Are Mutual Fund Shareholders Compensated for Active Management "Bets"?

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Abstract

This paper analyzes the investment returns of shareholders in U.S. domestic equity mutual funds over a 26-year period, focusing on whether fund managers taking bigger portfolio "bets" have better stockpicking skills. We find that funds with higher levels of return volatility provide better performance during the majority of the years in our study—this finding is robust to measures of performance that control for differential market-based and style-based investment strategies across the funds. We conclude that fund managers that take larger active management bets have better stockpicking skills, even though the average manager underperforms her benchmarks.

Introduction

Adherents of market efficiency have claimed, for some time, that actively managed money cannot outperform money that passively tracks an index, at least over the long-run and adjusted for priced risk factors. Numerous studies have focused on the active-passive mutual fund debate, from the seminal study by Jensen (1968) to the more recent studies by Carhart (1997) and Wermers (2000).

Although the interpretation of what should qualify as a "risk factor" is under intense current debate, recent studies of fund performance (including Carhart (1997) and Wermers (2000)) agree that the average mutual fund "alpha" is negative, once one adjusts for equity styles used by funds that are known to be related to the cross-section of average equity returns (whether or not these styles are really risk factors). In addition, the average alpha is negative if only the market portfolio is considered a risk factor (Carhart (1997)). At issue is whether fund managers should be credited with investing in small-capitalization stocks, value stocks, or momentum stocks—i.e., stocks with persistent high returns—during long time periods when those styles paid high return premia.

Regardless of the uninspiring results of the average active fund manager, we might find that some subgroups of managers have better skills than most. A logical consequence of active management is that the manager must take "bets" away from the market portfolio, e.g., the S&P 500 index, or from style benchmarks to take advantage of her superior information (if it exists) on equities. Further, we might believe that a manager with great information on stock values would deviate from these benchmarks more than a manager with only good information, holding constant the manager's mandated investment constraints and risk-aversion due to labor-market pressures. Thus, an issue of great interest to investors is whether fund managers that hold

portfolios with substantial total volatility, or with substantial non-market volatility, outperform indexers as well as active managers with less tracking error. That is, one approach to looking for talent is to conditional our search on the volatility of individual fund returns, and then to examine funds that are outliers. If we find that excess fund return volatility is not rewarded with higher average returns, or with higher benchmark-adjusted returns, then investors might be advised to stick with broadly diversified index funds (or, with ETFs that take a diversified position in a given style category, such as telecommunication stocks). Such funds would provide easy diversification for investors, as well as substantially lower expenses.

This paper addresses this issue by examining the cross-sectional relation between returns and volatility in the U.S. mutual fund industry over the 1975 to 2000 period. As such, this paper is the most comprehensive study to date of the risk-reward tradeoff experienced by investors in mutual funds. Specifically, we look at whether funds taking larger volatility bets exhibit better performance (measured using various approaches), and whether any such relation is due to market-based, style-based, or idiosyncratic bets taken by the managers. In recent articles, De Silva, Sapra, and Thorley (2001) note that changes over time in the cross-sectional variation in mutual fund returns is largely driven by the changing cross-sectional variation in individual stock volatility, while Campbell, Lettau, Malkiel, and Xu (2001) note that the idiosyncratic (non-market) volatility of individual stocks has increased over the past few decades. In light of these papers, we address whether the cross-sectional variation in U.S. mutual fund returns is driven by managers taking bigger portfolio bets when they have superior stockpicking skills, or whether this variation is simply a by-product of changing stock volatility or mandated investment constraints.

Our results show a generally positive relation between the level of risk taken by the mutual funds and the performance of these funds. During the majority of the three-year subperiods covered by our study, as well as during the entire 26-year period, we find a positive and significant relation between performance and risk. However, higher risk funds do not always beat their competitors—during a few subperiods, this performance-risk relation is either very close to zero, or it is negative.

These results are robust to whether we measure performance as average unadjusted fund returns, average S&P 500-index adjusted fund returns, or as the alpha from a single-index or a multiple-index model. This multiple-index model, in addition to the excess return on the value-weighted portfolio of stocks from the Center for Research in Security Prices (CRSP), adds the Fama and French (1993) factors that capture the small stock effect (SMB; the difference in returns between a portfolio of small stocks and a portfolio of big stocks), the value effect (HML; the difference in returns between a portfolio of high and a portfolio of low book-equity-to-market-equity ratio stocks), and the Carhart (1997) factor that captures the momentum effect (PR1YR; the difference in returns between a portfolio of high and a portfolio of low prior-year return stocks). Thus, the relation between performance and volatility remains after controlling for the relative fortunes of funds that hold different amounts of market risk, or that specialize in different style sectors of the market, such as small-capitalization value funds vs. large-capitalization growth funds. That is, our results remain after controlling for the portion of the changing cross-sectional dispersion in stock returns [highlighted by de Silva, Sapra, and Thorley (2001)] that is due to style or market effects.

We conclude that active management does provide value, but that this value is reflected in only a minority of funds that take relatively large volatility bets. That is, we show that funds

taking large bets away from the market or style portfolios generally perform well during contemporaneous time periods (where volatility and average return are measured over the same period).

In addition, we find evidence that high volatility funds persist in generating superior future alphas—future one-year style-adjusted alphas are generally higher for funds with higher three-year lagged volatilities. Thus, our results are not due to survival bias of the type described by Brown, Goetzmann, Ibbotson, and Ross (1992), since these tests only require a fund to survive for one year after the volatility ranking period.

Although some recent research has examined whether superior performance persists (e.g., Goetzmann and Ibbotson (1993), Brown and Goetzmann (1995), and Carhart (1997)), while other studies have examined characteristics that are associated with superior performance [see, for example, Ding and Wermers (2002)], we conclude that additional research is warranted to determine how investors might identify managers with superior *future* performance. Our study indicates that one place to look is in the tendency of a manager to take bets away from the S&P 500 index.

I. Methodology

We measure the relation between risk and performance using several approaches, which include the cross-sectional relation (across funds) between the fund time-series

- average monthly return and standard deviation of monthly return,
- average S&P 500-adjusted return and standard deviation of S&P 500-adjusted return,
- alpha (relative to the S&P 500) and standard deviation of S&P 500-adjusted return,
- and alpha (relative to the CRSP value-weighted market portfolio, the Fama and French SMB and HML factor returns, and the Carhart PR1YR factor return) and standard deviation of S&P 500-adjusted return.

Each approach applies the respective measures of performance and risk, for non-overlapping three-year periods from 1975 to 2000, to each U.S. mutual fund that existed during that three-year period. In total, nine nonoverlapping three-year subperiods are examined, beginning with the January 1, 1975 to December 31, 1977 period and ending with January 1, 1998 to December 31, 2000 period.[1] For each of the above approaches, the cross-sectional relation between risk and performance is determined over each of the three-year subperiods.

A positive (and significant) slope of a regression of performance on risk during a sufficient number of subperiods, or for the complete period under study, means that, regardless of the merits of active management for the average mutual fund, we find evidence supporting that funds taking large bets away from the market are rewarded with better levels of performance. If we find such evidence across all of our model approaches, then we can be reassured that our results are not model- or benchmark-dependent.

Since we require a fund to have a three-year record to be included in a given three-year measurement period, there is a possibility that survival bias of the type described by Brown,

[1] To keep consistent three-year periods, the final two periods (which are January 1, 1996 to December 31, 1998 and January 1, 1998 to December 31, 2000) overlap during 1998.

Goetzmann, Ibbotson, and Ross (1992) might be driving our results. That is, high volatility funds might look superior because ones that fail drop out of our database before we can measure their performance. To address this possibility, we repeat our tests in two different ways. The first approach looks at the cross-sectional relation between risk and return during one-year periods, which requires a fund to only exist for a single year to be included (thus, minimizing survival bias). The second approach measures risk during the three-year period prior to measuring return, and measures return during the following single year period. Again, this approach only requires the fund to survive for the one-year period following the ranking period, and should represent a strategy that is fairly close to one that could be implemented by investors. In both cases, we find results that are consistent with our baseline results, and we report these results when appropriate. However, in order to estimate our performance measures more precisely, we remain with our three-year window in most tests in this paper.

II. Database

We examine monthly net returns data from the Center for Research in Security Prices (CRSP) Survivor-Bias Free U.S. Mutual Fund Database, which is created and used by Carhart (1997). The CRSP database contains monthly data on net returns for all mutual funds existing at any time after January 1, 1962, with no minimum survival requirement for funds to be included in the database. Further details on this database, which is widely regarded as the highest-quality database of U.S. mutual funds available to academic researchers, may be obtained from CRSP.

Although investment objective information is available from the CRSP database, we supplement these data with investment objective and other fund information from a different source, the CDA-Spectrum mutual fund files from Thomson Financial, Inc., of Rockville,

Maryland. We use CDA investment objective data because these data are more consistent over the years of our study and allow a clearer identification of funds with a U.S. equity orientation.[2] In addition, we aggregate monthly returns obtained from CRSP, which are at the shareclass level, into an overall net portfolio return. In doing so, we assume a pro-rata investment in each shareclass of a given fund according to the total net assets of each shareclass at the beginning of each month.

The CDA database, and the technique for matching it with the CRSP database, are described in Wermers (1999, 2000). Since both the CRSP and CDA databases contain essentially all mutual funds existing during our sample period (with the exception of some very small funds), our merged database is essentially free of survival bias. The only exception to this rule is that we require a fund to have a three-year time-series of monthly returns available to be included in one of our three-year risk-performance windows. This requirement is necessary to generate precise estimates of performance and risk, as well as to satisfy the homoskedasticity assumption of the cross-sectional regression analysis to follow—that is, all mutual fund performance and risk estimates will be based on the same number of observations. As mentioned in a previous section, we run tests using a couple of different approaches to test for survival bias, and find that this bias does not explain our results. These extensions will be reported when appropriate.

We point out that a small number of very small funds could not be matched between the CRSP and CDA files—that is, they were usually present in the CRSP database, but not in the CDA database. Wermers (2000) discusses this limitation of the matching procedure; however,

[2] Specifically, CRSP investment-objective information data is sometimes missing for a fund that exists before 1992. Also, CRSP reports investment objective information, when available, from four different sources. As these sources classify funds in different ways, it is sometimes difficult to determine the precise investment objective of a fund. The CDA-Spectrum files report investment objectives in a more consistent manner across funds and over time. In any

we note that these funds are generally very small funds with a short life during our sample period. Since we require a minimum return history for a fund to be included in our regression tests, the majority of these unmatched funds would be excluded from our tests in any case.

Table I presents a census of the funds in our sample, that is, those U.S. domestic equity funds with complete monthly returns for each 36 month subperiod. Our sample, which begins with 205 domestic equity funds having complete returns data during the 1975 to 1977 subperiod, expands to 1,815 funds during the 1998 to 2000 subperiod. Overall, 2,331 funds are included in at least one subperiod. Clearly, the universe of mutual funds has rapidly expanded over this 26-year period; our study investigates one aspect of whether this expansion in actively managed money is justified. Specifically, we will search for evidence that supports the idea that money invested in actively managed funds has beaten money invested in index funds.

III. Results

A. The Relation Between Average Return and Risk

We first present a scatterplot that contains a point for each mutual fund during each three-year period, representing the investment experience of an individual who held that fund during that three-year period. These first results examine, for each non-overlapping three-year period from 1975 to 2000, the relation between the simple average monthly net return (annualized to percent per year) and the standard deviation of monthly net return. All subperiods and all funds are presented in a single scatterplot, Figure I. This figure shows the results for 6,501 three-year

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case, all investment objective information (both CRSP and CDA) is considered when we determine whether a fund is a U.S. domestic equity fund.

histories of funds. Note that a long-lived fund will be represented by one point for each three-year period during which that fund existed.

Also shown in Figure I are the return and standard deviation values for the riskfree asset (as proxied by the 30-day Treasury Bill return) and the S&P 500 index (with dividends reinvested), over the entire 26-year period. A line, plotted using these two points, would represent the investment outcomes that would have been achieved with various combinations of these two assets, before expenses and trading costs. Thus, if this line plots above (below) the average return/risk line for the funds, then an investor would have been penalized (rewarded) for investing in actively managed funds relative to a simple passive investment in an S&P 500 index fund plus a cash allocation to (or, borrowing from) T-Bills, ignoring the cost of this indexing strategy.[3] If, alternatively, the two lines cross, then our findings are more ambiguous—actively managed funds are superior to an indexing strategy, but only in certain risk regions of the plot.

Figure I shows that the experience of investors in mutual funds has been quite disperse across funds and subperiods [consistent with prior research by De Silva, Sapra, and Thorley (2001)], but a cross-sectional regression of average fund return on standard deviation of return has a slope coefficient of a positive 1.3. This regression slope indicates that a fund taking on an additional one percent per month in standard deviation of return has an average annual return that is 1.3 percent higher. While this strongly positive relation between average return and risk seems to support the value of active management, an indexer would have captured a much higher average return-risk tradeoff (ignoring costs)—this is shown as the broken line that passes through the 30-day T-bill and the S&P 500 index points in the graph—a slope of 2.4. Note that the

[3] Wermers (2000) estimates that the Vanguard 500 Index Fund expended 7 basis points per year on trading costs and charged an expense ratio of 28 basis points per year (on average) during the 1975 to 1994 period.

majority of mutual funds fall under this indexing line, but a substantial minority still beat it. These results are consistent with prior research [e.g., Kosowski, Timmermann, Wermers, and White (2002)] that finds that actively managed funds underperform indexing, on average, but that a substantial minority outperform.

In Panel A of Figure 2, we present the regression line for each non-overlapping three-year subperiod to determine whether our results are reasonably consistent over time. Each regression line is labeled with the final year of the three-year subperiod covered by the line—for example, the line labeled "77" is the relation between average monthly return (annualized) and standard deviation of month return during the 1975 to 1977 subperiod, across all funds having complete data during that subperiod.

Clearly, the first two three-year subperiods have the strongest positive average return-risk relation, while the other seven subperiods have a much more modest positive relation, or even a weakly negative relation. Overall, as shown in Panel B, six of the nine subperiods exhibit a positive average return-risk slope.[4] However, the performance of actively managed funds may be driven, during a given subperiod, by their loading on the market index (their "beta") or by their loadings on style indexes (their "style betas"). To gauge the relative success of active management with more precise methods, we next turn to a single-index market model to adjust for the varying exposures of funds to the market index. We will first present the results of our cross-sectional regression analysis using a simple market adjustment for return and risk. Then, we will present results for the single-index model.

B. The Relation Between S&P 500-Adjusted Return and Risk

[4] Note that the regression slope for each subperiod is statistically significant at the one percent confidence level.

To measure the performance and risk of U.S. mutual funds, relative to the S&P 500 index, we compute the average and standard deviation of S&P 500-adjusted return for mutual fund *i* as

$$\bar{r}_i^{S\&P500-adjusted} = \frac{1}{36}\sum_{t=1}^{36}(r_{i,t} - r_{S\&P500,t}) \tag{1}$$

and

$$\sigma(r_i^{S\&P500-adjusted}) = \sqrt{\frac{\sum_{t=1}^{36}\left((r_{i,t} - r_{S\&P500,t}) - \bar{r}_i^{S\&P500-adjusted}\right)^2}{35}}, \tag{2}$$

respectively, where $r_{i,t}$ =the month t net return of fund *i*, while $r_{S\&P500,t}$ = the month *t* return on the S&P 500 index, with dividends reinvested. These measures allow us to determine whether funds having more tracking error risk, as measured by Equation (2) provide a higher tracking error gain, as measured by Equation (1).

Panel A of Figure III shows the cross-sectional regression line for the relation between the average S&P 500-adjusted return and standard deviation, for each three-year period, while Panel B lists the slopes from these regressions. Note that the results for these benchmark-adjusted regressions are qualitatively similar to those of the non-benchmark-adjusted regressions in Figure II—the first two subperiods show a strong value of active management, while the other subperiods exhibit more modest results.

C. The Relation Between Mutual Fund "Alpha" and Market Risk

Although Section B indicated a positive relation between S&P-adjusted average return and volatility, it is possible that this relation may be due to differing exposures of the mutual funds to the market index. For example, funds with high beta portfolios would be more likely to

exhibit both high average S&P 500-adjusted returns and high levels of adjusted risk than low beta funds, due to the incorrect assumption that all funds carry a beta of unity that is implicit in this simple market adjustment.

To explore whether this assumption is driving our results, this section controls for differing exposures to the market index by computing, for each fund during each three-year subperiod, the alpha from the following single-index model:

$$\tilde{r}_{i,t} - \tilde{r}_{F,t} = \alpha_i + \beta_i\left(\tilde{r}_{S\&P500,t} - \tilde{r}_{F,t}\right) + \tilde{\varepsilon}_{i,t} \ , \qquad (3)$$

where $r_{F,t}$ = the month *t* return on 30-day T-bills. Figure IV, Panels A through I, present α_i relative to the volatility (standard deviation) of the S&P-adjusted return of each fund. These plots address whether funds taking larger bets on stocks that push their portfolios further away from the S&P 500 index produce higher beta-adjusted returns.

The results reveal some interesting patterns. Note that, during three-year periods when the S&P index substantially outperformed T-bills, such as 1975 to 1977, the slope of the α_i-volatility regression (Figure IV, Panel A) decreases, relative to the slope of the S&P index-adjusted return/volatility regression (Figure III). During three-year periods when the index outperformed bills by a lesser extent, the slopes are much more similar (see, for example, 1990 to 1992 in Panel F of Figure IV compared to the regression line in Figure III for this subperiod). These observations indicate that, consistent with our intuition, funds taking larger bets away from the S&P 500 index are also carrying higher beta portfolios, where beta is measured relative to the index.

Overall, however, measuring investment performance with the beta-adjustment model of Equation (3) does not change our findings: during six out of nine subperiods, the

performance/volatility relation is positive (during 1981 to 1983, the regression line essentially indicates no relation). Again, this indicates that, during more than half of the subperiods, increasing bets away from the S&P 500 index taken by active managers resulted in index-beating performance.

D. The Relation Between Style-Adjusted "Alpha" and Risk

Recent papers by Fama and French (1993, 1996) and Jegadeesh and Titman (1993) show that market capitalization, the ratio of book value of equity to market value of equity, and the prior one-year return of stocks are important variables in explaining the cross-section of stock returns in the U.S. In this section, we use these results to explore the return/volatility relation using a multivariate performance model, to attempt to control for differing exposures of mutual funds to various equity styles.[5] Specifically, we use the following four-factor model, which is introduced by Carhart (1997), to measure the style-adjusted performance (α_i) of each mutual fund. The performance model is given by

$$\tilde{r}_{i,t} - \tilde{r}_{F,t} = \alpha_i + \beta_i\left(\tilde{r}_{S\&P500,t} - \tilde{r}_{F,t}\right) + s_i \cdot SMB_t + h_i \cdot HML_t + p_i \cdot PR1YR_t + \tilde{\varepsilon}_{i,t} \ , \qquad (4)$$

where SMB, HML, and PR1YR are portfolios constructed to mimick the returns to small stocks minus large stocks, high minus low book-to-market ratio stocks, and high minus low one-year lagged-return stocks. We will refer to the alpha from this regression as the "Carhart alpha."

[5] In unreported tests, we examined the influence on average fund returns of the return to each equity style factor (size, book-to-market, and momentum). We found that the most important style influence is the relative return on small-capitalization stocks, relative to large-capitalization stocks (the SMB factor)—higher-risk mutual funds tend to have better returns, relative to the S&P 500 index, whenever small-cap stocks perform well, relative to the index—indicating that our high-risk sample has a disproportionate number of funds that invest heavily in small-cap stocks. However, we found that the HML and PR1YR factors also have an important influence on the average return/risk relation.

Further discussion on the construction of these style-mimicking returns are provided in Carhart (1997).[6]

Figure V shows the relation between Carhart alpha (as described by Equation (4)) and the standard deviation of S&P 500-adjusted return (Equation (2)) across mutual funds within each three-year subperiod. These tests examine whether funds taking larger bets away from the S&P 500 index provided higher style-adjusted alphas, adjusting for both the market factor and for the three style factors described above.

The results strengthen our previous findings—the slope of the cross-sectional regression of Carhart alpha on benchmark-adjusted standard deviation is positive in eight out of nine subperiods. In addition, all eight slopes are statistically significant. These results provide much stronger evidence that some actively managed funds added value during our study period, and that our approach of looking for talent by conditioning on portfolio volatility is effective. The stronger results, using the Carhart model compared to the single-index model of the last section, are apparently due to the way that the funds loaded on non-market style factors during the period. For example, the funds held more growth than value stocks, which resulted in a drag on their performance until the more recent subperiods. The single-index model did not control for this style effect, while the Carhart model provides a control, thus, improving the results of the funds.

Also interesting to note is that, in almost all subperiods, the regression line starts with a negative intercept (consistent with the expenses and trading costs incurred by actively managed funds), with the majority of funds having negative style-adjusted alphas (consistent with prior studies of mutual fund performance that shows that the average fund has a negative net return alpha). Thus, even with the positive slope between alpha and risk, only a minority of funds

[6] We thank Mark Carhart and Ken French for providing the time-series of returns for these style factors.

generate a positive alpha. Thus, we find that, across almost all subperiods of our study, active management does add value, but that value is only present in a sizable minority of funds—those who took larger bets away from the benchmark.

E. The Relation Between Style-Adjusted "Alpha" and Lagged Risk

Finally, in unreported tests, we tested whether an investor can identify funds with positive style-adjusted alphas by their lagged level of S&P 500 adjusted risk.[7] Besides representing a strategy that could be implemented by investors, this section provides evidence that survival bias is not driving our results. For example, perhaps our positive and significant relation between performance and risk in prior sections was entirely due to risky funds that perform poorly dropping out of our sample. By measuring the risk prior to the return, we eliminate this possibility, as average returns are measured over the one-year period following the three-year risk estimation period. The only requirement for a fund to be included in these tests is that the fund survives the one-year period following the risk-ranking period. For example, we regress, across all funds, the Carhart alpha of Equation (4), computed during 1978, on the standard deviation of the S&P-500 adjusted return, computed during 1975 to 1977.

The results are consistent with our prior finding that performance is associated with risk-taking behavior, although the relation is not as strong when performance is predicted based on lagged risk-taking. Specifically, during 14 out of 23 of the periods (where the alphas are non-overlapping between periods), the regression slope is positive and statistically significant. During the other 9 periods, the slope is negative. These results also confirm that our general findings of this paper are not due to survival bias, but to a true relation between risk-taking

[7] These results are available from the author on request.

behavior and performance. In addition, they point to a relatively simple rule that might be used to help to identify superior fund managers, although certainly such a rule would be quite risky to use in practice.

IV. Conclusion

This paper examined the relation between active bets made by fund managers and the performance of the funds. The objective of the study was to determine whether fund managers that deviate from the market portfolio to a greater degree are also rewarded by higher levels of average returns, either unadjusted or adjusted for their market exposures.

Our conclusions are:

- total risk was rewarded during six out of nine subperiods, while S&P 500-adjusted risk was rewarded during five out of nine subperiods,
- adjusting for the differing exposures of funds to the market did not significantly change this result,
- adjusting for the differing exposures of funds to style loadings substantially strengthened this result, and
- lagging the risk measure, relative to the performance measure generally supported the above results.

Although these results cast a somewhat flattering light on some active managers, we also note that our results indicate a good deal of risk of underperformance of funds taking on higher levels of risk. For example, during the 1998 to 2000 period (a relatively good period for the

average fund that took on high levels of risk), substantial numbers of high-risk funds underperformed the S&P 500 index by a wide margin.

Clearly, our results are driven by a substantial minority of mutual funds that provided value during the 26-year period of this study. Thus, the individual investor should carefully weigh these risks before deciding to invest in an actively managed fund. Further research is warranted on the types of funds, and fund managers, among which we might find talent.

References

Brown, Stephen J. and William N. Goetzmann, 1995, "Performance Persistence," *Journal of Finance*, 50, 679-698.

Brown, Stephen J., William Goetzmann, Roger G. Ibbotson and Stephen A. Ross, 1992, "Survivorship Bias In Performance Studies," *Review of Financial Studies*, 5, 553-580.

Campbell, John Y., Martin Lettau, Burton Malkiel, and Yexiao Xu, 2001, "Have Individual Stocks Become More Volatile? An Empirical Examination of Idiosyncratic Risk," *Journal of Finance*, 56, 1-43.

Carhart, Mark, 1997, "On Persistence in Mutual Fund Performance," *Journal of Finance*, 52, 57-82.

De Silva, Harindra, Steven Sapra, and Steven Thorley, 2002, "Return Dispersion and Active Management," *Financial Analysts Journal*, 57, 29-42.

Fama, E., and K. French, 1993, "Common Risk Factors In The Returns On Stocks And Bonds," *Journal of Financial Economics*, 33, 3-56.

Fama, E., and K. French, 1996, "Multifactor Explanations of Asset Pricing Anomalies." *Journal of Finance*, 51, 55-84.

Goetzmann, William N. and Roger G. Ibbotson, 1993, "Do Winners Repeat?" *Journal of Portfolio Management*, 20, 9-18.

Jegadeesh, N., and S. Titman, 1993, "Returns to Buying Winners and Selling Losers: Implications for Stock Market Efficiency," *Journal of Finance*, 48, 65-92.

Jensen, M., 1968, "The Performance of Mutual Funds in the Period 1945-1964," *Journal of Finance*, 23, 389-416.

Kosowski, Robert, Allan Timmermann, Russ Wermers, and Hal White, 2003, "Can Mutual Fund 'Stars' Really Pick Stocks? New Evidence from a Bootstrap Analysis," Working Paper.

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

Table I: Fund Census

This table presents the number of funds, during each three-year subperiod, that have a complete return history over that subperiod, as well as the total number of funds that are included in at least one three-year subperiod.

SUBPERIOD	NUMBER OF FUNDS
1975-1977	205
1978-1980	251
1981-1983	268
1984-1986	331
1987-1989	533
1990-1992	698
1993-1995	940
1996-1998	1,456
1998-2000	1,815
1975-2000	2,331

Figure I. Average vs. Standard Deviation of Monthly Returns of U.S. Domestic Equity Mutual Funds

This figure shows the aggregate experience of mutual fund investors over all three-year subperiods during the 1975 to 2000 period. In this plot, each point is the average return (monthly, annualized to percent per year) vs. standard deviation of return (in percent per month) for a given mutual fund over a given 36-month subperiod. These non-overlapping three-year subperiods start with 1975 to 1977, then 1978 to 1980, etc. The last two subperiods, 1996 to 1998 and 1998 to 2000 overlap by one year. Also shown in this plot is the slope from a cross-sectional regression of three-year average return on standard deviation of return (across all three-year observations), as well as the slope of a line passing through both the average 30-day T-bill return and the average S&P 500 return (dividends reinvested) during the 1975 to 2000 period.

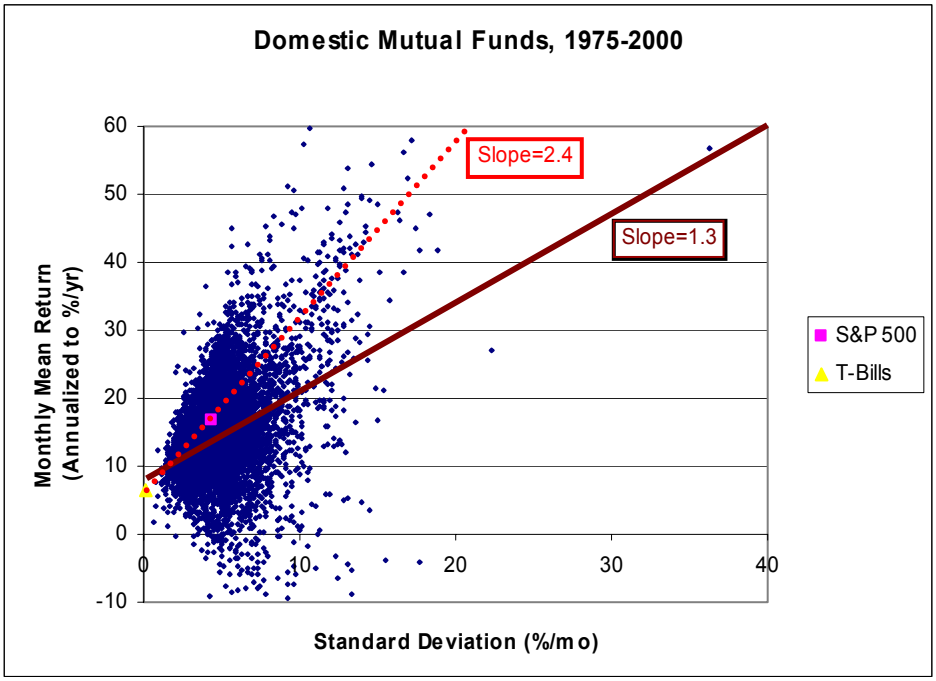
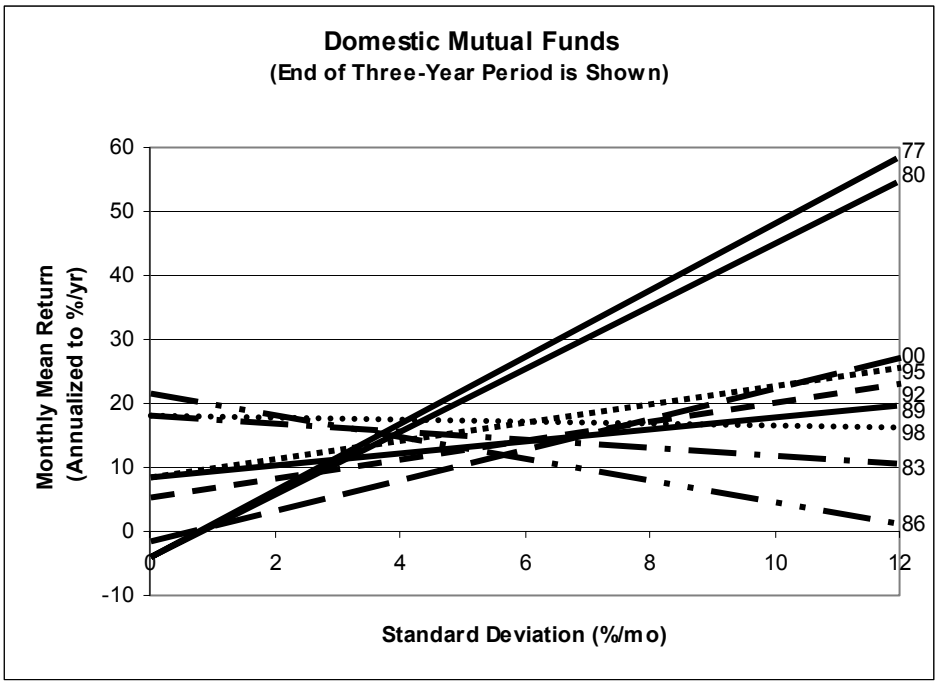


Figure II. Cross-Sectional Regressions of Average vs. Standard Deviation of Monthly Returns of U.S. Domestic Equity Mutual Funds

Panel A shows the experience of mutual fund investors over each three-year subperiod during the 1975 to 2000 period. In this plot, each line represents the cross-sectional regression of average vs. standard deviation of monthly return over a given three-year subperiod. These non-overlapping three-year subperiods start with 1975 to 1977, then 1978 to 1980, etc. The last two subperiods, 1996 to 1998 and 1998 to 2000 overlap by one year. Panel B shows the slope, as well as the significance level of the slope for each regression line.

Panel A: Regression Lines for Each Three-Year Subperiod



Panel B: Regression Slopes for Each Three-Year Subperiod

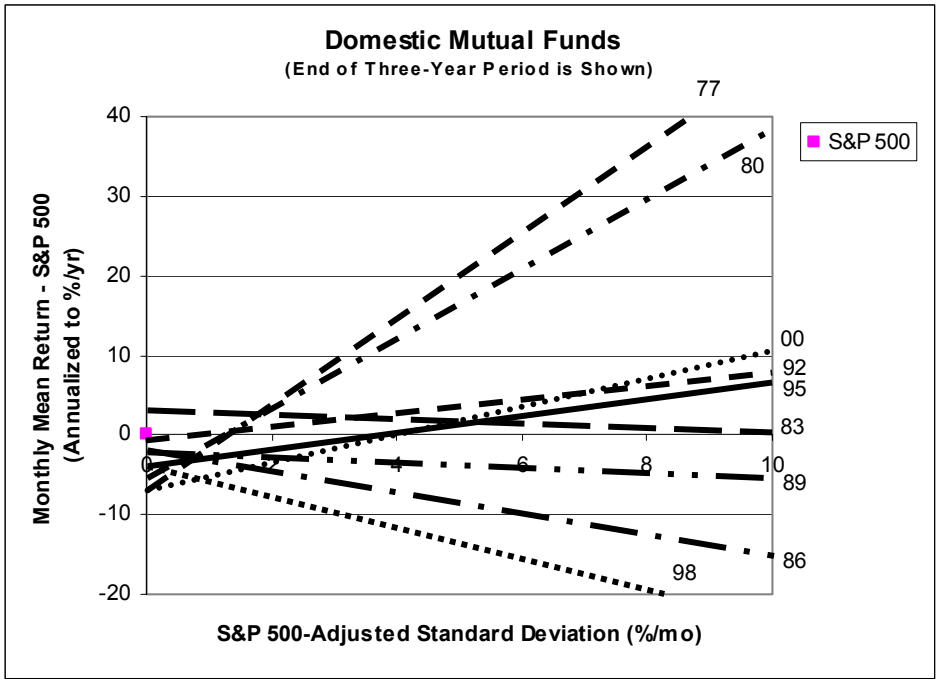
SUBPERIOD	SLOPE
1975-1977	5.4***
1978-1980	5.1***
1981-1983	-0.8***
1984-1986	-1.7***
1987-1989	0.9***
1990-1992	1.7***
1993-1995	1.4***
1996-1998	-0.2***
1998-2000	2.3***
1975-2000	1.3***

*** Significant at the 1 percent confidence level

Figure III. Cross-Sectional Regressions of Average vs. Standard Deviation of Monthly S&P 500-Adjusted Returns: All Three-Year Periods

Panel A shows the experience of mutual fund investors over each three-year subperiod during the 1975 to 2000 period. In this plot, each line represents the cross-sectional regression of average vs. standard deviation of monthly fund return minus S&P 500 return (with dividends reinvested) over a given three-year subperiod. These non-overlapping three-year subperiods start with 1975 to 1977, then 1978 to 1980, etc. The last two subperiods, 1996 to 1998 and 1998 to 2000 overlap by one year. Panel B shows the slope, as well as the significance level of the slope for each regression line.

Panel A: Regression Lines for Each Three-Year Subperiod



Panel B: Regression Slopes for Each Three-Year Subperiod

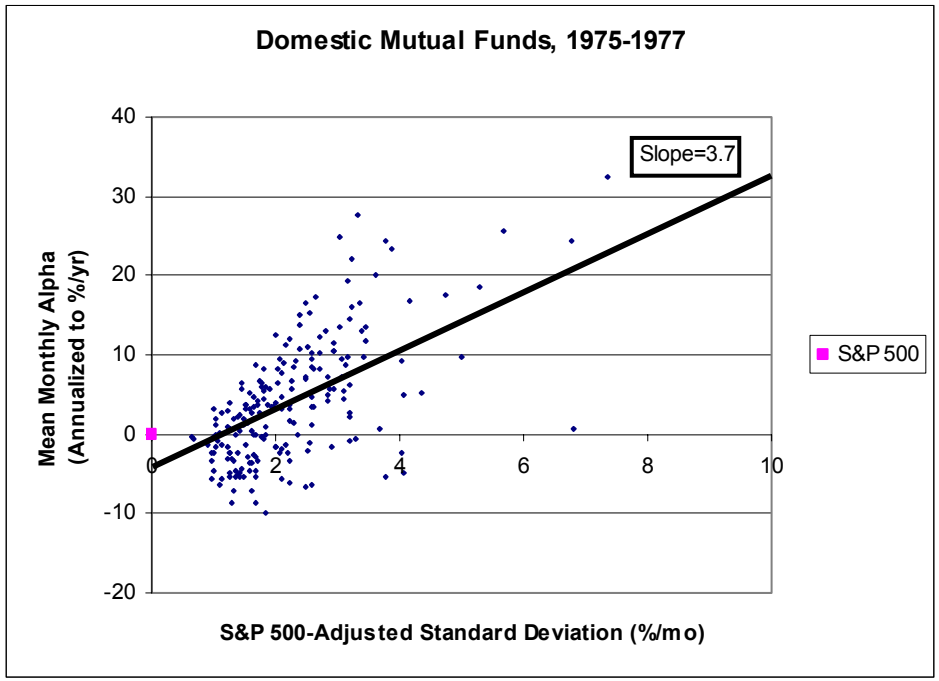
SUBPERIOD	SLOPE
1975-1977	5.4***
1978-1980	4.7***
1981-1983	-0.2***
1984-1986	-1.5***
1987-1989	-0.4***
1990-1992	0.8***
1993-1995	0.9***
1996-1998	-2.0***
1998-2000	1.8***

*** Significant at the 1 percent confidence level

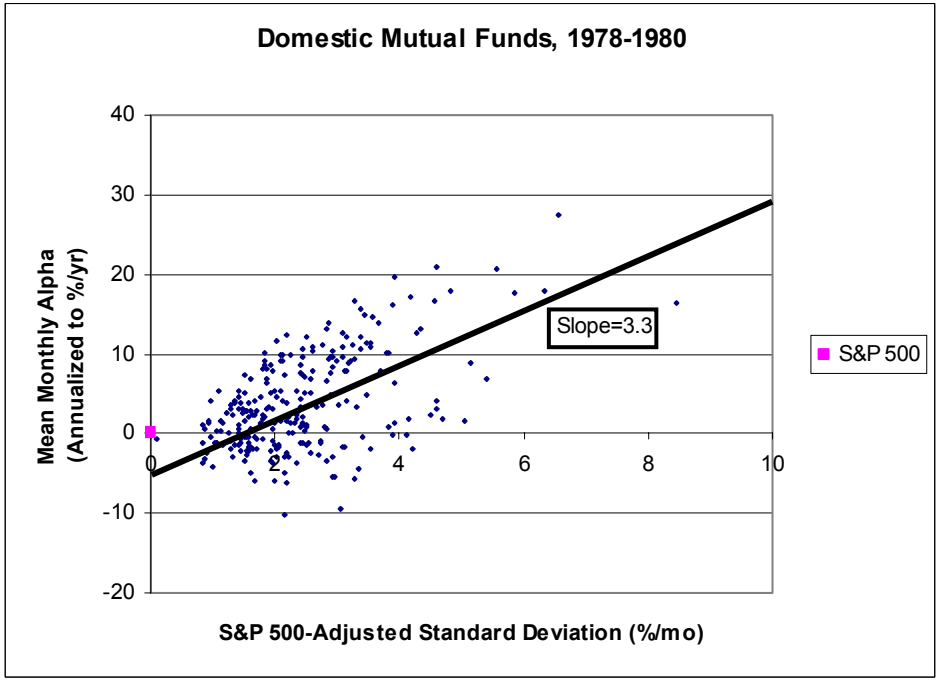
Figure IV. Alpha versus Standard Deviation of S&P 500-Adjusted Monthly Returns of U.S. Domestic Equity Mutual Funds

These panels show the investment experience of three-year investments in individual U.S. domestic equity mutual funds during a given subperiod. Each point represents one mutual fund during the three-year subperiod, and the cross-sectional regression line of monthly alpha as a function of the standard deviation of the S&P 500-adjusted monthly return is superimposed on the plot. The slope of this cross-sectional regression is also shown in each panel. The alpha is the intercept of a regression of monthly fund net return minus 30-day T-bills on the return on the CRSP value-weighted portfolio of NYSE, AMEX, and Nasdaq stocks minus the return on 30-day T-bills.

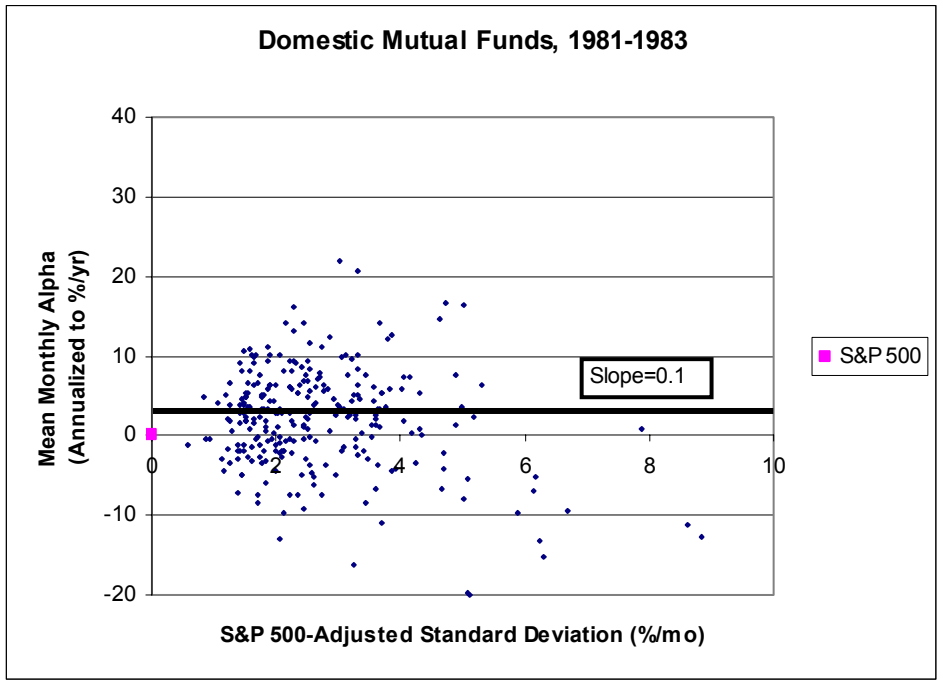
Panel A: 1975 to 1977



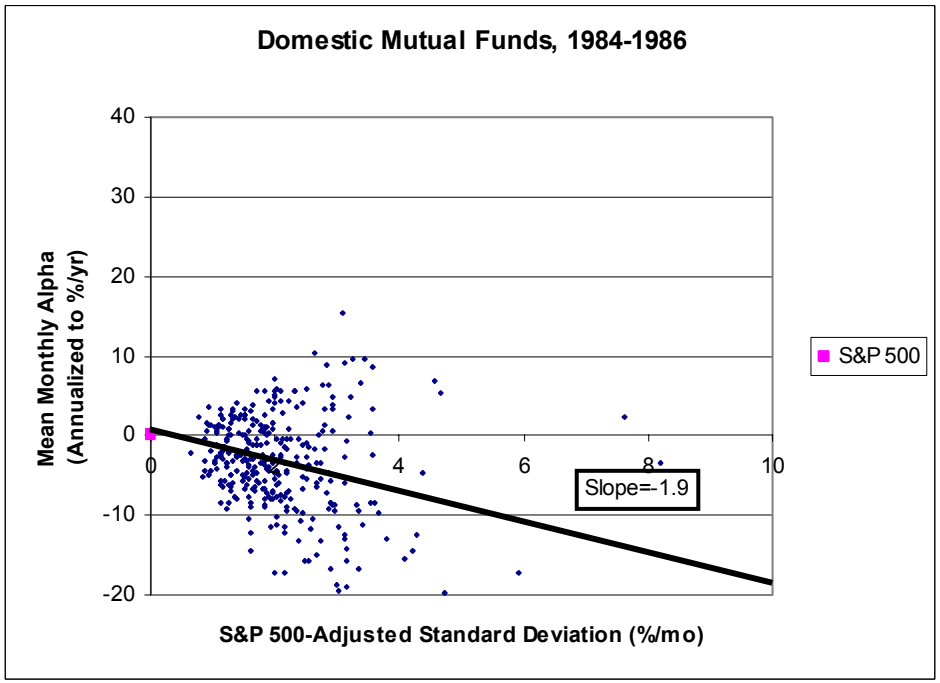
Panel B: 1978 to 1980



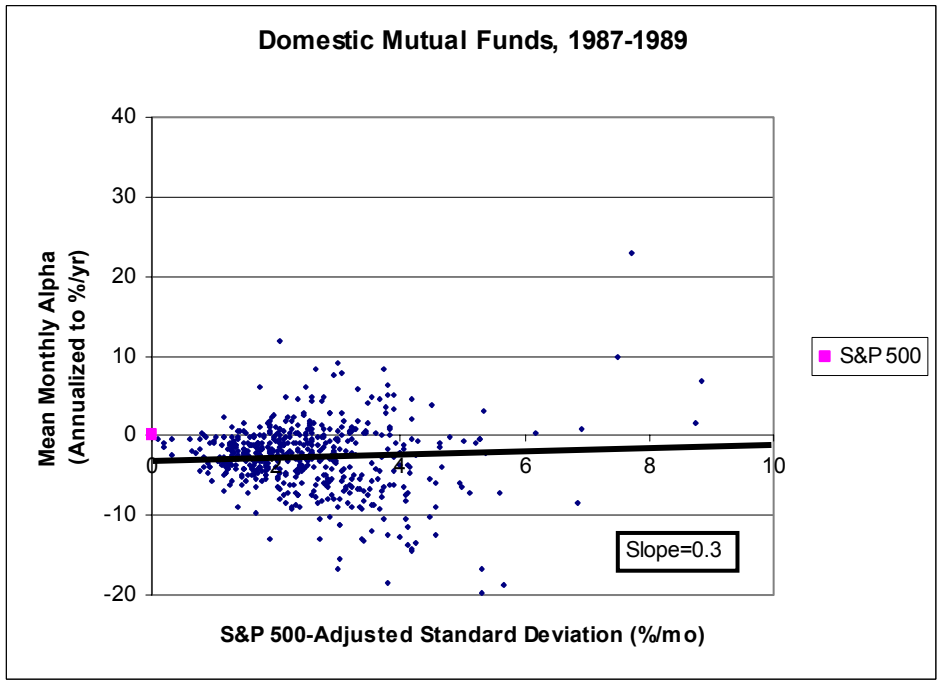
Panel C: 1981 to 1983



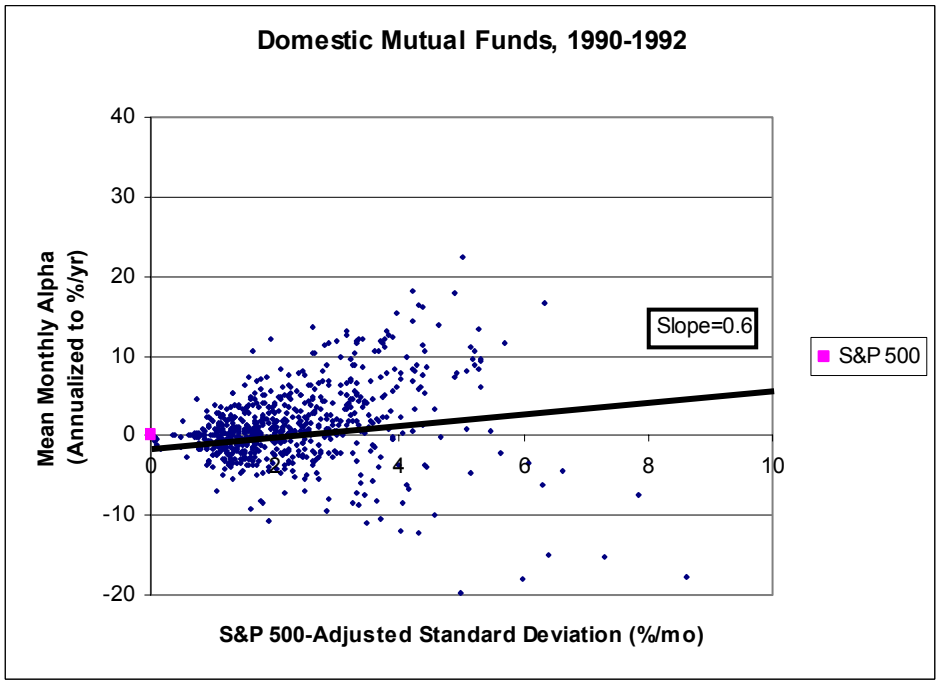
Panel D: 1984 to 1986



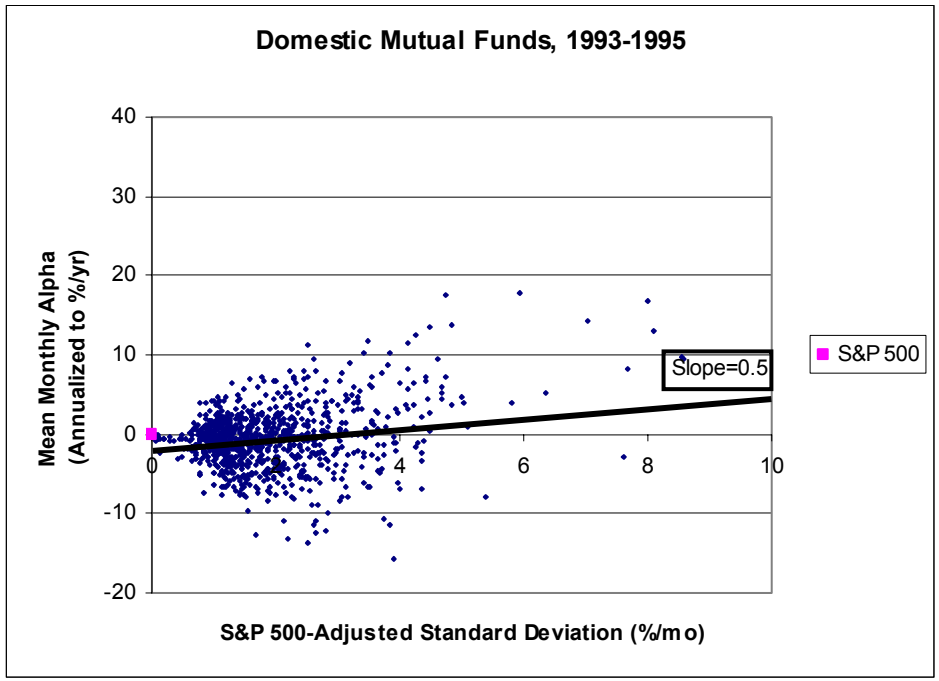
Panel E: 1987 to 1989



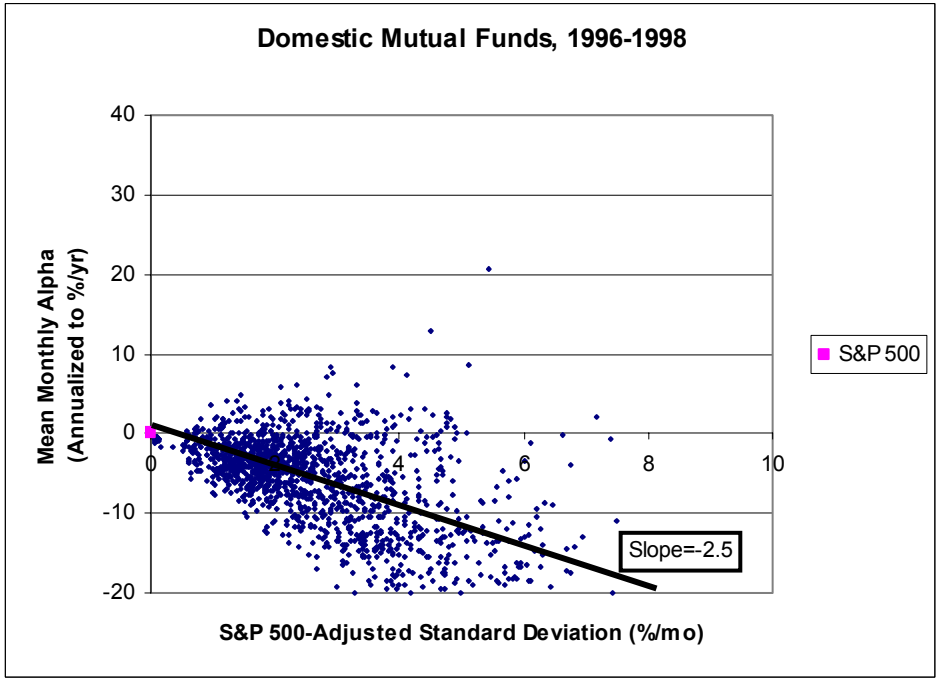
Panel F: 1990 to 1992



Panel G: 1993 to 1995



Panel H: 1996 to 1998



Panel I: 1998 to 2000

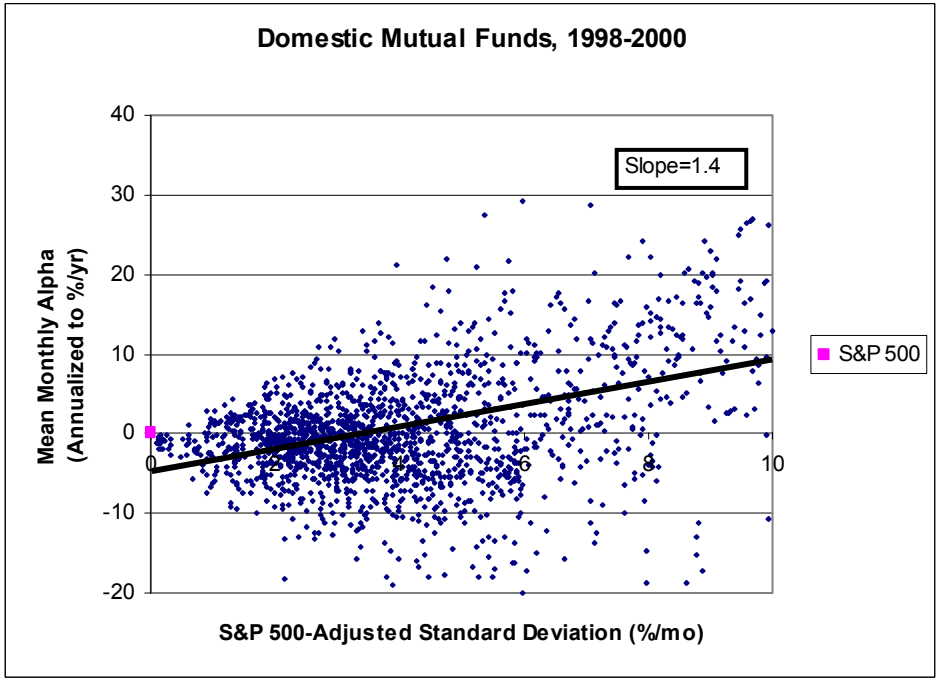
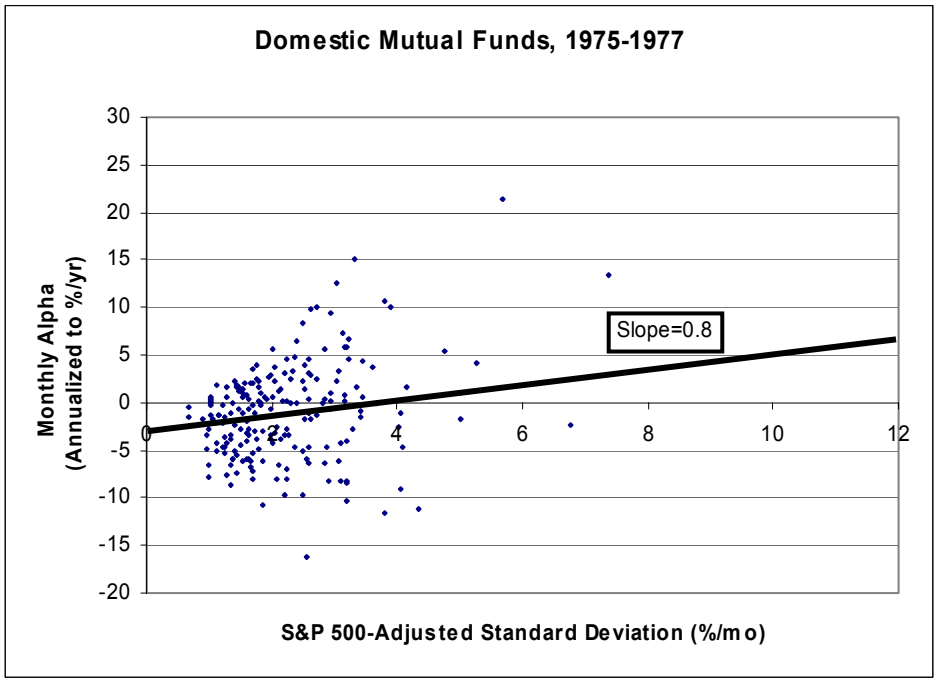


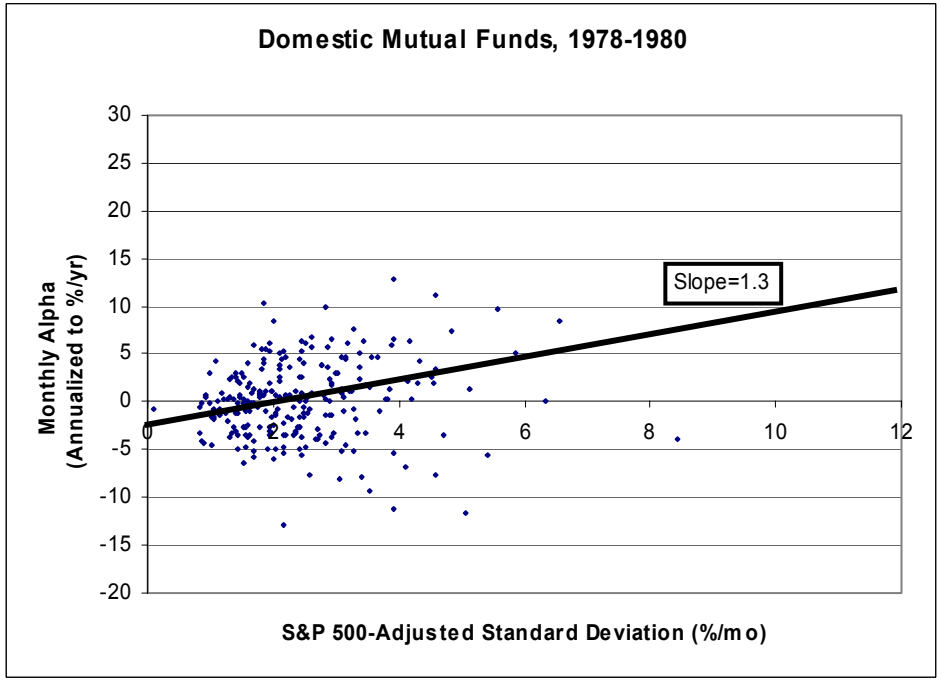
Figure V. Carhart Alpha versus Standard Deviation of S&P 500-Adjusted Monthly Returns of U.S. Domestic Equity Mutual Funds

These panels show the investment experience of three-year investments in individual U.S. domestic equity mutual funds during a given subperiod. Each point represents one mutual fund during the three-year subperiod, and the cross-sectional regression line of monthly alpha as a function of the standard deviation of the S&P 500-adjusted monthly return is superimposed on the plot. The slope of this cross-sectional regression is also shown in each panel. The alpha is the intercept of a regression of monthly fund net return minus 30-day T-bills on (1) the return on the CRSP value-weighted portfolio of NYSE, AMEX, and Nasdaq stocks minus the return on 30-day T-bills, (2) the Fama and French SMB (small minus big stocks) factor, (3) the Fama and French HML (high minus low book-to-market) factor, and (4) the Carhart PR1YR (high minus low past year return) factor.

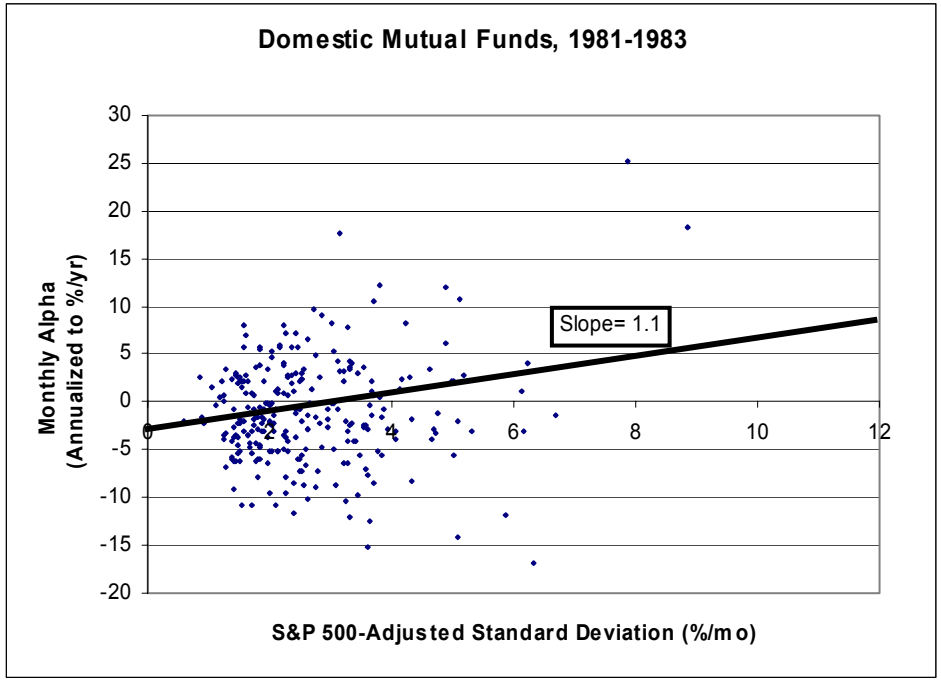
Panel A: 1975 to 1977



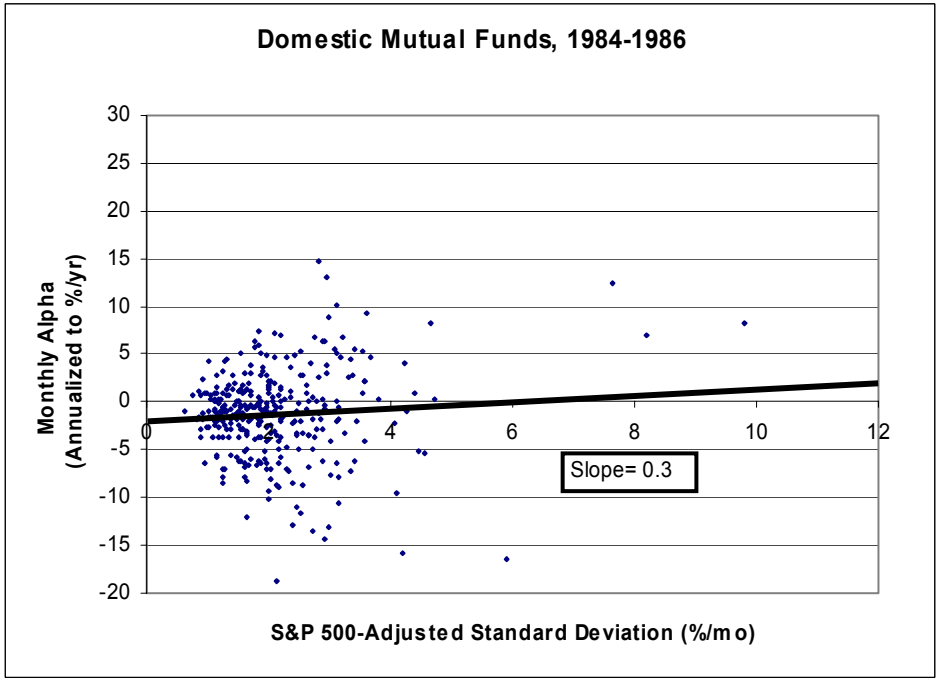
Panel B: 1978 to 1980



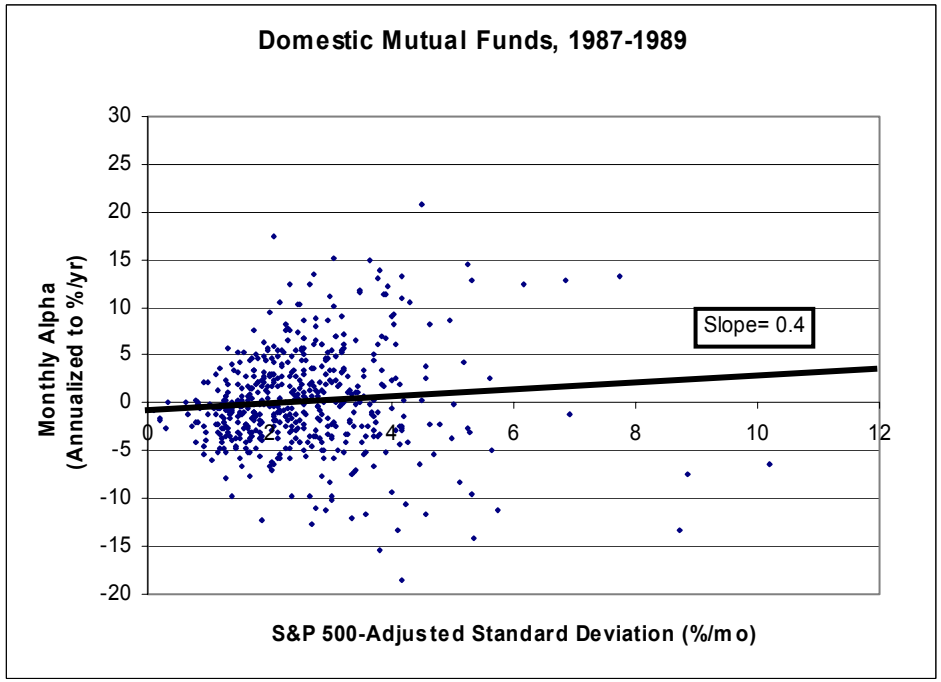
Panel C: 1981 to 1983



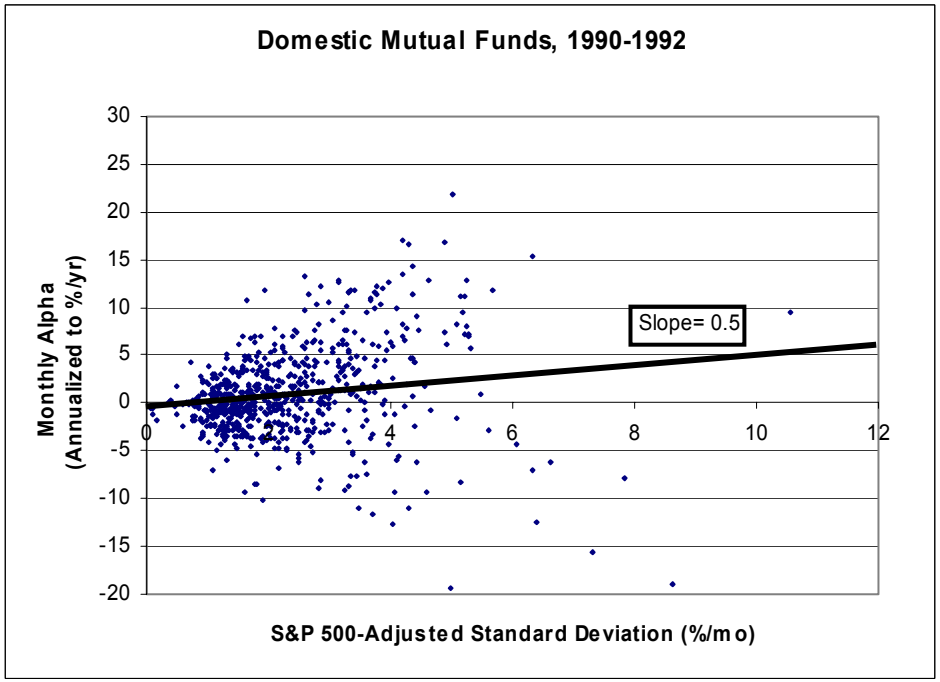
Panel D: 1984 to 1986



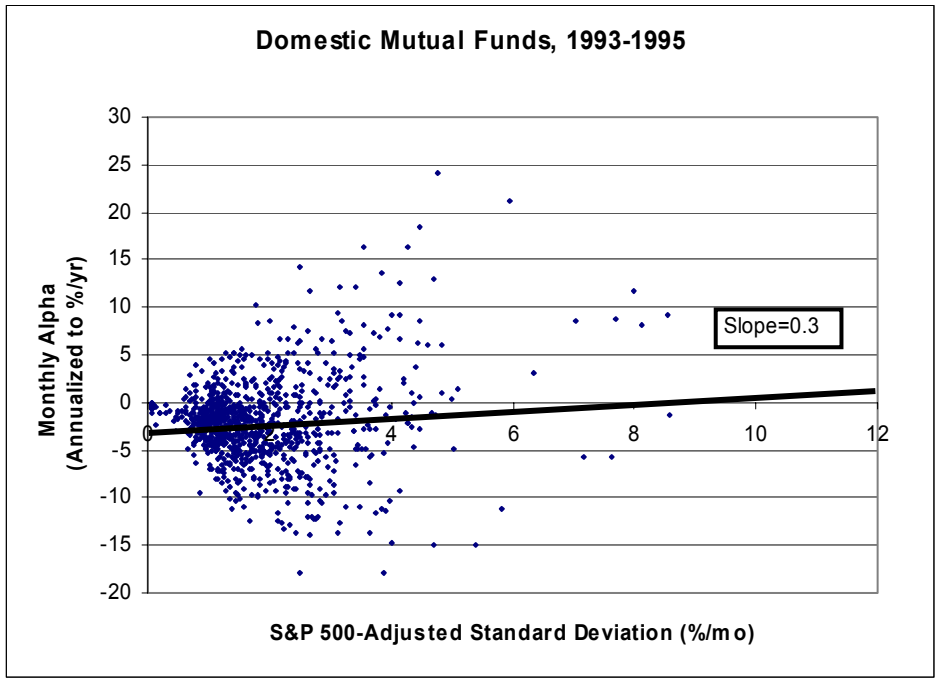
Panel E: 1987 to 1989



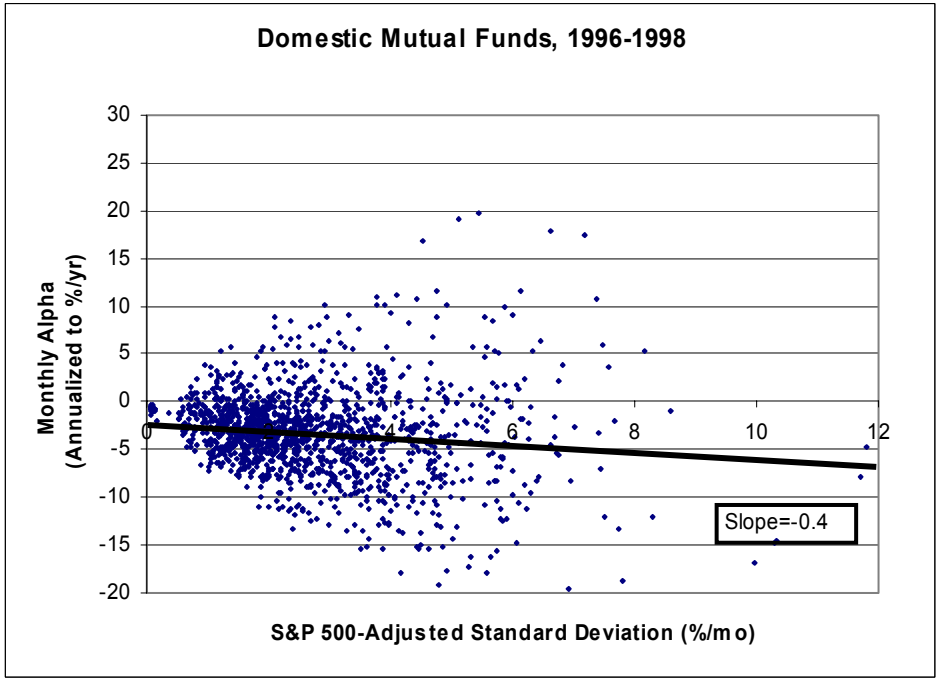
Panel F: 1990 to 1992



Panel G: 1993 to 1995



Panel H: 1996 to 1998



Panel I: 1998 to 2000