lost data.

Table 4 shows that if an investor had chosen funds using any combination of the ten independent variables used in the analyses on January 1, 1995 only a few factors consistently led to the choice of funds that fell into the top 30th percentile category over the nine-year period. Expense ratio was the only variable found to be a significant predictor of over-performance in each of the nine periods. In every case, lower expenses resulted in high performance. This finding is consistent with the literature (Elton et al., 1996; Gunn, 1996; Hooks, 1996; Malhotra & McLeod, 1997; Walker, 1997). Below average expense ratios led to top 30% results. This finding has significant implications for investors and financial planners. Funds that outperformed in the sample were consistently those with lower than average expense ratios. This persistence in returns held true during the stock market pre-bubble stage (1995 through 1998), the irrational exuberance stage (1999 through 2000, the cyclical bear market stage (2000 through 2002), and the significant market upturn of 2003. The finding related to expense ratios supports the conclusion of Dellva and Olson (1998) who stated, "Funds with superior performance, on average, also have lower expense ratios" (p. 100). Although past performance is no guarantee of future returns, it is reasonable to assume that this trend may continue into the future (Carpenter & Lynch, 1999).

Table 4.
Best Determinants of Mutual Fund Over Performance As Measured by Pooled With-In Group Correlations (ranked by importance with 1 = best)

Variables	One-Year	Two-Year	Three-Year	Four-Year	Five-Year	Six-Year	Seven-Year	Eight-Year	Nine-Year
Expense Ratio	2	1	3	2	2	2	1	1	1
Front Load									
Median Market Cap	1	2	1	1	1	1	2		
Net Assets				3		3			
P/E Ratio			2				5	3	2
Percent Stock	3	3	4			4	4		
Portfolio risk	4								
Tenure									
Turnover							3	2	3
Deferred load									

During seven of nine periods a fund's median market capitalization was useful in predicting over-performance. Large capitalization funds, as originally defined in 1995, outperformed small capitalization funds, on average. This finding mirrors the results of the last bull market where investors were attracted to large stocks. The fact that large capitalization stocks fell out of vogue during the first two years of the 2000-2002 bear market may be one reason this factor was not useful in predicting eight-year annualized returns, but more useful in predicting returns over the full nine year period.

Over-performance was not generally associated with the amount of risk taken by a fund manager. Only in the one-year analysis did portfolio risk, as measured by standard deviation, predict fund over-performance. The percent of stock held within a portfolio was found to be a predictor of over-performance, though not consistently. Funds that held more stock tended to outperform other funds. It appears, from these results, that market timing between stocks and cash was not a useful way to

reach the top 30% of all equity funds during the nine-year period of analysis.

Value funds -- those with lower P/E ratios -- showed some tendency to outperform growth funds, especially over the three-, seven-, and eight-year periods. Large funds also were more likely than other funds to outperform over certain periods. This finding may be the result of investors identifying good funds and adding assets to these funds. In other words, good funds tend to attract and retain assets. Over the seven-, eight-, and nine-year annualized period portfolio turnover showed predictive signs of over-performance. Those funds with lower turnover tended to outperform other funds. As was the case with expense ratios and mutual fund size, a possible interaction effect may exist between portfolio turnover and expense ratio, with low turnover funds exhibiting a low overall expense ratio.

Summary

Investors are faced with a dilemma; they are told that past performance is no guarantee of future returns, but simultaneously told to choose mutual funds using primarily past performance data. Most analyses of mutual fund past performance are suspect because funds that have been terminated or merged, are not included in the analyses; it is these terminated and merged funds that tend to have the worst performance record. This limitation, survivorship bias, has been reduced in this study. Therefore the results have greater validity in differentiating top performing funds from other funds. While it is important to note that the period from January 1, 1995 to December 31, 2003 was unique in the history of the U.S. stock market, this period does provide an excellent dataset for examining fund performance in a traditional bull market, a bubble bull market, a cyclical bear market environment, and a market recovery. Over the course of this market cycle one fund characteristic consistently led an investors to choose funds that would outperform in every period. Expense ratios turned out to be the best predictor of a fund's over- or under-performance. Based on this finding, investors are encouraged to choose funds based, in part, upon the fund's expense ratio. The lower the expense ratio the better.

Results from this study suggest that mutual fund performance may be persistent to some extent. Droms and Walker (2001) concluded that funds show a strong short-term persistence in returns, but that after a few years persistence in returns falls off. Findings from this study suggest that returns were most persistent over one, two, three, four, five, six, and seven year annualized return periods. Funds that outperformed during these periods tended to have lower overall expense ratios and larger market capitalizations. Persistence became less stable at the eight and nine year annualized periods. Expense ratios remained consistent as a predictor of over-performance, while other factors, such as portfolio turnover and P/E ratio, showed varying effects.

While the results from this study provide insight into fund performance characteristics it is important to note that the results are based on a random sample of funds from 1995. Results may have differed had a different set of funds been used. Findings might have also differed had the entire dataset of domestic funds been analyzed. Investors, financial planners, and researchers are encouraged to track future performance of mutual funds to determine if factors such as expense ratios, portfolio turnover, net assets, and median market capitalization continue to predict over- or under-performance in the future. Until further research is conducted on this topic, investors should remember the advice of Phelps and Detzel (1997) who declared "it does not appear that there is a reliable strategy for selecting funds expected to have superior future performance, other than to avoid funds with high expense ratios" (p. 62).

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