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Returns from Investing in Equity Mutual Funds 1971 to 1991

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ABSTRACT

Several recent studies suggest that equity mutual fund managers achieve superior returns and that considerable persistence in performance exists. This study utilizes a unique data set including returns from all equity mutual funds existing each year. These data enable us more precisely to examine performance and the extent of survivorship bias. In the aggregate, funds have underperformed benchmark portfolios both after management expenses and even gross of expenses. Survivorship bias appears to be more important than other studies have estimated. Moreover, while considerable performance persistence existed during the 1970s, there was no consistency in fund returns during the 1980s.

THE ACADEMIC VIEW OF the pricing of securities has become considerably more complicated over the past decade. By the early 1970s, the efficient market hypothesis became the accepted paradigm in the academy. The history of past stock prices appeared to provide no helpful information in predicting future price movements. Moreover, securities' prices appeared to incorporate all fundamental information so rapidly and efficiently that an uninformed investor, buying at the current tableau of prices, could earn returns equivalent to those available to the experts. In short, markets were proclaimed to be remarkably efficient.

By the early 1980s, however, several cracks appeared in the efficient market edifice. Returns from stocks from period to period were not independent: they were positively correlated over short time spans and negatively correlated when measured over longer periods.[1] Also, various seasonal and day-of-the-week patterns were isolated. Moreover, there appeared to be a considerable degree of predictability of stock returns on the basis of certain fundamental variables, such as initial dividend yields, market capitalization (size), price-earnings ratios, and price-to-book-value ratios.[2] Of course, return predictability need not imply inefficiency of equity markets. Time-series tests of return predictability may reflect rational variation through time in ex-

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[1]Earlier work suggests that serial correlation coefficients for stock returns were close to zero. See, for example, Kendall (1953), Osborne (1959), Alexander (1961), and Moore (1964).

[2]See Fama (1991), Fama and French (1992), and Fluck, Malkiel, and Quandt (1993) for a review of the literature on return predictability.

pected returns. Moreover, most tests of efficiency are necessarily joint tests of the particular predictable pattern being tested and the asset pricing model that is accepted. Nevertheless, the apparent robustness of certain predictable patterns has led to a view that our 1970s belief in the simplistic efficient-markets constant-returns model was unwarranted. As Eugene Fama (the author of a very influential 1970s survey on the efficient market hypothesis) began his more ambiguous 1991 sequel, "Sequels are rarely as good as the originals."

Along with recent empirical work on securities' prices, the profession's view regarding the returns available from professionally managed mutual funds has undergone a similar change. In a classic article, Jensen (1968) concluded that the performance of mutual funds (after expenses) was actually *inferior* to the performance of randomly selected portfolios with equivalent risk over the period 1945 through 1964.[3] Before expenses, Jensen found that mutual funds scatter randomly about the market line of the capital asset pricing model and concluded that mutual fund managers do not appear to possess useful private information.

Studies from the 1980s, however, have come to somewhat different conclusions. Henriksson (1984) and Chang and Lewellen (1984) found that during the 1970s, net returns to fund investors before load fees lie along the Sharpe-Lintner market line. These studies imply that fund managers have access to enough private information to offset their expenses. Ippolito (1989), covering the period 1965 through 1984, found that returns before loads, but net of other expenses, actually are slightly *above* the Capital Asset Pricing Model (CAPM) market line, although this result may depend on the particular benchmark employed. Moreover, two papers completed in the 1990s claim to have isolated a "hot hand" phenomenon. Hendricks, Patel, and Zeckhauser (1993) and Goetzmann and Ibbotson (1994) argue that past mutual fund returns predict future returns. This result is inconsistent with the earlier findings of Jensen (1968) and suggests that investors could earn significant excess (risk-adjusted) returns by purchasing recently good-performing funds.[4]

This study analyzes mutual-fund returns during 1971 through 1991 and utilizes a unique data set including returns from all mutual funds existing each year. The first section of the article discusses the dataset we have employed and contrasts it with mutual-fund data sets commonly employed. Our data enable us to examine more precisely how mutual funds perform relative to various benchmarks and to estimate the extent of survivorship bias. We find that survivorship bias is considerably more important than

[3] Similar results were reported by Treynor (1965) and Sharpe (1966).

[4] If persistence is driven by consistent poor performance, investors would not be able to earn excess returns unless they could sell a fund short. Moreover, if positive persistence is influenced by survivorship bias (as will be indicated below), selection of funds by past superior performance will not necessarily produce superior results. Superior performing funds in one period may simply have taken very risky bets and won. If the bets fail in the next period, the fund may go out of business and, thus, leave the sample. If the bets continue to be successful, the fund will survive. The problem is that, ex ante, the investor does not know which funds will survive.

previous studies have suggested, and we attempt to measure the specific amount of the bias.

In Section I, we describe the data set employed and argue that certain practices in the mutual fund industry make it likely that survivorship bias is important. In Section II, we look closely at the performance of the universe of equity mutual funds. This study tends to confirm the original Jensen conclusion that mutual fund managers do not outperform the market in general. In Section III, we examine the issue of whether a "hot hand" phenomenon exists. We find evidence of predictability of mutual fund returns from period to period, especially during the 1970s. The relationships do not appear to be robust, however. The persistency breaks down considerably during the 1980s, especially later in the decade, a period not included in earlier studies. In Section IV, we then simulate investment strategies designed to exploit the persistency relationships suggested in the literature. We find that, *ex post*, mutual-fund investment strategies existed that would have produced large excess returns during the 1970s. The strategy failed to work during the 1980s, however, producing somewhat inferior returns in that decade. The excess returns during the 1970s were sufficiently large to make persistence strategies effective over the whole 20-year period. Nevertheless, we conclude that we have been unable to fashion a *dependable* strategy by which an investor can *consistently* achieve excess returns over long periods of time. In Section V, the study examines the relationship between returns and expenses. We ask whether mutual funds earn gross excess returns sufficient to cover their expense ratios. We also analyze the relationship between returns and advisory and nonadvisory expenses. A concluding section then summarizes the results.

I. Survivorship Bias and the Data Set Employed

Commonly employed data sets of mutual fund returns typically show the past records of all funds *currently* in existence. Clearly, today's investors are not interested in the records of funds that no longer exist. This creates the possibility of significant biases in the return figures calculated from most of the data sets employed in the literature. A mutual fund that accepts very high risk will have a high probability of failure. If, however, that fund survives, this implies that the fund took a large bet and won. High returns will tend to persist, since funds whose bets were unsuccessful will tend to drop out of the sample. As long as currently employed estimates, such as the CAPM Beta, fail to adequately measure risk, we may be unable to correct for risk appropriately.

Mutual funds that have taken bets against the market that proved to be unsuccessful do not tend to survive. It is extremely difficult to sell a mutual fund to the public that has a poor record. Mutual fund complexes (that run large numbers of funds) will typically allow the fund to suffer a painless death by merging the fund into one of the more successful funds in the complex, thereby burying the fund's bad record with it. Thus, there will be a

tendency for only the more successful funds to survive, and measures of the returns of such funds will tend to overstate the success of mutual fund management.[5]

Another little known factor in the behavior of mutual fund management companies also leads to the conclusion that survivorship bias may be considerably more severe than for the stock market in general. A number of mutual fund management complexes employ the practice of starting a number of "incubator" funds. A complex may start ten small new equity funds with different inhouse managers and wait to see which ones are successful. Suppose after a few years only three funds produce total returns better than the broad market averages. The complex begins to market those successful funds aggressively, dropping the other seven and, thus, burying their records. The full records from inception of the successful funds will be the only ones to appear in the usual publications of mutual fund returns.

In order to employ a sample that could allow a clear analysis of the survivorship problem, Lipper Analytic Services provided us with the records of *all* equity mutual funds that were in existence during the 21-year period from 1971 through 1991. Thus, a fund which existed, say, for the 5-year period 1971 to 1975, would be included in the sample for those years in which it existed. We chose for analysis *all* general equity funds sold to the public during any time within the years covered. Excluded from the analysis were funds investing in foreign securities and so-called sector-funds investing in one particular industry, such as gold stocks, pharmaceutical stocks, etc. Thus, every diversified equity mutual fund sold to the public was included in the analysis. The return series provided by Lipper were quarterly total returns. In calculating returns, Lipper assumes that all dividends and capital gains distributions are reinvested on the ex-dividend date at the ex-dividend net asset value. Thus, the quarterly returns are calculated as the change in the total value of the fund for an investor reinvesting all distributions, expressed as a percentage of the beginning of quarter asset value.

Table I presents some estimates of survivorship bias over the 1982 to 1991 period.[6] The middle column presents the average annual returns of all general equity funds (net of expenses) that existed continuously from 1982 through 1991. This is the sample one would obtain from the normal data sources if one asked what was the average annual return for all general equity funds existing on January 1, 1992 that had at least a 10-year record. At the bottom of the table, we find that the (size-weighted) average annual return for the 10-year period was 17.09 percent for all continuously existing general equity funds versus 17.52 percent return for the S&P 500 Stock Index.[7] Both the mutual fund return data and the stock market data are total

[5]Moreover, Brown *et al.* (1992) show that censorship by survivorship can give rise to "a substantial probability that statistical tests based on risk adjusted return data will give rise to the false inference that there is, in fact, dependence in security returns."

[6]We concentrate on the 1982 to 1991 period because expense ratio data are available for this period. In footnote 8 we present data for a longer period going back into the 1970s.

[7]These data would suggest that surviving funds came close to matching the broad stock indexes and that the pre-expense returns of surviving funds (adding back expenses which average about 100 basis points) exceeded the S&P 500 Stock Index.

Table I

Some Estimates of Survivorship Bias

This table compares the average annual returns from 1982 through 1991 of all mutual funds in existence each year with the returns for all funds that survived for 10 years.

	All Mutual Funds in Existence Each Year (%)	Funds in Existence in 1982 the Survived Through 1994 (%)	S&P 500 Index (%)	All Mutual Funds in Existence Each Year Gross of Expenses
Capital appreciation funds	16.32	18.08	17.52	17.49
Growth funds	15.81	17.89	17.52	16.81
Small company growth funds	13.46	14.03	17.52	14.53
Growth and income funds	15.97	16.41	17.52	16.89
Equity income funds	15.66	16.90	17.52	16.53
All general equity mutual funds	15.69	17.09	17.52	16.70

returns including dividends and capital changes. The rows above show the returns by various categories of funds, where the funds are sorted by the announced objectives of the portfolio managers.

The first column of the table shows the average returns for *all* general equity mutual funds in existence in every year during the 10-year period irrespective of whether the fund survived through 1991 or not. In this calculation, we dropped funds that existed for only a partial year, but included every fund that was in existence for the entire year even if it ceased operations at some later time. We find that the dollar weighted average return for all funds, including those that were liquidated during the period, was only 15.69 percent, 150 basis points *less* then the average of surviving funds and substantially below the returns from the S&P index.[8] The last column of Table I adds the average expenses reported by each fund to the net return in order to obtain the funds' gross investment return before expenses. In this calculation, we ignore any load charges incurred by the buyers of the fund. We find that even the gross return before expenses for the universe of funds in existence each year fails to match the broad Standard & Poor's stock market index. There are enough transactions expenses incurred by the funds (that are not recorded in the funds' reported expense ratios) or enough poorly performing non-S&P stocks in fund portfolios to make even their gross returns lower than the market index.

Table II presents statistical tests for survivorship bias taking a somewhat

[8]The differences are even more dramatic for the 15-year period ending December 31, 1991. The average return for equity funds surviving over the whole 15-year period was 18.7 percent per annum. The average yearly return for *all* funds including nonsurvivors was only 14.5 percent.

Table II

Differences in Rates of Return of Surviving and Nonsurviving Funds

This table compares the rates of return for surviving funds with those of nonsurviving funds.

	Total Funds in Existence		Total Number of Funds Surviving Until 1992		Funds that Did Not Survive Until 1992			*T*-test for Difference Between Means of Surviving and Nonsurviving Funds
Year	Mean Return	Number	Mean Return	Number	Mean Return	Number	Mortality Rate	
1982	25.03	331	26.03	272	20.42	59	17.8	3.09
1983	20.23	353	21.66	296	12.80	57	16.1	7.15
1984	−2.08	395	−1.25	331	−6.39	64	16.2	3.67
1985	27.17	431	28.10	371	21.42	60	13.9	5.77
1986	13.39	511	14.39	425	8.45	86	16.8	6.29
1987	0.47	581	0.92	489	−1.91	92	15.8	3.04
1988	14.44	686	15.48	586	8.35	100	14.6	7.54
1989	23.99	720	24.91	639	16.73	81	11.3	7.57
1990	−6.27	724	−6.00	685	−11.07	39	5.4	4.07

different cut at the data. Here we calculate the mean return for all funds in existence each year from 1982 through 1990. We then compare the mean yearly returns from funds that survived until 1992 with those funds that did not survive. In this table, mortality for a 1982 fund means that the fund ceased operations sometime between 1983 and 1992. As expected, the differences in the means are substantial. In each year, the mean return of the surviving funds is substantially (and statistically significantly) greater than the mean for the nonsurvivors. We also note that mortality rates for funds are quite large, although naturally they decline over time as the year analyzed gets closer to the final year. We conclude that analyses that systematically exclude nonsurviving funds will significantly overstate the returns received by mutual fund investors. This finding suggests that previous researchers, such as Grinblatt and Titman (1989), have underestimated the magnitude of survivorship bias by claiming that the bias is relatively small.

Grinblatt and Titman's results differ from those reported here in two respects. First, they find evidence of excess (gross) returns among mutual fund managers. Second, they estimate that the amount of survivorship bias is quite modest (between 0.1 and 0.4 percent per year). Grinblatt and Titman's finding of abnormal returns depends heavily, however, on their method for the measurement of gross returns. What they do is to calculate *hypothetical* returns for the equity portion of the portfolios of mutual funds assuming that the funds' quarterly reported portfolios were held throughout the period. They estimate returns from the portfolio by using returns from the Center for Research in Security Prices (CRSP) tapes for each of the individual stocks

owned rather than calculating actual portfolio returns. The difference between the calculated returns (which they take to be the gross returns) and the actual portfolio returns are assumed to reflect transactions costs. The returns measured by Grinblatt and Titman are, thus, not returns that are actually achieved by active managers. In contrast, here we measure actual returns for the entire fund portfolio.

II. A Closer Look at Performance

The preceding section showed that it is possible to generate performance figures for equity mutual funds that approximate, or exceed, the S&P market index only if we employ a sample of funds that has been censored by survivorship. In this section, we further expand on those results and examine the record of mutual fund returns in the context of the CAPM.

For all funds in continuous existence during the 1971 to 1991 period, it is possible to calculate the funds' α measure of excess performance through the familiar CAPM model. Letting R_{Fd}, R_{MKT}, and R_F stand for the funds, the market, and the risk-free return, we can write:

$$R_{Fd} - R_F = \alpha + \beta(R_{MKT} - R_F) + \epsilon_{Fd}.$$

Positive αs imply positive risk-adjusted performance. In this calculation, we use quarterly returns for the funds and for the market benchmark. The risk-free rate is taken to be the three-month Treasury bill rate as reported by Ibbotson Associates. The distribution of αs for all general equity funds with continuous 20-year records is shown in Figure 1. The mean α is -0.06

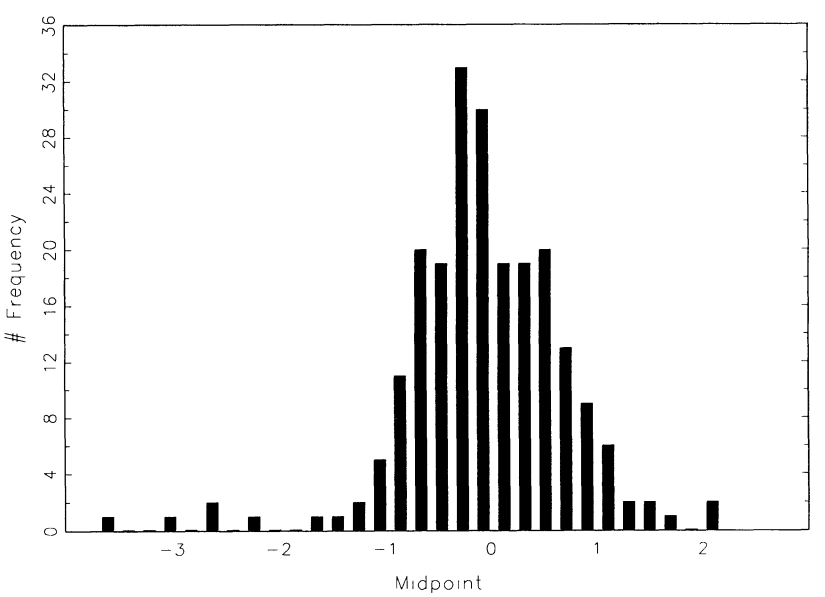

Figure 1. Estimates of Individual Mutual-Fund Alphas 1972 to 1991. The frequency distribution of estimated alphas for all equity mutual funds with 10-year continuous records.

percent but its t-ratio is only -0.21, so it is indistinguishable from zero.[9] While this result implies that even surviving funds do not produce excess returns for investors after expenses, it does correspond to recent findings in the literature that general equity mutual funds may at least earn sufficient excess gross to cover their expenses. Looking at the individual fund αs, we can reject the hypothesis that all the αs are jointly equal to zero.[10] However, the number of αs that are positive and significant, and those that are significantly negative, are approximately equal (23 positive and 26 negative).

Analyzing the 10-year 1982 to 1991 records of all funds with continuous records, we obtain somewhat similar results. Since expense rate data are available during this period for all funds, we are able to calculate αs both net of expenses and with all expenses (not including load charges) added back. The results are shown in Table III. Panel A of the table uses the Wilshire 5000 Stock Index as a benchmark. We note the average α is negative when we use net returns and positive when gross returns are used, but neither is significantly different from zero.[11] Few of the individual αs are significant but of those that are, there are more negative and significant αs than

[9]These calculations used the S&P 500 as a market benchmark. Similar results were obtained using the Wilshire 5000 and the average general equity mutual fund as benchmarks. For example, the mean α using the Wilshire 5000 benchmark is -0.02 ($t = -0.13$). T-ratios are defined in note 11.

[10]Under the Seemingly Unrelated Regression (SUR) framework, or multivariate regression framework, we can construct an F-type test to test the hypothesis of all the αs being jointly equal to zero. This can be done by first stacking up the single equations for all the N funds as suggested by Greene (1990; pp. 511–514). The statistic analogous to the F-ratio in multiple regression analysis can be constructed as

$$\hat{F} = \frac{1}{N}(R\hat{\beta})'[RVar(\hat{\beta})R']^{-1}(R\hat{\beta}),$$

where N is the number of funds, $\hat{\beta}$ is a vector of the stacked up coefficients of α and β for all N funds, and R is the $2N$ by N restriction matrix to test the restriction $R\beta = 0$. $\hat{F}$ is asymptotically distributed as $F[N, Nx(T-2)]$. The advantage of this test is that it performs better than a corresponding Wald test in small- or moderately-sized samples. See Greene (1990; p. 514). There is, however, a technical difficulty in the implementation of the test. As the total number of funds ($N = 220$) in our study exceeds the number of time periods ($t = 80$) available, the estimated variance-covariance matrix in the constructed test statistics will not be invertible. There are several approaches to deal with the problem, such as Ippolito (1989; p. 7) and Grinblatt and Titman (1989). Here, in order to get a feeling for the magnitude of the test statistics, we test the hypothesis of any reasonable size subsample's αs being jointly equal to zero. Therefore, we randomly select 50 funds at a time and repeat the test 100 times. The test statistics all reject the hypothesis of the αs in each subsample jointly equal to zero at a 99 percent significance level. This implies that there are some statistically significant nonzero αs among any 50 funds of the sample.

[11]The t-ratios in the table are defined as follows: Define $\bar{\alpha} = 1/N\sum_{i=1}^{N}\alpha_i$ and $R = \iota' \otimes [1, 0]$, where ι is a vector of N ones. Then we have the following,

$$\hat{\sigma}_{\bar{\alpha}} = \frac{1}{N}\sqrt{R\left(\sum \otimes (X_m'X_m)^{-1}\right)R'}$$

Therefore we can define $t = \bar{\alpha}/\hat{\sigma}_{\bar{\alpha}}$.

Table III

Analysis of the Performance of 239 Equity Funds

This table compares the 1982 to 1991 performance of 239 general equity mutual funds with 10-year records against two benchmark portfolios.

	Net Returns (After Expenses)	Gross Returns (Before Expenses)
Panel A: Wilshire 5000 as Benchmark Portfolio		
Average α	−0.93%	+0.18%
t-ratio	−1.78	+0.37
No. of individual αs positive and statistically significant	3	8
No. of individual αs negative and statistically significant	12	8
Panel B: Standard & Poor's 500 as Benchmark Portfolio		
Average α	−3.20%	−2.03%
t-ratio	−5.27	−3.46
No. of individual αs positive and statistically significant	0	0
No. of individual αs negative and statistically significant	19	13

positive and significant αs when we use net returns. With all expenses added back, there are an equal number of significantly positive and negative alphas.

The positive average alphas we have found for fund pre-expense returns, appear to offer some confirmation of the findings of Ippolito that mutual funds do earn gross returns sufficient to cover their expenses. As Grossman and Stiglitz (1980) have argued, such a result would be consistent with a view of market efficiency that includes some compensation for information gathering and analysis. In addition to our finding that the positive alphas are small and insignificant, however, there are two additional reasons to doubt that fund managers can outperform unmanaged portfolios even before expenses. First, as Elton, Gruber, Das, and Hlavka (1993; EGDH) have argued, the Ippolito type results may result from inappropriate benchmarks. EGDH show that positive alphas relative to the S&P index existed for unmanaged indices of small stocks during the period covered by Ippolito. Using Ippolito's data, EGDH demonstrate that once one corrects for the existence of non-S& P

stocks (by adding a benchmark index of non-S& P equities), the positive pre-expense alphas disappear.[12]

The 1980s, however, were a period where small stocks tended to *underperform* the S&P 500 Stock Index. For example, from 1982 through 1991, the Wilshire 4500 Index of smaller stocks (the 4500 additional non-S&P stocks that are included in the Wilshire 5000) underperformed the S&P 500 by about 2 1/2 percentage points per annum. Hence, during that period, mutual funds tended to look better when measured against broader indices that included smaller companies, such as the Wilshire 5000 Stock Index used in Panel A of Table III. If we then change the benchmark to the S&P 500 Stock Index, as is done in Panel B of the table, we find that mutual funds underperformed the index (i.e., had negative and statistically significant alphas) not only after expenses but before expenses as well. Moreover, we also obtain negative alphas before and after expenses when, following EGDH, we employ two benchmarks, the S&P 500 Index of large stocks and the Wilshire 5000 Index including large numbers of smaller companies.

Furthermore, we should keep in mind that in analyzing 10-year results, we have necessarily limited our sample to the biased group of better performing funds that have met the test of survivorship. Taken together with the data in Table I, which indicated the existence of considerable survivorship bias, these results are more consistent with the original findings of Jensen than those of Ippolito. There is no evidence that general equity mutual funds have been able to outperform the broad stock market averages, even before expenses.

The preceding analysis of mutual fund performance was presented in the context of the CAPM. A study by Fama and French (1992), however, found no long-term relationship between the returns of a large sample of common stocks and the β measure of risk of the CAPM. It will, therefore, be interesting to see if the data on mutual funds over the period from the early 1970s through the early 1990s support the relationships predicted by CAPM. First, we found that there is reasonable stability in the Betas of mutual funds over time. Mutual funds have certain objectives and stated policies that do not change from year to year, and mutual fund Betas calculated over the decade of the 1970s are well correlated with fund Betas for the 1980s. There is a statistically strong ($t = 10.5$) relationship between Betas over time. Nevertheless, we found that fund Betas and returns were not related as the CAPM suggests.

Over the 20-year period 1971 to 1991, there is absolutely no relationship between Betas (measured over the 20-year period and against three alternative benchmarks) and total returns ($R^2 = 0.00$ and the coefficient of Beta is statistically insignificant in a regression where the average annual 20-year return is the dependent variable). Moreover, when funds were grouped by

[12] EGDH also find that Ippolito's data contain some errors and that the funds selected did not always correspond to the criteria he selected. Correcting these errors and drawing a sample that corresponds to Ippolito's criteria, EGDH find that the average alpha is reduced, even using an S&P benchmark.

Beta deciles (to replicate the Fama-French (1992) study), we also found no relationship between Beta and returns. As an additional test, to account for cross-correlation and heteroscedasticity, we used a Fama-MacBeth (1973) approach of running periodic regressions and using the time series standard deviations to obtain more appropriate standard errors. Again, we found insignificant coefficients of β and R^2s that were generally near zero. There is no evidence that investors seeking higher returns will find the purchase of high Beta mutual funds a strategy that will dependably satisfy their objectives.

III. The "Hot Hand" Phenomenon: The Persistence of Mutual Fund Returns

As mentioned above, several recent studies, such as Grinblatt and Titman (1992), Goetzmann and Ibbotson (1994), and Hendricks, Patel, and Zeckhauser (1993), present strong evidence in favor of a "hot hand" phenomenon, that is, mutual funds that achieved above average returns continue to enjoy superior performance. We have suggested that survivorship bias may help explain these results. Moreover, the existence of expense ratios that vary over the universe of funds will tend to produce some persistence in returns. Suppose a number of funds hold something approximating the market portfolio. The fund with the lowest expense ratio is likely to outperform high expense funds persistently. It will be interesting, however, to see if we can confirm the findings of return persistence with our sample.

Following Goetzmann and Ibbotson (1994), we analyze the predictability of performance by constructing two-way tables showing successful performance over successive periods. In the tables that follow, we define a winner (loser) as having achieved a rate of return over the calendar year that exceeds (is lower than) the median fund return. (Similar patterns are found using a positive or negative α as the definition of winner or loser.) The data in Table IV show that there seems to be considerable persistence to returns during the 1970s. Hot hands (winning followed by winning) occur much more often than a win followed by a loss. The null hypothesis of no winning persistence is rejected in all but two of the years covered.[13] Similarly, the data indicate a "cold hand" phenomenon as well. Losing in the initial period is more likely to be followed by losing in the subsequent period. Over the whole period, winners tended to repeat almost 2/3 of the time. The same results are

[13]The z-test for repeat winners was calculated as follows. Let p be the probability that a winning fund continues to be a winning fund in the next period, and assume independence across funds. If there is no persistence, we would expect p to equal $1/2$. Therefore, evidence against persistence in winning would be provided by failing to reject the hypothesis that $p = 1/2$. Since the random variable Y of the number of persistently winning funds will have a binomial distribution $b(n, p)$, we can construct a binomial test to see if the probability p of consistent winning is greater than $1/2$. When n is reasonably large ($n \geq 20$), the random variable $Z = (Y - np)/\sqrt{np(1-p)}$, which is shown in the table, will be approximately distributed as normal with mean zero and standard deviation one.

Table IV

Tests of Persistence of Fund Performance: 1970s Data

This table presents two-way tables of ranked total returns over one-year intervals using data from the 1970s.

Initial Year	Next Year		Percentage Repeat Winners	*Z*-Test Repeat Winners
	Winner	Loser		
1971 Winner	68	37	64.8	3.0
Loser	39	66		
1972 Winner	55	55	50.0	0.0
Loser	56	54		
1973 Winner	72	43	62.6	2.7
Loser	41	74		
1974 Winner	61	56	52.1	0.5
Loser	55	62		
1975 Winner	87	30	74.4	5.3
Loser	30	87		
1976 Winner	80	37	68.4	4.0
Loser	38	79		
1977 Winner	85	35	70.8	4.6
Loser	37	83		
1978 Winner	85	37	69.7	4.3
Loser	39	83		
1979 Winner	89	35	71.8	4.8
Loser	36	88		
1971–1979 Winner	682	365	65.1	
Loser	371	675		

confirmed when returns are measured over one quarter or over two years, and when winners are defined as having positive alphas. It is easy to see why many researchers have claimed that there has been considerable persistency and predictability of mutual fund returns, at least during the 1970s.

The relationship is considerably weaker during the 1980s, however, as is shown in Table V. While there is a slightly greater percentage of repeaters than would be expected by chance, we cannot reject the null hypothesis of no persistence. For the individual years, 4 years out of 12 indicated statistically significant persistence, but 3 out of the 12 years indicate significant negative persistence, i.e., losing following winning and vice versa. During the other 5 years, the relationships are not significant. Over the whole period of the 1980s, it is hard to conclude that there is much predictability in mutual fund returns. Winners tended to repeat just over half of the time. Especially after

Table V

Tests of Persistency of Fund Performance: 1980s Data

This table presents two-way tables of ranked total returns over one-year intervals using data from the 1980s.

Initial Year	Next Year Winner	Next Year Loser	Percent Repeat Winners	*Z*-Test Repeat Winners
1980 Winner	46	80	36.5	−3.0
Loser	80	46		
1981 Winner	81	49	62.3	2.8
Loser	46	84		
1982 Winner	77	59	56.6	1.5
Loser	53	83		
1983 Winner	83	65	56.1	1.5
Loser	64	85		
1984 Winner	89	76	53.9	1.0
Loser	76	89		
1985 Winner	110	75	59.5	2.6
Loser	70	115		
1986 Winner	128	84	60.4	3.0
Loser	93	119		
1987 Winner	96	148	39.3	−3.3
Loser	145	99		
1988 Winner	120	173	41.0	−3.1
Loser	176	117		
1989 Winner	190	129	59.6	3.4
Loser	121	189		
1990 Winner	169	173	49.4	−0.2
Loser	173	169		
1980–1990 Winner	1189	1111	51.7	
Loser	1087	1203		

1986, a period not included in some of the earlier empirical work, winners do especially poorly.[14]

This test does not account for the possibility of cross-correlation among funds. For any period it is likely that funds managed according to the same "style" will perform similarly, at least to some extent. For example, in a

[14] Brown and Goetzmann (1995) study survivorship bias and persistence using a different data set, the Weisenberger annual survey of investment companies. They find considerable evidence of survivorship bias over the 1976 to 1987 period. They also find strong persistence in the late 1970s consistent with the results in Table IV. For the 1980 to 1987 period, they find somewhat weaker persistence, with strong reversals in 1980 and 1987 consistent with the results in Table V. Because their study ends in 1987, however, they do not show reversals in 1988 and 1990.

period when "growth" stocks do well, it is likely that growth-stock funds will enjoy better relative performance. To test if such potential cross-correlation affects our conclusions, we attempted to rerun the tests for each fund category, where the categories represented similar styles, i.e., "growth-stock funds," "income funds," etc. and winning performance was measured relative to each style benchmark. For many categories, there were not a sufficient number of funds to perform a meaningful test. Where a sufficient number of funds did exist, however, we could confirm that the conclusions reported above continue to hold. The pattern of persistence being quite pronounced in the 1970s and breaking down, especially late in the 1980s, held for each of the larger subcategories of funds.

IV. Simulations of Strategies Based on the Persistence of Mutual Fund Returns

We have confirmed the findings of some persistence in mutual fund returns. It appears that the persistence was quite strong and very significant in the 1970s and for at least some years in the 1980s through 1986. The question we now ask is whether such persistence is economically significant. Can an investor fashion a mutual fund buying strategy that will produce excess returns as suggested by previous authors?[15] We have simulated a large number of reasonable strategies and come to the following conclusion: a large number of strategies based on the persistence of returns would have produced excess returns during the 1970s. The results are not robust, however. None of a variety of reasonable persistence strategies would have allowed an investor to beat the market during the 1980s, even assuming away the existence of sales fees and load charges.

A. Strategies Involving the Purchase of Top Performing Funds

Table VI simulates a strategy of investing in the top performing general equity mutual funds during the preceding 12 months. On January 1st of each year, the investor would rank *all* general equity funds based on their performance over the preceding 12 months and in alternative strategies buy the top 10 funds, the top 20 funds, the top 30 funds, or the top 40 funds. The analysis starts at the beginning of 1973 when the investor would buy the top performing funds during 1972. In 1974, the investor would switch into the top performing funds of 1973 and so forth in subsequent years. While many funds charged load fees, we have assumed away the existence of all sales charges and load fees in arriving at rate of return figures.

Table VI shows that the strategy of being invested in only the top funds of the previous year performed extremely well during the five-year period from 1973 to 1977. Simulated returns were all better than 4 percent per year while

[15] Hendricks, Patel, and Zeckhauser (1993) suggest that risk-adjusted excess returns of 5 percent per year can be achieved following a persistency strategy.

Table VI

Simulated Annual Returns—Strategy of Buying Mutual Funds with Best One-Year Performance

This table simulates the returns that would have been earned by investors over various periods from buying funds with the best performance over the past year.

	1973–1977		1978–1981		1982–1986		1987–1991	
	Simulated Return	S&P Return	Simulated Return	S&P Return	Simulated Return	S&P Return	Simulated Return	S&P Return
Buy top 10 funds previous year	4.36	−0.18	26.73	12.29	19.96	19.80	14.59	15.29
Buy top 20 funds previous year	4.39	−0.18	25.23	12.29	19.70	19.80	13.95	15.29
Buy top 30 funds previous year	4.54	−0.18	24.54	12.29	19.71	19.80	14.28	15.29
Buy top 40 funds previous year	4.17	−0.18	23.90	12.29	20.11	19.80	14.31	15.29

the S&P's annual return was slightly negative. The strategy worked even better during the 1978 to 1981 period. Simulated returns were well over 20 percent, while the S&P return was only 12.29 percent. We find, however, that the strategy failed to produce excess returns during the next decade. The returns from the strategy and the S&P return were essentially the same during the 1982 to 1986 period, and the simulated strategy returned less than the S&P Index during the 1987 to 1991 period.

Similar analyses were performed on funds selected based on their previous two-year records and five-year records rather than their single-year performance. Again, the strategy of investing in the best performing funds works very well in the 1970s through 1981. In general, however, the strategy produced only average returns during the first half of the 1980s and distinctly inferior returns during the last years of the decade through 1991.

Table VII presents the results of a strategy of buying the 20 funds with the best records from 1970 through 1980 and follows their return during the 1980–1990 period. The top funds during the decade of the seventies outperformed the S&P 500 by over 11.5 percentage points. The right-hand side of the table shows, however, that these funds actually underperformed both the overall average of general equity funds and the S&P 500 during the decade 1980 through 1990. While it is obviously possible to find exceptions to the rule (note the Magellan Fund, the number 10 fund from 1970 through 1980, which was the number one fund in the decade of the 80s), the general pattern is discouraging. It does not appear that one can fashion a dependable strategy of generating excess returns based on a belief that long-run mutual fund returns are persistent.

The mixed results we have found in a 20-year analysis of persistence suggest a cautious assessment. Utilizing one-year return figures, we find that out of 20 years of data, there were 11 years where persistence of winners is statistically significant and 15 years where more than half of the winners repeat. And over the whole 20-year period, a strategy of purchasing winners (based on past one-year, two-year, and five-year returns) would have produced returns about 300 basis points above the S&P 500 return. The analysis certainly provides some support for the popular view that those investors who do choose to put their money into actively managed funds might help themselves by purchasing funds with excellent recent records. When the strategy works, it earns large benefits relative to the market. When it loses, at least it loses by only a small amount. Since we have seen that mutual funds tend to underperform the market, this suggests that even when the strategy loses relative to the S&P Index, it does no worse than the average mutual fund.

Against these positive results, however, three important caveats need to be emphasized. First, the results are not robust. We find no meaningful persistence in performance during the 1980s, and an investor's returns from following a persistence strategy would have been lower than the S&P return during that decade. This suggests that persistence may be a phenomenon that existed in the past but may have later disappeared. Second, even when the strategy "worked" during the 1970s, an investor could not have achieved

Table VII

Subsequent 1980 to 1990 Performance of Top Twenty Mutual Funds From the 1970 to 1980 Period

This table shows the returns earned during the 1980s on the 20 mutual funds with the best returns during the 1970s.

	1970–1980		1980–1990	
	Rank	Average Annual Return (%)	Rank	Average Annual Return (%)
1. Twentieth Century Growth	1	27.12	151	11.24
2. Templeton Growth	2	22.34	101	12.68
3. Quasar Associates	3	20.56	161	10.99
4. 44 Wall Street	4	20.13	260	−16.83
5. Pioneer II	5	20.12	112	12.49
6. Twentieth Century Select	6	19.95	17	15.78
7. Security Ultra	7	19.74	249	2.22
8. Mutual Shares Corp.	8	19.52	29	15.23
9. Charter Fund	9	19.50	97	12.78
10. Magellan Fund	10	18.87	1	21.27
11. Over-the-counter	11	18.13	210	9.24
12. Amer. Cap. Growth	12	18.11	243	4.90
13. Amer. Cap. Venture	13	17.97	136	11.75
14. Putnam Voyager	14	17.41	65	13.88
15. Janus Fund	15	17.29	18	15.74
16. Weingarten Equity	16	17.28	30	15.21
17. Hartwell Leverage Fund	17	16.92	222	8.44
18. Pace Fund	18	16.82	50	14.53
19. Acorn Fund	19	16.50	147	11.36
20. Stein Roe Special Fund	20	15.75	48	14.54
Average of 20 funds		19.01		10.87
Overall fund average		9.74		11.56
S&P 500		8.45		13.87
No. of funds with 10-year record		211		260

the simulated returns because many of the best performing funds had "load" (sales) charges of up to 8 percent of asset value, and the simulated strategies call for switching into the best performing funds at periodic intervals. Finally, it is important to remember that the persistence results are influenced by survivorship bias. To measure persistence, we need a sample of funds that existed in both the base and following periods. Funds that have taken large bets and won will be included in a sample. Some funds that took large bets and lost will have dropped out of the sample. The problem is that, ex ante, an investor does not know which funds will drop out and, thus, the actual results for an investor following a persistence strategy is likely to be lower than those shown in the simulations. All in all, the simulation results do not give

one confidence that investors can consistently beat the market by buying recently good performing mutual funds.

B. Strategies Involving the Purchase of Forbes "Honor Roll" Funds

Forbes Magazine, the most widely read investment magazine, has published an "honor roll" of mutual funds annually since 1975. To earn a place on the honor roll, a fund not only had to have an extraordinary long-run performance record (usually based on total returns measured over a ten-year period) but also had to meet certain consistency goals. Performance is measured in both up and down markets, and funds must be at least top-half performers in down markets to qualify for honor status. Thus, the *Forbes* method guards against the selection of only high Beta funds following a sharp rise in the overall market. It is interesting to ask if investors could have achieved superior returns buying these "consistent performers."

Table VIII

Subsequent Performance *Forbes* "Honor Roll" Funds

This table shows the rates of return for the following year that an investor would have achieved by purchasing those funds designated by *Forbes* as "Honor Roll" funds.

Year on Honor Roll	Following Year Total Return Honor Roll Funds (Excluding Loads) (%)	Following Year Total Return S&P 500 (%)
1975	17.95	23.81
1976	2.31	−7.19
1977	9.19	6.52
1978	36.32	18.45
1979	29.29	32.45
1980	−2.70	−4.88
1981	24.15	21.50
1982	21.60	22.50
Average annual 8-year return (1975–1982)	16.57	13.32
1983	−7.45	6.22
1984	24.19	31.64
1985	10.66	18.62
1986	2.25	5.18
1987	14.96	16.50
1988	24.83	31.56
1989	−8.60	−3.11
1990	29.96	30.39
Average annual 8-year return (1983–1990)	10.46	16.43
Average annual 16-year return (1975–1990)	13.48	14.86

Table IX

Analysis of the Performance of *Forbes'* Honor Roll Funds 1976 to 1991

This table shows the rates of return for the following 5- and 10-year periods that an investor would have achieved by purchasing those funds designed by *Forbes* as "Honor Roll" funds.

	Panel A: 10-Year Period	
	10-Year Total Return of *Forbes'* Honor Roll Funds	10-Year Total Return of S&P 500 Index
1976 Funds	392.20	280.02
1977 Funds	345.50	264.09
1978 Funds	344.65	312.62
1979 Funds	360.01	351.27
1980 Funds	320.66	401.22
1981 Funds	197.85	266.65
1982 Funds	294.23	402.61
	Panel B: 5-Year Period	
	5-Year Total Return of *Forbes'* Honor Roll Funds	5-Year Total Return of S&P 500 Index
1983 Funds	72.15	113.64
1984 Funds	58.45	103.24
1985 Funds	112.72	151.73
1986 Funds	61.49	85.28
1987 Funds	86.91	103.66

In the tables that follow, we again ignore any load charges that might be imposed on the purchase of these mutual fund shares. Table VIII gives the year-by-year performance of the *Forbes* honor roll funds. We note that in the first eight years of the experiment, the honor roll funds did do substantially better than the S&P Index. Over the last eight years, however, the *Forbes* honor roll funds did substantially worse than the index. Over the entire 16-year period, the *Forbes* "honor roll" funds underperformed the S&P 500 Stock Index.

Table IX shows the longer run (10-year and 5-year) results from buying the *Forbes* honor roll funds. Again, we find a similar pattern to that in the previous table. Buying *Forbes* honor roll funds in the early years, we do achieve well above average 10-year rates of return. As the strategy continues, however, investors receive well-below average returns. Thus, even before considering load fees, the strategy of buying good performing funds does not appear to be a long-run consistent winner. The fact that many strategies seem to work in the early years, however, is consistent with earlier studies that isolated a "hot hand" phenomenon.

V. An Analysis of Expense Ratios

We have seen that, in general, mutual funds do not achieve gross investment returns sufficient to justify the management expenses they incur. In this section we take a cross-sectional look at the relationship between management expenses and fund returns for the ten years from 1982 through 1991. The sample consists of all funds with continuous records for the 10-year period.[16] Returns are average annual total returns, while expenses are averages of the yearly expense ratios calculated as total expenses divided by average assets over the year. Table X presents the results of a single cross-sectional regression using 10-year average returns and expense ratios.

Panel A of the table includes all funds for which we have records. We find an extremely strong and apparently significant negative relationship between a fund's total expense ratio and its net performance. However, when we perform a multiple regression, regressing fund performance on the investment advisory and nonadvisory expense ratios, we find that nonadvisory expenses (e.g., advertising, other marketing expenses, accounting, recordkeeping, etc.) are negatively related to performance, whereas there is a positive relationship between advisory expenses and performance. Thus, there is some evidence that spending money on investment advice does increase net performance, but the coefficient is not statistically significant. Unfortunately, the correlations reported in Panel A are spuriously high. There are a few outlying funds with unconscionably high expenses, which have an extraordinary influence on the results. Thus, the regressions were redone excluding a handful of outliers which dominated the results.

Panel B repeats the analysis with nine observations excluded. Removed from the sample were funds with unusually high expense ratios greater than 2.5 percent (the average fund expense ratio was just over one percent). In addition, two additional sample points were deleted because of their extraordinary influence on the regressions.[17] We find the same relationships as in Panel A with total expenses significantly negatively related to performance but with far smaller coefficients of determination. The coefficient of the total expense ratio is -1.92, implying that a dollar of expenses is associated with \$1.92 reduction in return, but we should note that the coefficient is not significantly different from unity. The tendency for increasing expenses to have a multiplier effect on net returns may result from a positive correlation between measured expenses and other nonmeasured expenses, such as turnover. Malkiel (1993) presents data from the *Morningstar* mutual fund

[16] This sample does suffer from survivorship bias. It would have been preferable to include all funds in the analysis, but unfortunately, the Lipper data on expense ratios are available only for surviving funds.

[17] These sample points were identified as outliers using the "DFBETAS" test described in Judge *et al.* (1988; pp. 895–896). The magnitude of the influence of these points can be illustrated by noting that their inclusion more than doubles the R^2 of the regressions.

Table X

Regressions of 10-Year (1982 to 1991) Average Annual Returns on 10-Year Average Annual Expense Ratios

This table shows coefficients and standard errors of regressions where the dependent variable was average annual returns, and independe variable(s) were either total expenses or advisory and nonadvisory expenses.

Total Expense Ratio	Nonadvisory Expense Ratio	Advisory Expense Ratio	R^2	Number of Observations
		Panel A: All Funds		
− 3.68 (0.24)			0.51	239
	−4.20 (0.26)	+1.01 (1.16)	0.54	239
Panel B: Excluding Funds with Total Expense Ratios Greater than 2.5 Percent and Two Additional Outliers Identified by the "DFBETAS" Test				
− 1.92 (0.56)			0.05	230
	−3.01 (0.68)	+0.73 (1.06)	0.08	230
Panel C: Sample of Funds in Panel B with Gross Returns as Dependent Variable				
− 0.87 (0.55)			0.01	230
		+1.82 (1.07)	0.01	230
	−1.97 (0.68)	+1.97 (1.06)	0.05	230

database showing that higher turnover is associated with lower net investment returns.[18]

One might argue that a negative relationship between nonadvisory expenses and net performance is to be expected. After all, there is no reason to expect "12b-1" distribution expenses, or other administrative expenses, to enhance performance. Investment advisory expenses, however, ought to improve performance. Indeed, to the extent that these expenses vary with performance because of incentive features, a higher expense ratio should be associated with higher net returns and the coefficient will be biased upward. Thus, the failure to find a *significant* relationship between performance and advisory expenses strongly suggests that investors do not get their money's worth even from expenditures on investment advice.

In Panel C, we add all expenses back to the return figures to obtain gross investment returns before expenses. We find essentially no relationship between gross investment returns and expenses. While gross returns are positively related to investment advisory expenses, the coefficient is not statistically significant, and the coefficient of determination is close to zero. The data do not give one much confidence that investors get their money's worth from investment advisory expenditures.

VI. Concluding Comments

Recent empirical literature in the field of finance has emphasized predictable patterns in the time series of securities' returns. While such patterns may not be inconsistent with the efficient functioning of markets, they have often been interpreted as implying the existence of superior risk-adjusted rates of return. Recent studies of the pattern of mutual fund returns have come to similar conclusions. There appear to be predictable patterns in mutual fund returns that are sometimes claimed to provide investors with an opportunity to earn large risk-adjusted (excess) returns. Moreover, more recent measures of the rate of return earned by mutual fund managers have suggested that professionals can beat the market (at least before management expenses) and have claimed that earlier conclusions regarding mutual fund returns, from studies done in the 1960s, may be in error.

This study takes a new look at mutual fund returns during the 1971 to 1991 period and utilizes a data set that includes the returns from all mutual funds in existence in each year of the period. Most data sets include all

[18] Malkiel (1993) also presents separate analyses of performance and expense ratios by categories of funds. The pattern of higher expenses tending to reduce net returns holds for all categories of funds with the exception of small company growth funds. Here the coefficient of expenses is positive, implying that after paying these expenses, the investor is actually better off. This would be consistent with a view that the stock market is less efficient for smaller companies, and the expenditure of additional investment management expenses may indeed have a positive payoff. The coefficient is not statistically significant, however, and probably the safest statement one can make is simply that the typical negative relationship between expenses and net returns fails to hold for the smaller growth company mutual funds.

mutual funds currently in existence and, thus, exclude funds that have terminated operations. Our data set permits us to obtain measures of survivorship bias, which we estimate to be substantial. When returns from all funds are analyzed, we find that mutual funds have tended to underperform the market, not only after management expenses have been deducted, but also gross of all reported expenses except load fees. Moreover, fund returns are analyzed in the context of the capital asset pricing framework. We not only fail to document any evidence of excess returns but also fail to verify the risk return relationship posited by the capital asset pricing model, a conclusion similar to that of Fama and French (1992) for individual securities.

Recent mutual fund studies have also documented considerable persistency in fund returns: good performing funds tend to continue to perform well, at least over the near term. Some writers have suggested it is, therefore, possible to fashion investment strategies that will permit investors to earn excess returns. We document the persistence phenomenon but note two cautions. First, the findings are likely to be influenced by survivorship bias.[19] Second, the relationships may not be robust since the strong persistence that characterized the 1970s failed to exist during the 1980s. When we simulate a variety of sensible investment strategies based on the persistence phenomenon, we are able to produce well above average returns during the 1970s. During the 1980s, however, we find no evidence that investors could earn extraordinary returns following a strategy based on persistence. Moreover, we do not find that mutual fund investors get their money's worth from the expenditures incurred in the management of mutual funds, even when expenditure data is limited to funds spent for investment advice.

In conclusion, this study of mutual funds does not provide any reason to abandon a belief that securities markets are remarkably efficient. Most investors would be considerably better off by purchasing a low expense index fund, than by trying to select an active fund manager who appears to possess a "hot hand." Since active management generally fails to provide excess returns and tends to generate greater tax burdens for investors,[20] the advantage of passive management holds, a fortiori.

[19] Since persistence can only be tested with a sample that includes funds that have existed in both the base and the following period, the sample characteristics must necessarily be influenced by survivorship.

[20] Dickson and Shoven (1993) find that the effect of taxes on net returns is substantial. Utilizing a sample of 62 mutual funds, they find that, pretax, one dollar invested in 1962 would have grown to $21.89, compared with $22.13 in the S&P 500. After tax, however, that same dollar invested in mutual funds by a high income investor would have grown to only $9.87.

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