# CAREER CONCERNS OF MUTUAL FUND MANAGERS*

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**Abstract**

We examine the labor market for mutual fund managers. Using data from 1992-1994, we find that "termination" is more performance-sensitive for younger managers. We identify possible implicit incentives created by the termination-performance relationship. The shape of the termination-performance relationship may give younger managers an incentive to avoid unsystematic risk. Direct effects of portfolio composition may also give younger managers an incentive to "herd" into popular sectors. Consistent with these incentives, we find that younger managers hold less unsystematic risk and have more conventional portfolios. Promotion incentives and market reponses to managerial turnover are also studied.

## I Introduction

A side effect of the growth of the mutual fund industry in recent years has been increased attention paid to the internal workings of fund companies. Among the most dramatic stories of the last several years was the the wholesale shakeup of portfolio managers at Fidelity Investments: 26 managers were reassigned in a single day in March of 1996. The recent public attention paid to the hiring and firing of mutual fund managers suggests that fund managers work in an environment in which their actions and performance greatly affect their future career prospects. This leads to the question of whether fund managers' investment decisions are affected by their career concerns.

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It has long been recognized that the relationship between a mutual fund company and its investors involves potential agency problems. The organization of the industry under the 1940 Investment Company Act is designed to allow investor monitoring of management companies, and later regulations prohibiting option-like compensation schemes for fund companies were directly motivated by concerns that such schemes might lead to undesirable behavior. The subsequent academic literature (following Modigliani and Pogue [1975]) has noted that there remain a number of ways in which investment decisions may be affected both by the explicit compensation schemes of fund companies, and by implicit incentives which derive from a desire to attract new customers. However, to our knowledge, the literature has focused exclusively on incentive issues arising from the agency relationship between fund companies and fund investors. Agency issues within the fund companies, and, in particular, the possible effects of managerial career concerns have not been studied in applied work. In this paper, we look at how the behavior of mutual fund managers may be affected by their desire to avoid losing their jobs. In particular, we look at how the likelihood of a manager being "terminated" is affected by the manager's actions, past performance, etc., discuss how aspects of the relationship might cause behavior to vary systematically across managers, and then examine these predictions by looking at how behavior actually differs between younger and older managers.

In the theory literature, the idea that manager's behavior might be influenced by career concerns was introduced by Fama [1980] and Lazear and Rosen [1981] who focused on how career concerns might solve agency problems. Holmstrom [1982] analyzed the nature of career concerns which arise when a competitive labor market is trying to learn about managers' abilities despite the presence of unobserved effort and random noise. Holmstrom noted that, while career concerns can overcome agency problems in particular cases, a number of distortions typically remain. For example, managers may exert excessive effort when young and slack off when old. A number of more recent papers have followed Holmstrom in looking at the types of distortions which career concerns may induce when managers make investment decisions, select between projects, etc. Of late, particular interest has centered on whether career concerns may lead to "herd behavior" [Scharfstein and Stein

1990; Zwiebel 1995; Prendergast and Stole 1996; Morris 1997; Avery and Chevalier 1998].

In this paper, we examine managerial turnover and patterns in investment decisions in a dataset which contains information on 453 portfolio managers who had primary responsibility for a growth or growth and income mutual fund at the start of 1992, 1993 or 1994. By tracking managers' career outcomes, we separate managers into two categories: managers who maintain their position or move to a position with a larger fund and managers who lose their position and either disappear from fund management or obtain a position at a smaller fund. We refer to managers in this latter category as having been "terminated". Our first estimates are of the relationship between a manager's performance and the probability of termination. As one would expect from models like those of Jovanovic [1979] and Holmstrom [1982] where fund companies are learning about managers' abilities from observations on returns, we find that a manager's probability of retaining or improving his current position is increasing in the risk-adjusted return he achieves, and that managerial termination is more performance-sensitive for younger managers.[1]

Examining the determinants of termination in a bit more detail, we find some interesting features which would be expected to lead to cross-sectional differences in managerial behavior if managers are influenced by a desire to avoid termination. First, we find that, for young managers, the probability of termination is a convex function of performance. Specifically, the probability of termination decreases steeply with performance when managers have negative excess returns, but it is fairly insensitive to differences at positive excess return levels. As a result, young managers may have an incentive to avoid unsystematic risk when selecting their portfolios. Second, we look at direct effects of managers' actions on the probability of termination (controlling for performance). Here, we find that a young manager is more likely to be terminated if his fund's sector weightings or unsystematic risk level deviates considerably from the mean of the fund's objective group. Young managers may thus have an incentive to herd, as has been suggested in the theoretical literature.

Clearly, a desire to avoid termination is only one of the incentives a manager faces. Managers may also have explicit incentive contracts (on which no data is available) and

[1]Our results are also consistent with an "entrenchment" story, which we discuss below.

may be concerned about possible promotions (although, as we discuss later, we think this is probably not so important in our sample). Thus, one would not be been surprised to find that the features of the termination-performance relationship that we studied had no identifiable effects on managerial behavior. Nonetheless, we look for evidence of the age-related differences in behavior mentioned above. Consistent with the incentives created by the nonlinearities in firing probabilities, we find that younger managers do indeed take on less unsystematic risk than their older counterparts. Consistent with our results on boldness, we find also that younger managers appear to deviate less from the mean risk levels and sector weightings of funds in their objective class.

We next look at how investment flows react to managerial turnover. If consumers believe that managerial ability exists, one might imagine that they will reallocate their investments in response to changes in a fund's management, and that this might well provide an additional motivation for funds to fire or retain managers. We find some weak evidence of such behavior on the part of consumers. Finally, while there aren't many promotions in our dataset, we look also at how the probability of promotion is related to a manager's age, performance, portfolio choices, etc. and comment on the potential incentives this may provide.

The first part of our paper is similar to Khorana [1996] which examines the relationship between fund returns (and growth) and managerial replacement in a sample of stock and bond funds which contains 339 instances of managerial turnover between 1979 and 1992. Khorana finds that the probability of separation is negatively related to returns in the current and previous year. In this paper, we track managers post-separation in order to try to isolate separations which constitute negative career outcomes and separations which can be thought of as positive career outcomes. We also consider the direct impact of a manager's actions and look at age-related variation in the determinants of termination, and analyze whether behavior appears to respond to the differential career concerns which our analysis uncovers.

While unique in its focus on career concerns, our work is also related to a number of other papers on the distortions which delegated portfolio management can produce. Modigliani

and Pogue [1975], Starks [1987], Grinblatt and Titman [1989] and Admati and Pfleiderer [1997] consider the incentive effects of explicit performance contracts between a mutual fund company (or manager) and mutual fund investors. As Berkowitz and Kotowitz [1993] note, contracts which pay the fund company a fixed fraction of assets under management implicitly contain a performance compensation element which stems from the fact that new money flows into a fund when the fund does well, and money flows out of funds when the fund does poorly. Huddart [1997] discusses the incentive effects of the flow-performance relationship theoretically. Chevalier and Ellison [1997] and Roston [1997] examine empirically how such implicit incentives may affect risk-taking by mutual funds. Lakonishok, Shleifer, Thaler and Vishny's [1991] study of window-dressing among pension fund managers is similarly motivated by the idea that an incentive to attract customers may lead managers to alter their portfolios.

Despite the theoretical interest in career concerns, there has been very little empirical work documenting how career concerns affect managerial behavior in any industry. There is a literature which shows that, in general, poor job performance leads to poor labor market outcomes for managers. The largest branch of this literature, following Coughlan and Schmidt [1985], Warner, Watts and Wruck [1988], and Weisbach [1988], has clearly demonstrated that CEO turnover tends to follow poor stock market performance. Kaplan and Reishus [1990] can be thought of as providing some evidence for promotion-like incentives for CEOs in showing that CEOs who perform poorly are less likely to become outside members on the Boards of Directors of other firms. Gibbons and Murphy [1992] provide some indirect evidence of the incentive effects of career concerns; they show that firms make explicit compensation more performance-sensitive for CEOs who are closer to retirement.[2] Gompers and Lerner [1994] offer similar results for venture capitalists. In contrast to Gibbons and Murphy, Kahn and Sherer [1990] examine managers in a single industrial company and show that bonuses are more sensitive to performance evaluations for managers with lower seniority.

[2]Dewatripont, Jewitt and Tirole [1997] note that, depending on how one specifies relationships between ability, effort, and output, it is possible for career concerns incentives and explicit incentives to be complements, and thus the reverse finding might also have been consistent with a career concerns model.

While these papers shed light on the effort incentives generated by career concerns, we are aware of no direct empirical evidence which links career concerns to other aspects of managerial decision-making. As a context in which to study the effects of career concerns, the mutual fund industry is attractive for a number of reasons: the set of portfolio managers provides a large sample of managers in similar positions; the managers are sufficiently public figures so as to allow us to identify when turnover occurs and to obtain such information as the managers' ages; performance in terms of fund returns are readily observable; and some elements of behavior such as sectoral allocations and risk-taking can be directly observed or inferred from the time series of returns.

The remainder of the paper proceeds as follows. In Section II, we describe the data used in the paper and provide background information on the post-separation careers of fund managers. In Section III, we examine the basic termination-performance relationship. Section IV examines nonlinearities in the termination-performance relationship that may generate incentives for young managers to avoid unsystematic risk in the management of their funds. We investigate the relationship between termination and a manager's decision to choose sector weightings or systematic or unsystematic risk levels which deviate significantly from the mean for the fund's objective group in Section V. We examine managerial responses to these implicit career concerns in Section VI. Section VII examines the effect of managerial turnover on investment flows. Section VIII examines promotions. Section IX provides discussion and conclusions.

## II Data

Most of the data in the paper are obtained from Morningstar Incorporated. We gather data on fund characteristics, returns, and manager identities for growth and growth and income mutual funds from the Morningstar *Mutual Funds OnDisc* compact discs. We use multiple CDs of approximately annual frequency to construct a sample of funds which are in operation in 1992, 1993, or 1994. We follow all funds through 1995, unless they expire earlier, in which case we follow them through their last appearance in the data. The dataset contains data for all new growth and growth and income funds which appear over

the 1992-1994 time period. Thus, our dataset eliminates some of the common survivorship difficulties.

We consider the characteristics and performance of the manager in charge of the fund on January 1st of year $t$ in determining whether the manager is terminated from the fund between year $t$ and year $t+1$. Thus, for a fund manager to be included in our sample, the manager must have been the sole manager of a growth or growth and income mutual fund on January 1st of 1992, 1993, or 1994.[3] While the data sometimes lists the names of each member of a management team, it is often not clear whether all of the managers listed contribute equally to the management of the fund, or whether one of the listed managers is the lead manager, and we thus felt that it would be problematic to generate metrics of manager characteristics and follow manager careers in the case of multiple managers.

The characteristic of a manager on which we will focus most is the manager's age. While manager ages are not reported in Morningstar, Morningstar does report the dates on which a manager received college and advanced degrees. Our manager age variable is calculated by assuming that the manager was 21 upon college graduation. Occasionally, the graduation date is missing, but the manager's birth year is reported. In those cases, we use the birth year to calculate the manager's age. We view the manager's age as being the best available proxy for the manager's stage in his career and for the amount of information that the market has about the manager. Alternatively, one could construct a manager tenure variable based on the manager start date reported in Morningstar. We rejected this alternative measure of manager experience for two reasons. Firstly, because mutual fund managers change positions frequently and the available tenure variable is fund-specific rather than company-specific, such a tenure variable provides only very limited information on a manager's career history. Secondly, the tenure variable seems to be reported somewhat inconsistently; in looking back through old Morningstar references, we find many inconsistencies in the managers' reported start dates. In contrast, the reported birth year or graduation year for a given manager very rarely changes when one examines Morningstar

[3]Because Morningstar often provides incomplete or inaccurate information about the start dates of managers, we verified the manager identities CD by CD, rather than inferring the manager identities for an older CD by using the tenure of a manager reported on a newer CD.

records generated at different times.[4]

We construct annual measures of the funds' risk-taking and performance using monthly return data for the year in question. Betas are derived by regressing the difference between a fund's return and the risk-free rate on the difference between the return on a market index and the risk-free rate.[5] Our measure of fund $i$'s unsystematic risk in year $t$, $UnsysRisk_{it}$, is the square root of the estimated residual variance in this regression, rescaled so that $UnsysRisk$ would, for example, take on a value of 0.05 if a portfolio was expected to return the market return plus or minus five percentage points per year. Our standard measure of performance, $Alpha_{it}$, is Jensen's alpha, the constant term in this regression, similarly rescaled so that it represents an annual excess return.

Table I provides summary statistics for the variables that will be used in the subsequent analysis. Because our analyses of termination and promotion require that we look ahead to the start (or end) of the next year to see whether the manager was replaced, etc. most of our analysis will be based on data from 1992 - 1994 described in the top panel of the table. When analyzing cross-sectional patterns in manager behavior we do not need to look forward in time and thus use the full 1992 - 1995 sample. Summary statistics for this sample are in the middle panel of the table. Our analysis of investment flows uses a sample similar to that with which we study terminations and promotions, but we drop funds which close in year $t+1$ (for which we do not have a measurable inventment flow) and funds which are very small or have extremely high or low returns. Summary statistics for this sample are given in the bottom panel of the table.

To motivate our measure of terminations, Table II examines all "separations" of a manager from his position. There are two ways that a "separation" can occur in our dataset. First, our definition of separation includes any situation in which the sole manager of a fund is replaced, either by a team of managers, or by a new manager. Second, a separation occurs when a fund ceases to exist in our data. A manager in our data is said

[4]We will also see in Section III that when the fund-specific tenure variable is included along with age in a regression it does not have a significant effect.

[5]The "market" return is a value-weighted NYSE/AMEX/NASDAQ composite. Our data on market returns and risk-free rates were obtained from Kent Daniel and their construction is described in Daniel and Titman [1997].

to retain his position if a separation does not occur.

In principle, separations could represent promotions, firings, demotions, or lateral moves. However, because the management of a growth or growth and income fund is among the pinnacle positions for portfolio managers within a fund company, we would expect that few of the separations in our sample are likely to reflect promotions. Were we to examine a sample of specialty or sector funds, we would have expected promotions to be much more important.

Separation occurs in 242 of the 1320 manager-fund-years in our dataset. We can crudely measure the effect of the separation on the manager's career by examining the total assets that the manager managed prior to the separation and after the separation. To calculate the total assets that the manager manages in each period, we search for all funds in the *entire* Morningstar database which list the manager. In cases in which $N$ managers were listed as managing a fund, $1/N$ of the fund assets were attributed to each manager. As a very crude proxy for changes in the manager's compensation, we looked to see how the total assets which the manager controlled changed in the year in which separation occurred.[6] This proxy could be misleading if, for example, a small fund brings in a "star" manager at a high salary in order to attract money into a new fund.

One hundred forty four of the 242 managers who separated managed some fund in the year following their separation. Of these, 38 managers controlled more assets post-separation while 106 controlled fewer total assets post-separation. Of that group, managers who reappeared in the dataset managing fewer total assets had performance slightly worse than the mean performance for their objective group, while managers who resurfaced in the dataset managing greater total assets had slightly better than the mean performance for their objective group (the objective group being the group of all growth funds or the group of all growth and income funds).

The other 98 separated managers managed no assets in the Morningstar database in the year of their separation. Only four of them were greater than sixty years old, so it

[6]That is, if the manager ceased managing a growth and growth and income fund in year t, we examined whether or not he could be found elsewhere on the Morningstar CD in year t. We adjusted the total assets managed before and after separation to control for total growth in the mutual fund industry during that year using data from the Investment Company Institute.

seems unlikely that many of these moves are simply retirements. Some of the exits could be "promotions", for example, to a more desirable position at hedge fund. The anecdotal evidence in the press, however, suggests that this is not common for our sample period. For example, when Jeff Vinik (who earlier left Fidelity's flagship Magellan fund) opened a hedge fund in November of 1996, *The New York Times* quoted an expert on hedge funds as saying that "I think he will be the first of many high-profile money managers with great reputations who cross over into the hedge fund field," which suggests that in the period we are looking at this had not been a common move.[7] In our sample, the group of ninety-eight managers who disappear from the fund industry after separation also had, on average, a worse pre-separation performance than any of the other groups of separators.

For lack of a better shorthand, we will refer to these instances in which the manager separates from his position and either disappears from Morningstar or resurfaces managing fewer total assets as negative career outcomes or "terminations". We recognize that many of these separations may, in fact, reflect a manager's voluntary departure from a position and thus, may not be situations in which an actual firing has occurred. We refer to any manager who separates from his position and reappears elsewhere in the next year managing greater total assets as having been promoted. It is, of course, also possible that some of these managers did not leave their previous positions voluntarily.

## III The Basic Termination-Performance Relationship

In this section, we examine the determinants of managerial termination. Our empirical specification is motivated by the idea that terminations may result from a learning process similar to those described in Jovanovic [1979], Holmstrom [1982] and Murphy [1986]. Presumably, actively managed mutual funds exist because investors believe that some managers have an ability to gather information and pick stocks that will have an above average return. We would imagine that firms and managers will initially be uncertain about each manager's ability, and will learn over time by observing the returns that the manager achieves. To obtain a theory of termination (as opposed to a model in which wages adjust

[7] *New York Times*, November 1, 1996, p. D1.

to the level of a manager's expected ability), Jovanovic notes that one could assume that a manager's productivity has a match-specific component. While the skills of a mutual fund manager seem unlikely to be company-specific, terminations could similarly be generated by assuming that there are a limited number of positions for fund managers and a large pool of potential managers of unknown ability.

With a competitive labor market, terminations will occur in such a model whenever firms' assessments of a manager's ability fall below some threshold which is sufficiently low so as to make it efficient to incur the transaction costs involved in replacing him with a new manager. Termination will thus be expected to follow poor performance.[8] We would expect that the sensitivity of termination to performance will decrease with the manager's experience for two reasons. First, when firms have more observations of a manager's performance they will update their assessment of his ability less in response to a single observation. Second, because more experienced managers are survivors of a selection process, market assessments of their ability may on average be further away from the threshold level at which it becomes efficient to replace the manager.

To analyze the termination-performance relationship empirically, we perform probit regressions. Our dependent variable is a dummy variable, $Termination_{it}$, which is set to one if the manager responsible for fund $i$ in January of year $t$ is no longer in charge of the fund at the beginning of year $t+1$ and has also not been observed to have obtained another fund management position by that time which involves managing greater total assets:

$$\begin{aligned} Termination^{*}_{it} &= \beta_0 + \beta_1 Alpha_{it} + \beta_2 Alpha_{it} \times (MgrAge_{it} - \overline{Age}) + \beta_3 Alpha_{it-1} \\ &\quad + \beta_4 Alpha_{it-2} + \beta_5 ManagerAge_{it} + \beta_6 Age60+_{it} \\ &\quad + \beta_7 GrowIncDummy_{it} + \beta_8 Year92_t + \beta_7 Year93_t + \epsilon_{it}, \\ Termination_{it} &= \begin{cases} 1 & \text{if } Termination^{*}_{it} > 0 \\ 0 & \text{otherwise.} \end{cases} \end{aligned}$$

Our measure of a fund's performance in given year is Jensen's alpha, risk-adjusted excess

[8] Note that the cutoff level of current performance necessary to retain one's position varies with a manager's past performance. In the presence of hiring/firing costs, there is an option value to retaining a manager of unknown ability which decreases over time as his ability is known more precisely. Hence, the threshold level of expected ability below which a manager would be replaced increases over time, and the cutoff level of current performance necessary for a manager to retain his position can in some circumstances be average or above average rather than "poor".

returns. We allow termination to be affected differentially by performance in the current year, $Alpha_{it}$, and in each of the previous two years, $Alpha_{it-1}$ and $Alpha_{it-2}$. To allow the performance-sensitivity of termination to vary with a manager's experience, we include also an interaction between $Alpha_{it}$ and the difference between the manager's age and the mean age in the sample (which is about 44.) The manager's age is also entered additively, and to allow for the possibility of normal retirements we include a dummy variable $Age60+$ which takes the value of one if the manager is sixty years old or greater, and zero otherwise. Our specification so far implicitly assumes that managers are evaluated based on their performance relative to the market. Evaluations based on absolute performance or changes in the tightness of the market for fund managers would cause termination probabilities to change from year to year. We have thus included year dummies in our specification. The omitted year is 1994. A dummy for growth and income funds (as opposed to growth funds) is also included.

The results from the basic specification are presented in column one of Table III. Standard errors are adjusted to account for the possibility that multiple observations for the same fund may be correlated (see Rogers [1993] for the methodology). As expected, the coefficient on $Alpha_{it}$ is positive, and it is statistically different from zero at the 1 percent confidence level. The point estimate suggests that a manager of the mean age in the sample who has performance ten percentage points worse than the mean manager increases the probability that he will be terminated by about 7.2 percentage points. (The mean probability of termination is 15.5 percent.)

From the perspective of learning about career concerns, the most interesting result in the table is that the sensitivity of termination to performance is greater for younger managers. If our hypothetical manager who underperforms the market by ten percentage points is ten years younger than the mean manager in the sample, then the probability of termination increases by fourteen percentage points rather than seven.

As expected, the coefficients for the lagged alpha variables are positive. The coefficient for the one year lagged alpha variable is statistically different from zero at the five percent confidence level. The coefficient for the one-year lagged alpha variable implies that, if a

manager underperformed by ten percentage points last year, his probability of termination is 3.3 percentage points higher this year. The coefficient on the two-year lagged alpha is not statistically significant at standard levels.

The coefficient on the additive age variable is small and statistically insignificant. This suggests that, for managers whose performance just matches the market, age is not a significant determinant of termination. While we include a dummy variable for managers who are greater than sixty years old to allow for normal retirement, the coefficient for the $Age60+$ dummy variable is negative, as expected, but is not statistically different from zero at standard confidence levels. We find also that managers of growth and income funds are more likely to be terminated from their positions than the managers of growth and income funds, and that termination was least likely in 1993 and most likely in 1994. The latter results are consistent with our expectations; 1993 was the best year of the three for the mutual fund industry and 1994 was the worst, both in terms of the raw return of the mean fund and in terms of industry growth due to inflows of new investment.[9]

One potential problem with our specification of the termination-performance relationship is that the primary explanatory variable for whether a manager is terminated in year $t$, is the *fund's* performance in year $t$. When a termination occurs in the middle of the year, the performance measure includes returns attributable to the manager who replaced the terminated manager. One might thus worry that some of what we find is a result of an endogeneity problem where returns are lower when a manager is replaced because the new manager might tend to turn over the portfolio and incur trading and transactions costs. We felt our specification was the most reasonable choice because we often lack data on when during the year the termination occurred. The data we do have also indicates that the potential endogeneity problem mentioned above is not a concern. In 109 of the cases in which a manager is terminated during year $t$ we can identify the month in which this occurs. In these fund-years, the average annualized return in the period prior to termination was -0.061, and the average annualized return for the period after termination was -0.005.

[9]For example, on February 18, 1995 *The New York Times* reported that Stein Roe laid off two fund managers and eliminated their positions by assigning responsibility for their funds to other fund managers at the company, and quoted analysts as saying that "with less money moving into mutual funds, fund groups are likely looking at ways to cut costs."

Hence, essentially the entire correlation between $Alpha_t$ and $Termination_t$ is due to the low returns of the managers who were terminated.

Columns 2-5 of Table III examine other factors which might affect the sensitivity of termination to performance. Column 2 adds the mutual fund's expenses to the right hand side in order to examine whether managers are implicitly evaluated on a pre-expense basis or a post-expense basis. If managers are evaluated on their pre-expense returns ($Alpha_{it} + ExpenseRatio_{it}$), then one might expect that the coefficient on the expense ratio to be positive and equal to the coefficient on $Alpha_{it}$. The coefficient estimate is indeed positive and we can not reject the hypothesis that it is equal to the coefficient on $Alpha_{it}$, although the standard errors are sufficiently large so that we can only reject the hypothesis that it is zero at the ten percent level.

Column 3 adds fund size and a fund size-performance interaction to the specification. One might imagine that the managers of larger funds are those who are most highly regarded by their current employers, and thus they might be less likely to be fired following a poor performance. At the same time, however, it may be more costly in terms of forgone investment flows to retain a poorly performing manager at a large fund. While manager terminations tend to be higher unconditionally for larger funds, we do not find a significant effect of fund size on the performance sensitivity of termination.

Another issue which might affect the basic relationship is the possibility that different fund organizations may respond very differently to poor performance. For example, small fund organizations might be family run, with turnover limited by personal relationships. To examine this, we check whether termination is more sensitive to performance for larger or smaller fund organizations by including (separately and interacted with $Alpha_{it}$) the logarithm of $FamilySize_i$, the total assets of all funds within the fund family at the start of the sample period. The results suggest that termination is unconditionally more likely in larger fund organizations, but terminations are not significantly more sensitive to performance at the larger fund organizations in our sample.

Finally, in the preceding specifications, we chose manager age as our proxy for the manager's experience in the industry. Another proxy is available to us; Morningstar provides

a variable which is the manager's start date at the fund. We argue above that the tenure variable available to us is inferior to age as a measure of the manager's experience. As a check, Column 5 of Table III presents the basic specification when tenure and a tenure-performance interaction are included as regressors along with age and the age-performance interaction. The age-performance interaction survives in magnitude and significance, while the tenure-performance interaction coefficient is very small and statistically insignificant. In unreported regressions, we also examine the effect of including tenure measures while excluding age measures. Not surprisingly, a specification which includes the tenure variables and excludes the age variables gives coefficients for tenure and for tenure interacted with performance which are similar in magnitude and significance to the coefficients for the corresponding age coefficients in a regression with age measures and without tenure measures.

In summary, the results of this section are consistent with the hypothesis that fund companies dismiss managers in a manner which is consistent with a model in which fund companies gradually learn about managers' abilities through time. The results are also consistent with other reasonable models. For example, the lower sensitivity of termination to performance for older managers is also consistent with the idea that older managers tend to become "entrenched" in their positions. Another possibility is that manager firing is, in effect, "window-dressing" for fund investors. While the existence of the actively-managed fund industry suggests that invelstors believe that stock-picking ability exists, one could certainly imagine that the fund companies themselves do not believe in stock-picking ability and are only dismissing poor performing managers in order to please their customers and stimulate inflows into the fund. We investigate this potential motivation for firings in more detail in Section VII.

In tying to understand how career dynamics may affect the behavior of fund managers, of course, it does not really matter whether the sensitivity of firing to performance is generated by learning, entrenchment, or catering to the desires of fund investors. In the next two sections, we expand on the basic termination-performance specification in order to understand in more detail what types of incentives managers face.

# IV The Shape of the Termination-Performance Relationship

In this section, we examine in more detail how the likelihood of managerial termination varies with the manager's recent performance, estimating the shape of the termination-performance relationship. We do so both to understand better when managers are replaced and because nonlinearities in the termination-performance relationship might alter the manager's incentives to undertake risk.

The idea that the shape of the performance contract facing a mutual fund manager may have incentive effects is not new. For example, Starks [1987] and Grinblatt and Titman [1989] show that mutual fund fee schedules which are nonlinear in fund performance may distort the fund's risk incentives. Chevalier and Ellison [1997] suggest that nonlinearities in the relationship between the flow of new funds into mutual funds and fund performance may also lead to distortions in the fund's risk incentives. However, this literature does not consider incentives of the fund managers; these could well differ from those of the fund company.

We focus our analysis on the relationship between the likelihood of a manager keeping his job throughout year $t$ and the excess return he achieves in that period, estimating the model

$$\begin{aligned} Termination_{it} &= f(Alpha_{it}) + \beta_1 Alpha_{it-1} + \beta_2 Alpha_{it-2} + \beta_3 ManagerAge_{it} \\ &\quad + \beta_4 GrowIncDummy_{it} + \beta_5 Age60+_{it} + \beta_6 Year92_t \\ &\quad + \beta_7 Year93_t + \epsilon_{it}, \end{aligned}$$

with $\epsilon_{it}$ assumed to have expectation zero conditional on the right hand size variables. We apply the procedure of Robinson [1988] to obtain estimates of the coefficients $\beta$ on the control variables and an estimate of the function $f$.[10] To allow for differences depending

[10] The procedure for estimating $f$ in the model $y_i = f(x_i) + \beta z_i + \epsilon_i$ consists of first obtaining an estimate $\hat{\beta}$ of the parametric part of the model using a procedure which is similar to the way in which variables can be partialed out of an OLS regression (but using nonparametric regressions of the $y$ and $z$ variables on $x$) and then performing a standard kernel regression of $y - \hat{\beta} z$ on $x$. The estimates presented below were obtained from a kernel regression which an used Epanechnikov kernel with the window width around

on the manager's age we estimate the equation separately on two subsamples: the 651 fund-years for which the manager is less than forty five years of age and the 669 fund-years for which the manager is at least forty five.

The predicted termination probabilities obtained from applying the semiparametric model to the the young manager and old manager subsamples are shown in Figure I along with pointwise 95% confidence bands. In constructing the predicted termination probabilities, all variables other than $Alpha_{it}$ are set to their mean values within the subsample in question. The primary observation we'd like to make from the figure is that for young managers the relationship between the probability of termination and excess returns appears to be much steeper to the left of zero than to the right of zero. As a result, the overall relationship for young managers appears to be somewhat convex. For older managers the relationship is much flatter and has no apparent concavity/convexity.

The figures also seem consistent with our hope that we have adequately separated out positive and negative career outcomes. If there were many instances of promotions which we had misclassified as terminations (such as a manager departing for an important position in a hedge fund), we would expect to find an increase in the frequency of termination among managers with very good performance. It is, however, possible that there is some increase in the probability of unmeasured promotion with good performance which is not apparent in the figure because it is offset by a lower probability of being fired.

In unreported specifications, we conduct a formal test of the significance of the differential sensitivity of termination to excess returns for young managers with high and low performance levels, by estimating a simple linear probability model allowing the coefficient on $Alpha_{it}$ to take on different values to the left and to the right of zero. In the young manager subsample we estimate the slope of the termination-performance relationship to be -1.72 at negative values of *Alpha* and -0.32 at positive values of *Alpha*. The difference between the these coefficients is significant at the five percent level. In the older manager subsample, the estimated slopes, -0.23 and -0.40 are not significantly different from each

a particular value of *Alpha* being $0.05 + 0.3|Alpha|$. To reduce the bias in the kernel estimates (which we otherwise found to be substantial), the estimates were made by subtracting from the dependent variable a two piece piecewise linear estimate of the relationship, estimating the kernel regression on the residuals, and then adding back in the piecewise linear estimates.

other.

# V Career Concerns: Deviations from the Herd

In this section, we explore the termination-performance relationship further to see whether it may provide managers with an incentive to "herd" (or anti-herd). More concretely, we ask whether, controlling for performance, a manager's likelihood of being terminated depends on how bold or unconventional of the actions he took were.

In the mutual fund industry it seems plausible that firms will judge managers not only on their performance, but also, in part, on the portfolio decisions they have made. In marketing a fund as a "growth" or "growth and income" fund, fund companies have to some degree promised investors a particular management style. Customers who make portfolio allocation decisions on the basis of this promise may become quite upset if they later discover that the fund has done something different. For example, Jeff Vinik's departure from Fidelity followed extensive criticism in the press of his concentration in technology stocks in 1995 (a year in which Magellan outperformed 80 percent of growth funds) and of his 1996 move into cash and bonds. While Vinik did trail the market in the 1996 by six percentage points, his overall performance was outstanding, and *The New York Times*' analysis was that "What got Mr. Vinik in trouble was not his underperformance, but how he did it."[11] While fund companies may want to commit to punish managers who are observed to have taken bold or unusual positions, however, they will at the same time want to leave managers with some discretion to take unconventional positions if this is necessary to exploit information they've received. In making this tradeoff, one would imagine that managers who are thought to have higher ability may be given more discretion.

A number of recent papers have argued that even in the absence of explicit incentive/punishment schemes which are based on a manager's actions, managers' career concerns may at times induce them to ignore private information and follow the herd (or to try to avoid following it) when their actions are observable. In Scharfstein and Stein [1990], Prendergast and Stole [1996] and Morris [1997], this occurs because observable actions

[11] See *The New York Times*, May 26, 1996, sec. 3 p. 5.

which the manager takes serve as signals of the quality of the manager's private information. In Scharfstein and Stein, "smart" managers receive correlated information, while "dumb" managers receive uncorrelated noise. Thus, if a manager learns that his private information about an investment opportunity differs from the information that another manager has received, he learns that it is more likely that he is "dumb." Because taking the action that his information suggests is optimal would signal to the market that his ability is low, the manager ignores his information and herds. In Prendergast and Stole [1996], managers have private information about the precision of the information they possess. A bolder action signals that a young manager knows his information to be good, and hence young managers have an incentive to take excessively bold actions. Older managers, in contrast, have an incentive to become "jaded" and not change their actions a great deal from period to period, because when the optimal actions are correlated over time this signals ability. Zwiebel [1995] focuses on an alternate motivation for herding/anti-herding in a model where taking an unconventional action (which is itself unobserved) increases the variance of the market's ex post assessment of a manager's ability. In his model, average managers prefer the conventional action because it reduces the risk of their being fired, while high or low ability managers may prefer unconventional actions.

We try here to see whether managers seem to be judged on actions as well as on performance, and to explore whether a desire to avoid termination might lead some managers to herd (or do the opposite), by examining whether taking "bold" actions has an effect on the probability of a positive career outcome.

We construct three variables to reflect different senses in which a manager's portfolio choices might be bold or unconventional. Our first variable, $SectorDeviation_{it}$, measures boldness in the sense of a manager having concentrated his portfolio in sectors which differ from those which are most popular at the time in question. Specifically, we define $SectorDeviation_{it}$ to be the square root of the sum of squared differences between the share of fund $i$'s assets in each of the ten industry sectors reported by Morningstar and the mean share in each sector in year $t$ among all funds in fund $i$'s objective class (growth or

growth and income).[12] Our second variable, $UnsysDeviation_{it}$, again measures boldness in terms of a departure from a typical portfolio, this time involving an unsystematic risk level which differs from that of the typical fund. Specifically, the variable is the absolute value of the difference between $UnsysRisk_{it}$ and the mean of this variable over all funds in fund $i$'s objective class in year $t$. Our third variable, $BetaDeviation_{it}$, measures boldness in the sense of having taken a large bet on the direction of the market. The variable is the absolute value of the difference between fund $i$'s beta in year $t$ and the average beta in that year of the funds in fund $i$'s objective class.

Our results on whether a manager's actions have a separate effect on the probability of his retaining or improving his position are presented in Table IV. Each column reports estimates from a probit model which is otherwise identical to our basic model of the termination-performance relationship, but which includes four variables examining the effect of one of our boldness measures. First, because "boldness" seems sure to be punished if a gamble fails, but might be ignored or rewarded if a gamble succeeds, we include the boldness measure interacted with a dummy for $Alpha_{it}$ being positive and the boldness measure interacted with a dummy for $Alpha_{it}$ being negative. In addition, one might imagine that firms will update their assessment of a manager's ability less in response to any one signal when more is known about the manager and that managers with better reputations may be given more discretion. Hence, we include also interactions between the two variables mentioned above and the manager's age. To summarize, each specification in Table IV contains four variables which are not included in our base specification: boldness for alpha greater than zero, boldness for alpha less than zero, boldness interacted with age for alpha greater than zero and boldness interacted with age for alpha less than zero.

The dependent variable in these regressions, $Termination_{it}$, is an indicator for whether the manager in charge of a fund at the start of year $t$ no longer retains this position at the start of year $t+1$ (and also does not obtain another position where he manages more money). The right hand side variables include year $t$ and lagged alpha's, an alpha-manager

[12] The definitions of the sectors change slightly from year to year. The 1994 sectors are utilities, energy, financials, industrial cyclicals, consumer durables, consumer staples, services, retail, health, and technology.

age interaction, the manager's age, and dummies for the fund objective and year.[13]

The first column of table IV considers the effect of "boldness" in the sense of a manager choosing an allocation across industry sectors which differs from that of the typical fund, i.e. $SectorDeviation_{it}$ is the measure of boldness. The positive and significant estimate on the $SectorDeviation_{it}(Alpha_{it} < 0)$ interaction indicates that managers whose actions deviate from the norm and who perform poorly are more likely to be terminated than managers who achieved similar performance levels but had more standard sector allocations. The point estimate on $SectorDeviation_{it}(Alpha_{it} \geq 0)$ is also positive (suggesting that it is better to have succeeded while maintaining the standard mix across sectors than to have succeeded with a more unorthodox position) but is not significantly different from zero at standard confidence levels. The positive coefficient estimates on the $SectorDeviation_{it}(MgrAge_{it} - \overline{Age})$ interactions indicate that deviating from the mean sector weightings is even more costly for younger managers. These estimates are significant at the five percent level for underperforming managers and at the seven percent level for managers with positive alphas.

Our results on the effect of holding unusual levels of unsystematic risk are given in column 2 of Table IV. The positive point estimate on $UnsysDeviation_{it} \times (Alpha < 0)$ suggests that managers whose risk levels are more unconventional (and do badly) are more likely to be terminated than managers who take on a more standard level of unsystematic risk, while the negative point estimate on $UnsysDeviation_{it} \times (Alpha \geq 0)$ suggests that this form of "boldness" may be rewarded if a manager is successful. Neither effect, however, is significantly different from zero at standard confidence levels. The coefficients on the $UnsysDeviation_{it}(MgrAge_{it} - \overline{Age})$ interactions are both negative (and significant at the five percent level). This is consistent with younger managers being given less discretion.

Note that the incentives for risk-taking we identify here are to some degree in conflict with those we identified in Section IV. There, we noted that termination probabilities for young managers were convex in risk-adjusted performance. Counter to the results of this section, this can be though of as providing for younger fund managers with an incentive to

[13] To control for the primary nonlinearities we had noticed in the termination-performance relationship, we also tried estimating the models of this section allowing for separate coefficients on $Alpha_t$ and $MgrAge \times Alpha_t$ for positive and negative values of $Alpha_t$. The results were similar to those presented below.

deviate from the herd in the direction of indexing the market portfolio.[14]

The final column considers the effect of taking large bets on the direction of the market. The only statistically significant coefficient is that on the $BetaDeviation_{it}(MgrAge_{it} - \overline{Age})(Alpha < 0)$ interaction. The negative coefficient estimate indicates that the increase in termination probability which results from taking a bold position and trailing the market (in risk-adjusted return) is larger for younger managers.

To provide a better idea of the magnitude of these effects and to help clarify when taking a bold action is a gamble and when it is a lose-lose proposition, Table V reports the estimated effect of a one standard deviation increase in boldness on a manager's termination probability both conditional on the manager beating the market and conditional on his trailing the market. The table shows the increment to the termination probability associated with changes in boldness; this increment to the termination probability is added to the termination probability implied by the manager's alpha in order to obtain a total termination probability. The first two rows contain the estimated effect (in percentage points) of a one standard deviation increase in boldness on a thirty five year old manager's termination probability and the last two rows contain the estimated effect for a forty five year old manager.

The numbers in the first column of the table reflect the fact that our point estimates suggest that bold sector deviations are a lose-lose proposition for younger managers. A thirty five year old manager whose portfolio choices result in *SectorDeviation* being one standard deviation higher than the mean is estimated to increase his probability of being terminated by 4.5 percentage points if his gamble fails and by 2.0 percentage points if he beats the market. For a forty five year old manager who is successful, the estimated penalty for having taken bold sector choices is very small, but the probability of termination is estimated to increase by 2.7 percentage points if the manager ends up trailing the market.

The numbers in the second column indicate that only young managers seem to have an incentive not to hold unconventional levels of idiosyncratic risk. A thirty five year old

[14]Note that Section IV did not address the question of whether managers are directly punished for taking on idiosyncratic risk. If we include the *level* of unsystematic risk and the level of unsystematic risk interacted with age as explanatory variables in a termination-performance regression, the coefficients for these variables are small and statistically insignificant.

manager whose $UnsysDeviation$ is one standard deviation higher (i.e. a manager whose unsystematic risk level is two percentage points further from the mean for funds in his objective class in the year in question) is estimated to increase his termination probability by an extra 5.5 percentage points if he trails the market and to also increase it by 1.0 percentage point if he is successful. For a forty five year old manager there is little incentive to take or avoid bold risk levels – the increase in termination probability if the manager ends up trailing the market is just about offset by the decrease in termination probability which would result if he beats the market. Finally, while most of our estimates of the effects of deviations in betas were insignificant, one can see in the table that the point estimates are that for a thirty five year old manager the cost of taking a bet with or against the market and failing is greater than the benefit from that bet succeeding, while for forty five year old managers there may be a small benefit to bold positions.

The results on "boldness" are fairly consistent across measures of boldness. The probability of termination is usually increasing in boldness for younger managers, and the effects are large for managers who underperform the market. One possible explanation for the similarity of the results for the three measures of boldness could be a high degree of correlation between these measures. In fact, this is unlikely to be the whole story. The correlation between $SectorDeviation_{it}$ and $BetaDeviation_{it}$ is 0.29; the correlation between $SectorDeviation_{it}$ and $UnsysDeviation_{it}$ is 0.23; the correlation between $UnsysDeviation_{it}$ and $BetaDeviation_{it}$ is 0.22.

On the whole, we regard the results in this section as providing fairly clear evidence that younger managers are evaluated not only on their performance, but also on the extent to which their actions deviate from the actions undertaken by other managers. In order to avoid termination, our results suggest that young managers may have an incentive to herd. In Section VI, we will return to this issue by examining whether younger managers do indeed appear to respond to this by choosing sector weightings and unsystematic and systematic risk levels which are closer to the the average of the choices of other managers in their objective group.

## VI Does Behavior Reflect Career Concerns?

In this section we explore whether there is systematic variation in the behavior of mutual fund managers of different ages. Any such variations may be of independent interest, although our primary motivation is to see whether differences in behavior are suggestive of managers reacting to the career concerns we've identified.

In discussing what incentives managers might have, we will equate career concerns with a desire to avoid termination. A model of the industry which would support this is one in which managers have no incentives other than not being fired, and where the total lifetime cost of being fired is independent of both the manager's characteristics and his/her performance before being fired. Clearly there are a number of reasons why such a model might not predict behavior accurately: some terminations in our data may, in fact, be positive career outcomes rather than firings; a manager's job prospects after being fired may depend on his past record; and managers may be greatly influenced by explicit or implicit incentive pay. As Gibbons and Murphy [1992] suggest in their study of CEO compensation, it certainly seems reasonable to imagine that firms might adjust the form of incentive pay to counteract differences in career concerns. For all these reasons, we would not want to regard a failure to find predicted behavioral differences as indicating that managers do not pay attention to career concerns or that these concerns do not exist. With all these caveats, we proceed now to discuss what actions managers might be expected to take to avoid getting fired in light of our previous results on the termination-performance relationship.

First, we saw in Section IV that for young managers, the probability of termination appears to be a convex function of excess returns. For older managers, the relationship was fairly flat. The termination-performance relationship can be thought of as an implicit incentive scheme, and the natural prediction this gives is that younger managers would be expected to behave as if they were avoiding unsystematic risk in selecting their portfolio.[15]

To examine this hypothesis we estimated the regression

$$UnsysRisk_{it} = \gamma_0 + \gamma_1 ManagerAge_{it} + \gamma_2 log(Assets_{it}) + \gamma_3 GrowIncDummy_{it}$$

[15]Given the greater performance sensitivity of firing, one might also expect younger managers to work harder to achieve good returns. In a separate paper [Chevalier and Ellison 1999] we provide some (fairly weak) evidence suggesting that young managers may indeed outperform their older counterparts on average.

$$+\gamma_4 Year92_t + \gamma_5 Year93_t + \gamma_6 Year94_t + \epsilon_{it},$$

on the universe of the 1835 fund-years within the 1992 - 1995 period for which all of these variables were available. The dependent variable which we use as our measure of a portfolio's riskiness is again the square root of the estimated residual variance from a regression of monthly portfolio returns on the difference between the market return and the risk free rate, rescaled so that $UnsysRisk$ can be thought of as an annual standard deviation.

Coefficient estimates are presented in the first column of Table VI along with standard errors which allow for the possibility of within-fund correlations in the errors. The primary observation which we make from the table is that the coefficient on the $ManagerAge$ variable is positive and significant at the one percent level as predicted. The magnitude of the coefficient estimate is such that a manager who is ten years older than the sample mean would be expected to hold a portfolio which is about seven percent riskier than average. Other coefficients in the regression indicate that growth and income funds hold substantially less unsystematic risk than growth funds, that small funds tend to be riskier than large funds, and that on average measured risk levels were highest in 1992.[16]

Our second set of hypotheses about behavior in response to career concerns derive from our results on boldness and discretion in Section V. There we found that the increase in termination probability which results from a manager choosing his sector weightings, unsystematic risk level, or beta to be farther from the mean choices of other funds in the fund's objective class is larger for younger managers. As a result, we might expect that young managers will be less likely to take such "bold" positions, or, to use language which has become popular in the literature, younger managers may be more likely to "herd" with the other managers in their objective category.

To examine this hypothesis, we regressed each of our measures of the boldness of a manager's action in a given year on the manager's age and several control variables, estimating

$$SectorDeviation_{it} = \gamma_0 + \gamma_1 ManagerAge_{it} + \gamma_2 log(Assets_{it}) + \gamma_3 GrowIncDummy_{it}$$

[16]The last result could be attributable to a number of factors: funds may have been least diversified or held smaller cash positions, realized monthly returns on individual stocks may have been more volatile, the sectors favored by growth and growth and income funds may have been particularly volatile, etc.

$$
\begin{aligned}
& & & + \gamma_4 Year92_t + \gamma_5 Year93_t + \gamma_6 Year94_t + \epsilon_{it} \\
UnsysDeviation_{it} & = & \gamma_0 + \gamma_1 ManagerAge_{it} + \gamma_2 log(Assets_{it}) + \gamma_3 GrowIncDummy_{it} \\
& & & + \gamma_4 Year92_t + \gamma_5 Year93_t + \gamma_6 Year94_t + \epsilon_{it} \\
BetaDeviation_{it} & = & \gamma_0 + \gamma_1 ManagerAge_{it} + \gamma_2 log(Assets_{it}) + \gamma_3 GrowIncDummy_{it} \\
& & & + \gamma_4 Year92_t + \gamma_5 Year93_t + \gamma_6 Year94_t + \epsilon_{it}
\end{aligned}
$$

Recall that the first measures of boldness $SectorDeviation_{it}$, is the square root of the sum of the squared differences between a fund's portfolio weightings in each of ten industry sectors and the mean sector weights for the funds in the fund's objective class in that year, and the latter two are are a fund's deviations from the mean unsystematic risk level and beta of the funds in a fund's objective class in that year.

Coefficient estimates and standard errors from these regressions are reported in the second through fourth columns of Table VI. In each case we find that, as predicted, the portfolios of younger managers are closer to those of the typical fund with their objective. In the regression examining sector weightings, the age coefficient is statistically significant at the one percent level, with the coefficient estimate indicating that a manager who is ten years younger than the mean manager will on average have a *SectorDeviation* approximately eleven percent smaller than the mean manager in the dataset. In the regression examining deviations in unsystematic risk, the age coefficient is significant at the five percent level with the estimate being that a manager who is ten years younger than the mean will on average be twelve percent closer to the mean riskiness than the average fund. In the regression examining deviations in betas, the age coefficient is significant at the one percent level and the estimate is that that a manager who is ten years younger than the mean will be eleven percent closer to the mean beta than the average fund.

The other coefficient estimates from these regressions indicate that large funds tend to stick closer to the mean characteristics of funds in their objective, and that growth and income funds are a more homogeneous class than are growth funds.

At the broadest level, our results support the predictions of the theoretical models of Scharfstein and Stein [1990], Zwiebel [1995], and Avery and Chevalier [1998]. These models

predict that, in particular environments, managers' career concerns may lead them to herd on a common action. Our finding is that younger managers are more likely to be punished for deviating from the herd and are less likely to deviate from the herd than their older counterparts. Our findings appear less consistent with Prendergast and Stole [1996], who argue that younger managers may have an incentive to undertake bold actions.[17] Our results resemble the empirical results of Lamont [1995] and Hong, Kubik, and Solomon [1998]. Lamont examines a sample of macroeconomic forecasters over the 1971 - 1989 period and shows that, as a forecaster ages, he tends to produce forecasts which deviate more significantly from the consensus forecast. Hong, Kubik, and Solomon [1998] examine a sample of stock analysts' earnings forecasts and show that younger managers produce forecasts closer to the consensus forecast and that younger analysts tend to produce their forecasts after the forecasts of older analysts have already been made.

## VII Market Reactions to Managerial Turnover

In this section we investigate the reaction of investors to managerial turnover. Understanding market reactions to managerial turnover may provide a more complete understanding of why firing patterns are what they are. In particular, the literature on the performance of mutual funds finds little evidence that fund performance is persistent through time. This evidence has been interpreted as implying that stock-picking ability does not exist in this industry.[18] This view of the industry is somewhat at odds with evidence that fund companies sort managers as if they are trying to learn about the inherent "ability" of portfolio

[17] The difference between our findings and the predictions of Prendergast and Stole are not entirely surprising. Theirs is a model in which younger managers undertake bold actions in order to convince their evaluators that they are confident that they have received precise information. If young managers do not in fact know their own type but learn it along with their evaluators, as we think plausible for this industry, then our empirical setting does not closely resemble the theoretical framework envisioned in their model. The idea that managers may obtain private information about their abilities as their career progresses and thus undertake more bold actions later in their careers is discussed in Avery and Chevalier [1998].

[18] See, for example, Grinblatt and Titman [1992], Hendricks, Patel and Zeckhauser [1993], Goetzmann and Ibbotson [1994], Malkiel [1995] and Carhart [1997]. These papers suggest that after controlling for expenses, current mutual fund performance is at best a very weak predictor of future fund performance. However, as Chevalier and Ellison [1999] point out, these papers look at performance persistence at the fund level. Since fund managers turn over frequently, it is not obvious that the results of this literature imply that there is no performance persistence at the manager level. Chevalier and Ellison [1999] provide some evidence that manager characteristics may, in fact, predict fund performance.

managers. However, even if "ability" does not exist, and even if fund companies know this, the existence of a large actively-managed fund industry implies that some investors believe that stock-picking ability exists. It is possible that fund companies hire and fire managers in order to please investors.

It is a well-established fact in the mutual fund literature that investment flows react strongly to past performance.[19] One could in principal assess both the nature of market incentives and consumers' views on ability by extending previous studies on investment flows to discuss how consumers react to managerial turnover in a variety of circumstances. Unfortunately, there is a lot of noise in data on investment flows, and hence the short time span and limited number of managerial separations in our data preclude our doing this. Instead, we will be satisfied here just to explore the most basic market incentives question: do mutual fund investors react to managerial turnover?

To examine this question we look at how managerial turnover affects the net flow of investment into a mutual fund using a specification based on a simplified parametric version of the specification in Chevalier and Ellison [1997]:

$$\begin{aligned} NetInflow_{it+1} &= (1+\kappa_0 MChange_{it})\left(\sum_k \gamma_k FundAgek_{it} Alpha_{it} + \beta_1 Alpha_{it-1} + \beta_2 Alpha_{it-2}\right) \\ &\quad + \sum_k \delta_k FundAgek_{it} + \lambda_0 + \lambda_1 log(Assets_{it}) + \lambda_2 Alpha_{it+1} \\ &\quad + \lambda_3 Year92_t + \lambda_4 Year93_t + \epsilon_{it+1}. \end{aligned}$$

The dependent variable, $NetInflow_{it+1}$, is the proportional growth in total assets under management for the fund between the start and end of year $t+1$, net of internal growth (assuming reinvestment of dividends and distributions), i.e.

$$NetInflow_{it+1} = (Assets_{it+1} - Assets_{it})/Assets_{it} - r_{it+1}.$$

Excess returns in year $t$ are the most important determinant of investment flows in year $t+1$, so in recognition of the fact that consumers, updating their beliefs about the quality of a mutual fund from noisy observations, may treat young and old funds quite differently, we allow the relationship between flows and excess returns to vary with the age category,

[19] See Ippolito [1992], Sirri and Tufano [1993], and Chevalier and Ellison [1997].

$FundAgek$, to which the fund belongs. We allow also for separate intercepts for each fund age category, and include the excess return of the fund in years $t-1$, $t-2$, and $t+1$, year dummies and the natural logarithm of assets under management at the fund in question at the end of year $t$ as control variables.[20]

In a world where consumers were trying to assess the abilities of managers as well as the qualities of funds, the primary effect we would imagine managerial turnover to have would be to make the investment flow into a fund less sensitive to past performance. We have thus specified the flow relationship so that the terms involving past performance are interacted with the term $(1+\kappa_0 MChange_{it})$, where $MChange_{it}$ is an indicator for whether the manager in charge of the fund on January first of year $t$ is still managing the fund at the beginning of year $t+1$.[21] At one extreme, a value of -1 for $\kappa_0$ would indicate that consumers completely disregard the past performance of a fund which has just changed managers, and a value of 0 would indicate that investment flows are unaffected by managerial turnover.

The data available to us for this test include all growth and growth and income funds in Morningstar from the 1992-1995 period, including funds which are "born" or "die" during that time period. We treat this panel as a cross-section with one observation for each fund's growth during each of the three years: 1992-1993, 1993-1994, and 1994-1995. Complete data are available for 1056 fund-years.

Nonlinear least squares estimates of the coefficients in the flow equation are presented in column 1 of Table VII. The results are in most ways similar to those in the previous literature. Flow reacts quite strongly to past performance and the relationship is strongest for young funds. Flows react more strongly to performance in the previous year than to performance in past years. The point estimate on the effect of manager change is -0.25 which would indicate that flow is approximately 25 percent less sensitive to past performance when the manager has just been changed, but the estimate is not statistically different from zero

[20] The age categories used are 0-1, 2-3, 4-6, 7-9, and more than nine years old. The lagged returns are set to zero for very young funds. Total assets under management by the industry is obtained from the Investment Company Institute. As in our previous paper, we drop mutual funds from the sample with less than $10 million in assets, because very small funds may be "incubator" funds which are not being marketed to the public.

[21] Here we look at the effect on flow of any change in fund management. Thus, managers who are "promoted" are coded identically to managers who are "terminated".

at standard levels. The estimate is statistically different from -1, suggesting that fund investors do not completely discount the past performance of a fund when the manager turns over.[22]

Because a firm can choose to heavily advertise the fact that it has replaced the manager of a fund with a poor track record and can avoid drawing attention to the fact that an outstanding manager has left, one might imagine that managerial turnover would have a much larger effect on flows into funds which have performed poorly. To investigate this, we estimated also a model of flow nearly identical to that above, but with separate coefficients on $MChange_{it}$ for funds with positive and negative excess returns in year $t$. The results of this estimation are presented in the second column of Table VII. The coefficient on the interaction between $MChange_{it}$ and a dummy for $Alpha_{it}$ being negative is now -0.46 and is significant at the 5 percent level, indicating that firing a manager who has performed badly may reduce the resulting outflow of funds by about one-half. Such a market reaction would clearly provide a significant motivation for replacing poorly performing managers. The estimate on the interaction between $MChange_{it}$ and a dummy for $Alpha_{it}$ nonnegative is positive but not statistically significant (as is not surprising given that we have fewer observations of replacements following good performance).

One potential problem with these regressions is that managerial change may be endogenous: firms may be more likely to replace a manager when he/she has received unfavorable publicity or is otherwise likely to be regarded as unattractive by potential investors. What effect this might have on the estimated response to managerial change in our first regression is not clear. Presumably, managerial change would be associated with lower net flow, but there is no a priori reason to expect that this effect would be greater when past performance is good or bad. In the second specification, we can make somewhat better guesses about the

[22]In unreported regressions, we examined whether investors discount past performance more or less when an older manager leaves a fund. We did not find statistically significant differences between the turnover of a younger manager and the turnover of an older manager, although the point estimates suggest that investment flows implicitly discount past performance more when an older manager turns over. If fund companies fire managers to please investors, these results suggest that, if anything, turnover should be more sensitive to performance for *older* mutual fund managers. If investment flows do react differently to the turnover of young and old managers we will be unable to correct for the potential endogeneity problem mentioned below.

bias. If managerial change is associated with lower expected flow, the bias might be toward finding a positive coefficient on $MChange_{it} \times (Alpha_{it} < 0)$ and a negative coefficient on $MChange_{it} \times (Alpha_{it} \geq 0)$. In each case this is the opposite of what we find, so we do not think that there is great cause to worry that our results are driven by the endogeneity problem.

One way in which one might be able to correct for the potential endogeneity problem is to assume that the manager age-return interactions which are so important in predicting firings do not affect investment flows. The assumption is somewhat plausible because consumers are surely less informed about a manager's age/experience than are fund companies (although in the extreme, this assumption is at odds with consumers being concerned with managers' abilities.) The third and fourth columns of Table VII report nonlinear two stage least squares estimates using as instruments interactions between $Alpha_{it}$ and the manager's age and a dummy for the manager being at least sixty years old. The estimates are fairly similar to those in the first two columns, although the result that suggests that flows are less sensitive to past performance when the manager changes and $Alpha_{it} < 0$ is now statistically significant only at the ten percent level.

## VIII Promotion

While we feel that the desire to avoid termination is the most important career concern for the managers in our sample, we will briefly investigate our data on promotions in order to consider what incentives promotions may provide. Recall that we do not actually know what managers are promoted, but instead infer that a manager has achieved a promotion whenever one of our managers separates from the fund he is managing and reappears the following year managing greater total assets (adjusted for the growth of the fund industry). There are only 38 such promotions in our data and thus few of the results in this section will be highly statistically significant.

Table VIII contains a first look at the promotion-performance relationship. The estimates are of a probit model similar to that of our basic specification of the termination-

performance relationship.

$$\begin{aligned} Promotion^{*}_{it} &= \beta_0 + \beta_1 Alpha_{it} + \beta_2 Alpha_{it} \times (MgrAge_{it} - \overline{Age}) + \beta_3 Alpha_{it-1} \\ &\quad + \beta_4 Alpha_{it-2} + \beta_5 ManagerAge_{it} + \beta_6 Age60+_{it} \\ &\quad + \beta_7 GrowIncDummy_{it} + \beta_8 Year92_t + \beta_7 Year93_t + \epsilon_{it}, \\ Promotion_{it} &= \begin{cases} 1 & \text{if } Promotion^{*}_{it} > 0 \\ 0 & \text{otherwise.} \end{cases} \end{aligned}$$

The point estimates on $Alpha_{t-1}$ and $Alpha_t$ are both positive, although the coefficient on $Alpha_{t-1}$ is significant at only at the ten percent level and the coefficient on $Alpha_t$ is not significant at standard levels. We find no evidence of age-related variation in the sensitivity of promotion to performance. Younger managers do appear to be more likely to be promoted on average. Promotion was less likely in 1992 and 1993 than in 1994.

Figure II presents estimates of the shape of the promotion-performance relationship analagous to the estimates of the termination-performance relationship presented in Figure I. The solid lines in the figures are predicted values from estimating the the semiparametric regression

$$\begin{aligned} Promotion_{it} &= f(Alpha_{it}) + \beta_1 Alpha_{it-1} + \beta_2 Alpha_{it-2} + \beta_3 ManagerAge_{it} \\ &\quad + \beta_4 GrowIncDummy_{it} + \beta_5 Age60+_{it} + \beta_6 Year92_t \\ &\quad + \beta_7 Year93_t + \epsilon_{it}, \end{aligned}$$

separately on the young and old manager subsamples and the dotted lines are 95 percent pointwise confidence bands. Note that the graphs look much flatter than our pictures of the termination-performance relationship and that even with very good performance the probability of promotion never gets very high.

Finally, Table IX presents estimates of the marginal effect of the "boldness" of a manager's actions on the probability of his being promoted analogous to those in Table V. Here a number of the estimates are statistically significant although the magnitudes of the effects are smaller than those for termination. Young managers who beat the market appear to have a higher probability of being promoted if their sector mix was more unusual, and younger managers who trail the market appear to further reduce their probability of promotion if their unsystematic risk level was more standard. Promotions may thus provide

young managers with an ex ante incentive to take bolder positions, and may partially offset the incentives to herd which are inherent in the termination process. Older managers may also increase their promotion probability slightly with a more unconventional mix across sectors and by betting on the direction of the market.

# IX Conclusion

We view our paper as a first attempt to exploit the opportunity which the mutual fund industry provides to examine career concerns in an environment in which both managerial performance and specific aspects of managerial behavior are observable.

The first goal in our paper is to obtain information about the implicit incentives generated by the fund managers' career concerns. In general, our results seem consistent with firing being the result of fund companies updating their beliefs about managers' abilities over time. Furthermore, we find that, after controlling for a manager's performance, the manager's portfolio choices can be a predictor of whether the manager loses a position. In particular, we find that, even controlling for fund performance, younger managers are punished for deviating widely from the industry sector holding in their objective group, or from the consensus beta or unsystematic risk level. These results are consistent with the idea in Scharfstein and Stein [1990] that managers who undertake the same action as other managers are perceived to be of higher ability. Finally, we find that the probability of termination may be a convex function of performance for younger fund managers.

The second goal of our paper is to examine whether fund managers appear to respond to their incentive to avoid termination. We first consider the incentive implications of our finding that the probability of maintaining or improving one's position may be concave in performance for younger (but not older) managers. Consistent with the hypothesis that younger managers respond to these implicit career incentives, we find that younger managers take on less unsystematic risk than older managers. Second, we consider the incentive implications of our finding that younger managers are more likely to separate from their positions when they deviate widely from the mean sector weightings of their objective group or from the mean beta or unsystematic risk level of their fund objective.

Consistent with the view that career concerns provide incentives, we show that younger managers are less likely to deviate from the herd than older managers.

These results have implications not only for the career concerns literature, but also for the literature on delegated portfolio management. The results of this paper suggest that a complete discussion of the incentives facing mutual funds must consider both the agency relationship between the fund company and fund investors *and* the agency relationship between the fund company and fund management. Analysis of the explicit incentive effects of the fund's compensation or the manager's compensation would ideally be paired with analysis of the implicit incentive schemes facing those agents.

One important area for future research is the consideration of fund managers at lower positions in the organization. Mutual fund managers often start out managing smaller sector funds, and then are promoted to managing a growth or growth and income fund such as one of the funds in our sample. In our paper, the risk incentives may be very specific to the circumstances of managers who have already reached a relatively high position in the industry and are motivated by their desire to maintain that position. For managers at lower positions in the industry, the incentive to move up to a higher position may create very different incentives than those that we have analyzed here.

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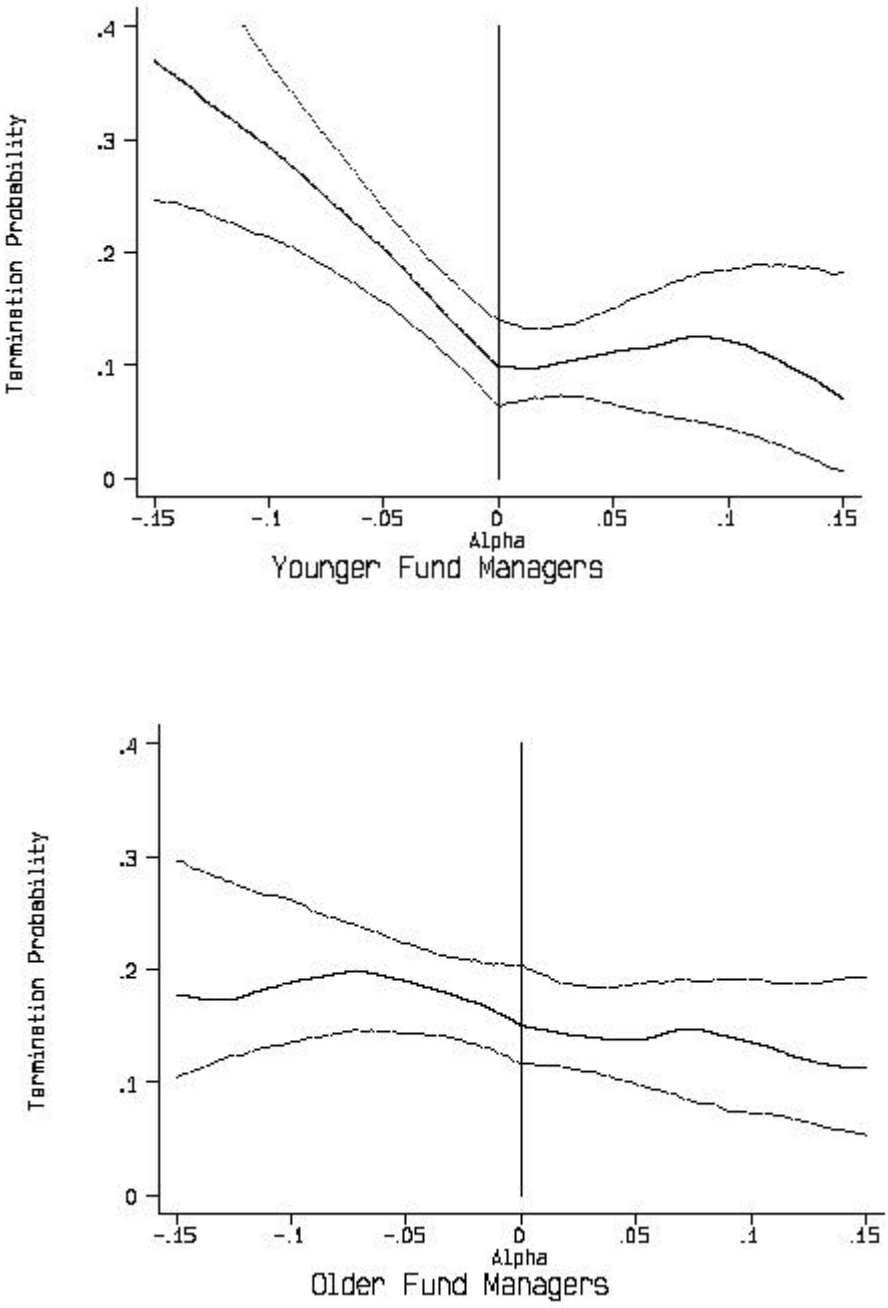


Figure I: Shape of Termination-Performance Relationship

The solid lines in the figure are graphs of the predicted probability of a manager being "terminated" during the course of a given year as a function of his risk adjusted excess return in that year. The top panel graphs the relationship for managers who are less than 45 years old and the bottom panel graphs the relationship for managers who are at least 45 years old. The estimates are obtained from semiparametric regressions with a number of additional variables having been partialled out as described in Section IV. The data are fund-year observations of managers who were in charge of a growth or growth and income fund at the start of 1992, 1993, or 1994. The sample of younger managers contains 651 fund-years and the sample of older managers contains 669 fund-years. The dotted lines in the figures are pointwise 95% confidence bands obtained from a bootstrap procedure.

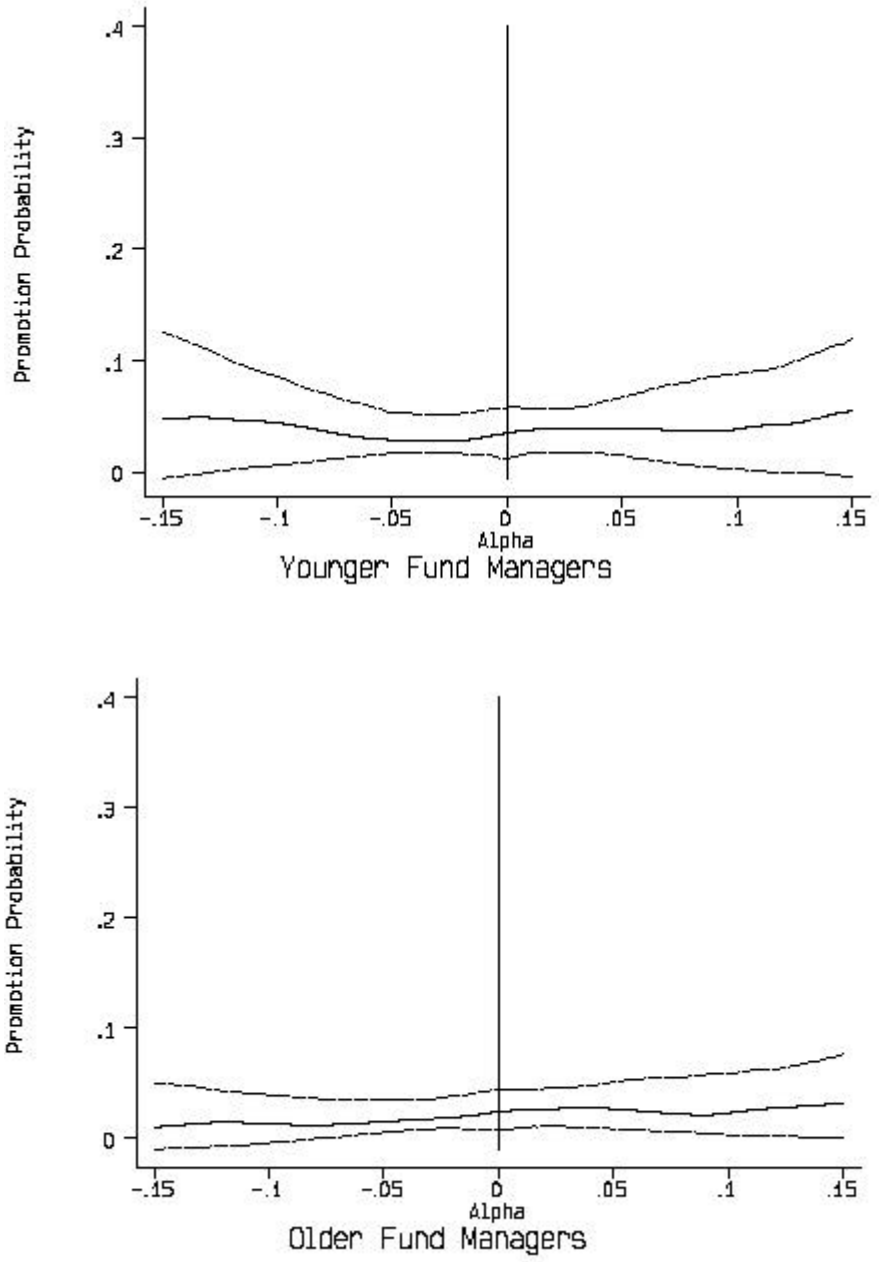


Figure II: Shape of Promotion-Performance Relationship

The solid lines in the figure are graphs of the predicted probability of a manager being "promoted" during the course of a given year as a function of his risk adjusted excess return in that year. The top panel graphs the relationship for managers who are less than 45 years old and the bottom panel graphs the relationship for managers who are at least 45 years old. The estimates are obtained from semiparametric regressions with a number of additional variables having been partialled out as described in Section VIII. The data are fund-year observations of managers who were in charge of a growth or growth and income fund at the start of 1992, 1993, or 1994. The sample of younger managers contains 651 fund-years and the sample of older managers contains 669 fund-years. The dotted lines in the figures are pointwise 95% confidence bands obtained from a bootstrap procedure.

Table I: Summary Statistics

| Variable | Number of Observations | Mean | Standard Deviation |
|---|---|---|---|
| Termination and Promotion Regressions: 1992 - 1994 | | | |
| $Termination$ | 1320 | 0.155 | 0.362 |
| $Promotion$ | 1320 | 0.028 | 0.165 |
| $Alpha_t$ | 1320 | -0.0062 | 0.070 |
| $Alpha_{t-1}$ | 1320 | 0.0018 | 0.075 |
| $Alpha_{t-2}$ | 1320 | -0.0041 | 0.066 |
| $ManagerAge$ | 1320 | 44.220 | 9.781 |
| $Age60+$ | 1320 | 0.067 | 0.250 |
| $GrowIncDummy$ | 1320 | 0.361 | 0.480 |
| $Beta$ | 1320 | 0.992 | 0.261 |
| $UnsysRisk$ | 1320 | 0.047 | 0.028 |
| $SectorDeviation$ | 1320 | 0.202 | 0.107 |
| $UnsysDeviation$ | 1320 | 0.018 | 0.018 |
| $BetaDeviation$ | 1320 | 0.182 | 0.170 |
| $ExpenseRatio$ | 1276 | 0.013 | 0.009 |
| $\log(Assets)$ | 1278 | 4.467 | 1.935 |
| $\log(FamilySize)$ | 1300 | 7.057 | 2.510 |
| $ManagerTenure$ | 1319 | 3.352 | 4.694 |
| $Year92$ | 1320 | 0.277 | 0.447 |
| $Year93$ | 1320 | 0.324 | 0.468 |
| $Year94$ | 1320 | 0.399 | 0.490 |
| Sample for Behavior Regressions: 1992 - 1995 | | | |
| $UnsysRisk$ | 1835 | 0.047 | 0.027 |
| $SectorDeviation$ | 1490 | 0.200 | 0.105 |
| $UnsysDeviation$ | 1835 | 0.018 | 0.017 |
| $BetaDeviation$ | 1835 | 0.192 | 0.177 |
| $ManagerAge$ | 1835 | 44.403 | 9.702 |
| $\log(Assets)$ | 1835 | 4.398 | 2.032 |
| Growth Funds | | | |
| $UnsysRisk$ | 1181 | 0.054 | 0.028 |
| $Beta$ | 1181 | 1.053 | 0.285 |
| Growth and Income Funds | | | |
| $UnsysRisk$ | 654 | 0.035 | 0.021 |
| $Beta$ | 654 | 0.912 | 0.219 |
| Sample for Flow Regression: 1992 - 1994 | | | |
| $Flow_{t+1}$ | 1056 | 0.177 | 0.675 |
| $MChange$ | 1056 | 0.149 | 0.356 |
| $Alpha_t$ | 1056 | -0.0016 | 0.062 |
| $Alpha_{t-1}$ | 1056 | 0.0056 | 0.074 |
| $Alpha_{t-2}$ | 1056 | -0.0017 | 0.064 |
| $Alpha_{t+1}$ | 1056 | -0.022 | 0.088 |
| $FundAge$ | 1056 | 13.504 | 16.180 |
| $\log(Assets)$ | 1056 | 5.002 | 1.509 |

Summary statistics for all of the variables used in the analysis are provided. The upper panel provides summary statistics for the data sample used in Tables II through V, VIII, and IX. The middle panel provides the summary statistics for the data sample used in Table VI. The lower panel provides the summary statistics for the data sample used in Table VII.

Table II: The Postseparation Careers of Mutual Fund Managers

| Category | Number | Mean Adj. Alpha |
|---|---|---|
| Manager-fund-years | 1320 | |
| Total separations | 242 | |
| Instances in which fund disappeared | 72 | -0.017 |
| Instances in which fund survived but manager did not remain with fund | 170 | -0.013 |
| Separations in which manager disappears from data | 98 | -0.025 |
| Separations in which manager reappears in data, managing fewer total assets | 106 | -0.011 |
| Separations in which manager reappears in data, managing greater total assets | 38 | 0.015 |
| Separations in which manager disappears from data and manager is >60 years old | 4 | -0.001 |
| Fraction of total separations of managers ≥45 in which manager disappears. | 0.45 | -0.025 |
| Fraction of total separations of managers ≥45 in which manager reappears managing fewer total assets | 0.43 | -0.004 |
| Fraction of total separations of managers ≥45 in which manager reappears managing greater total assets | 0.12 | 0.020 |
| Fraction of total separations of managers <45 in which manager disappears. | 0.36 | -0.031 |
| Fraction of total separations of managers <45 in which manager reappears managing fewer total assets | 0.44 | -0.018 |
| Fraction of total separations of managers <45 in which manager reappears managing greater total assets | 0.20 | 0.012 |

This table provides information on the post-separation careers of managers who were in charge of a growth or growth and income fund in 1992, 1993, or 1994. A manager is defined to have "separated" from his position if he was the sole manager of a fund in year $t$ but not in year $t+1$. A separated manager "disappears" if the Morningstar database does not list him as a manager of any fund in year $t+1$. He "reappears" if he does manage a fund in year $t+1$. The manager "reappears managing greater total assets" if the total assets managed by the manager in year $t$ are smaller than the total assets managed by the manager in year $t+1$ divided by one plus the growth rate of the mutual fund industry from year $t$ to year $t+1$. The mean adjusted alpha given for each class of managers is the mean of the difference between Jensen's alpha for each fund in year $t$ and the mean alpha of the fund's objective category in year $t$.

Table III: Basic Termination-Performance Relationship

| | Dependent variable: $Termination_t$ | | | | |
|---|---|---|---|---|---|
| Variable | (1) | (2) | (3) | (4) | (5) |
| $Alpha_t$ | -3.22 | -3.84 | -3.89 | -3.30 | -3.20 |
| | (0.734) | (0.807) | (0.793) | (0.768) | (0.746) |
| $Alpha_t \times (MgrAge - \overline{Age})$ | 0.259 | 0.280 | 0.302 | 0.269 | 0.262 |
| | (0.064) | (0.077) | (0.070) | (0.070) | (0.079) |
| $Alpha_{t-1}$ | -1.462 | -1.346 | -1.486 | -1.910 | -1.405 |
| | (0.673) | (0.702) | (0.691) | (0.705) | (0.687) |
| $Alpha_{t-2}$ | -0.753 | -1.411 | -1.220 | -1.194 | -0.800 |
| | (0.768) | (0.872) | (0.818) | (0.783) | (0.783) |
| $ManagerAge$ | -0.003 | 0.0003 | -0.0006 | -0.005 | -0.0010 |
| | (0.006) | (0.006) | (0.006) | (0.006) | (0.006) |
| $Age60+$ | 0.240 | 0.229 | 0.211 | 0.314 | 0.293 |
| | (0.190) | (0.197) | (0.200) | (0.193) | (0.191 |
| $GrowIncDummy$ | 0.231 | 0.248 | 0.251 | 0.242 | 0.236 |
| | (0.089) | (0.091) | (0.092) | (0.091) | (0.088) |
| $ExpenseRatio$ | | -9.284 | | | |
| | | (5.178) | | | |
| $\log(Assets)$ | | | 0.052 | | |
| | | | (0.024) | | |
| $\log(Assets) \times Alpha_t$ | | | 0.243 | | |
| | | | (0.367) | | |
| $\log(FamilySize)$ | | | | 0.045 | |
| | | | | (0.179) | |
| $\log(FamilySize) \times Alpha_t$ | | | | -0.270 | |
| | | | | (0.274) | |
| $ManagerTenure$ | | | | | -0.015 |
| | | | | | (0.010) |
| $Alpha_t \times (MgrTen - \overline{Ten})$ | | | | | 0.026 |
| | | | | | (0.12) |
| $Year92$ | -0.114 | -0.101 | -0.081 | -0.245 | -0.106 |
| | (0.106) | (0.109) | (0.110) | (0.112) | (0.107) |
| $Year93$ | -0.159 | -0.287 | -0.303 | -0.155 | -0.168 |
| | (0.105) | (0.112) | (0.113) | (0.106) | (0.106) |
| Constant | -0.979 | -1.009 | -1.329 | -1.221 | -1.021 |
| | (0.254) | (0.269) | (0.290) | (0.305) | (0.259) |
| Number of Observations | 1320 | 1276 | 1278 | 1300 | 1319 |

Each column is a probit specification in which the dependent variable takes the value of one if the manager was "terminated" from his position and zero otherwise. Each observation is a fund manager-year. Standard errors, adjusted for intra-fund correlation of the errors, are in parentheses.

Table IV: Direct Effects of Deviations from Behavioral Norms

| Dependent Variable: $Termination_t$ | | | |
|---|---|---|---|
| Independent Variable | (1) | (2) | (3) |
| $Alpha_t$ | -2.195 | -2.142 | -2.796 |
| | (0.927) | (0.879) | (0.876) |
| $Alpha_t \times (MgrAge - \overline{Age})$ | 0.258 | 0.220 | 0.144 |
| | (0.098) | (0.092) | (0.093) |
| $Alpha_{t-1}$ | -1.606 | -1.488 | -1.474 |
| | (0.655) | (0.700) | (0.687) |
| $Alpha_{t-2}$ | -0.888 | -0.960 | -0.845 |
| | (0.751) | (0.807) | (0.803) |
| $ManagerAge$ | 0.007 | 0.013 | 0.006 |
| | (0.007) | (0.007) | (0.007) |
| $Age60+$ | 0.347 | 0.253 | 0.250 |
| | (0.193) | (0.189) | (0.192) |
| $GrowIncDummy$ | 0.265 | 0.264 | 0.227 |
| | (0.090) | (0.092) | (0.091) |
| $SectorDev(Alpha \geq 0)$ | 0.169 | | |
| | (0.525) | | |
| $SectorDev(Alpha < 0)$ | 1.129 | | |
| | (0.423) | | |
| $SectorDev \times (MgrAge - \overline{Age})(Alpha \geq 0)$ | -0.069 | | |
| | (0.037) | | |
| $SectorDev \times (MgrAge - \overline{Age})(Alpha < 0)$ | -0.077 | | |
| | (0.038) | | |
| $UnsysDeviation(Alpha \geq 0)$ | | -5.456 | |
| | | (4.371) | |
| $UnsysDeviation(Alpha < 0)$ | | 4.917 | |
| | | (3.262) | |
| $UnsysDeviation \times (MgrAge - \overline{Age})(Alpha \geq 0)$ | | -0.792 | |
| | | (0.401) | |
| $UnsysDeviation \times (MgrAge - \overline{Age})(Alpha < 0)$ | | -0.889 | |
| | | (0.299) | |
| $BetaDeviation(Alpha \geq 0)$ | | | -0.512 |
| | | | (0.434) |
| $BetaDeviation(Alpha < 0)$ | | | -0.089 |
| | | | (0.363) |
| $BetaDeviation \times (MgrAge - \overline{Age})(Alpha \geq 0)$ | | | -0.008 |
| | | | (0.038) |
| $BetaDeviation \times (MgrAge - \overline{Age})(Alpha < 0)$ | | | -0.093 |
| | | | (0.041) |
| $Year92$ | -0.150 | -0.146 | -0.101 |
| | (0.108) | (0.111) | (0.107) |
| $Year93$ | -0.171 | -0.172 | -0.143 |
| | (0.106) | (0.106) | (0.107) |
| Constant | 1.531 | 1.664 | 1.337 |
| | (0.343) | (0.336) | (0.330) |

Each column is a probit specification in which the dependent variable takes the value of one if the manager was "terminated" from his position and zero otherwise. Each observation is a fund manager-year. Standard errors, adjusted for intra-fund correlation of the errors, are in parentheses.

Table V: Increase in Termination Probability from One Standard Deviation Increase in Boldness

| Manager Age and Performance | Measure of Boldness | | |
|---|---|---|---|
| | *SectorDeviation* | *UnsysDeviation* | *BetaDeviation* |
| Age 35 $Alpha_t < 0$ | 0.045** | 0.055** | 0.032 |
| Age 35 $Alpha_t > 0$ | 0.020** | 0.010 | -0.016 |
| Age 45 $Alpha_t < 0$ | 0.027 | 0.020 | -0.003 |
| Age 45 $Alpha_t > 0$ | 0.004 | -0.022 | -0.019 |

This table uses the estimates from the previous table to construct predicted increases in the probability of termination implied by a one standard deviation increase in boldness for managers with different characteristics. * denotes significance at the 5 percent level. ** denotes significance at the 1 percent level.

Table VI: Patterns in Managerial Behavior

| Independent Variables | Dependent Variable | | | |
|---|---|---|---|---|
| | *UnsysRisk* | *SectorDeviation* | *UnsysDeviation* | *BetaDeviation* |
| Constant | 0.0478 | 0.1400 | 0.0165 | 0.178 |
| | (0.0054) | (0.0290) | (0.0040) | (0.027) |
| *ManagerAge* | 0.00035 | 0.0021 | 0.00022 | 0.002 |
| | (0.00012) | (0.0006) | (0.00010) | (0.0006) |
| log(*Assets*) | -0.0021 | -0.0074 | -0.0010 | -0.008 |
| | (0.0004) | (0.0019) | (0.0003) | (0.002) |
| *GrowIncDummy* | -0.0181 | -0.0358 | -0.0072 | -0.053 |
| | (0.0017) | (0.0092) | (0.0012) | (0.010) |
| *Year*92 | 0.0076 | 0.0029 | 0.0034 | -0.024 |
| | (0.0018) | (0.0058) | (0.0013) | (0.011) |
| *Year*93 | 0.0028 | 0.0016 | -0.0014 | 0.014 |
| | (0.0012) | (0.0055) | (0.0009) | (0.012) |
| *Year*94 | -0.0078 | 0.0083 | -0.0046 | -0.074 |
| | (0.0010) | (0.0047) | (0.0007) | (0.09) |
| NOBS | 1835 | 1835 | 1835 | 1835 |
| R-squared | 0.18 | 0.08 | 0.10 | 0.10 |

Each column is a regression specification in which some characteristic of the manager's portfolio choices is is regressed on fund and manager characteristics. The first column has the fund's unsystematic risk level as the dependent variable; the second through third columns have our "boldness" measures as the dependent variables. The observations are manager-years for the 1992-1995 period. Standard errors are corrected for within-fund correlation of the error terms and are in parentheses.

Table VII: Determinants of Mutual Fund Asset Flows

| Parameter | Independent Variables | Dependent Variable: $NetInflow_{t+1}$ Estimation NLS | NLS | NL2SLS | NL2SLS |
|---|---|---|---|---|---|
| $\kappa_0$ | $MChange_t$ | -0.243 | | -0.242 | |
| | | (0.185) | | (0.192) | |
| $\kappa_1$ | $MChange_t \times (Alpha_t < 0)$ | | -0.449 | | -0.404 |
| | | | (0.209) | | (0.261) |
| $\kappa_2$ | $MChange_t \times (Alpha_t > 0)$ | | 0.409 | | 0.427 |
| | | | (0.382) | | (0.425) |
| $\gamma_{01}$ | $FundAge01 \times Alpha_t$ | 7.144 | 6.883 | 7.146 | 7.190 |
| | | (0.811) | (0.801) | (0.801) | (0.799) |
| $\gamma_{23}$ | $FundAge23 \times Alpha_t$ | 3.299 | 3.378 | 3.310 | 3.689 |
| | | (0.810) | (0.816) | (0.804) | (0.813) |
| $\gamma_{46}$ | $FundAge46 \times Alpha_t$ | 6.129 | 6.151 | 6.139 | 6.397 |
| | | (0.742) | (0.744) | (0.737) | (0.743) |
| $\gamma_{79}$ | $FundAge79 \times Alpha_t$ | 3.345 | 3.399 | 3.352 | 3.735 |
| | | (0.783) | (0.778) | (0.780) | (0.775) |
| $\gamma_{10+}$ | $FundAge10+ \times Alpha_t$ | 2.067 | 2.113 | 2.073 | 2.554 |
| | | (0.490) | (0.476) | (0.486) | (0.476) |
| $\beta_1$ | $Alpha_{t-1}$ | 1.100 | 1.167 | 1.105 | 1.151 |
| | | (0.267) | (0.259) | (0.261) | (0.259) |
| $\beta_2$ | $Alpha_{t-2}$ | 1.672 | 1.647 | 1.677 | 1.613 |
| | | (0.304) | (0.299) | (0.300) | (0.298) |
| $\delta_{01}$ | $FundAge01$ | 0.503 | 0.492 | 0.504 | 0.488 |
| | | (0.059) | (0.059) | (0.059) | (0.059) |
| $\delta_{23}$ | $FundAge23$ | 0.164 | 0.162 | 0.164 | 0.165 |
| | | (0.054) | (0.054) | (0.054) | (0.054) |
| $\delta_{46}$ | $FundAge46$ | 0.221 | 0.215 | 0.222 | 0.216 |
| | | (0.054) | (0.054) | (0.054) | (0.054) |
| $\delta_{79}$ | $FundAge79$ | 0.051 | 0.044 | 0.051 | 0.044 |
| | | (0.057) | (0.057) | (0.057) | (0.056) |
| $\lambda_0$ | $Constant$ | 0.257 | 0.256 | 0.255 | 0.260 |
| | | (0.085) | (0.085) | (0.084) | (0.084) |
| $\lambda_1$ | $\log(Assets_t)$ | -0.030 | -0.031 | -0.030 | -0.030 |
| | | (0.013) | (0.013) | (0.013) | (0.013) |
| $\lambda_2$ | $Alpha_{t+1}$ | 0.914 | 0.899 | 0.915 | 0.918 |
| | | (0.231) | (0.230) | (0.229) | (0.229) |
| $\lambda_3$ | $Year92$ | 0.014 | 0.016 | 0.015 | 0.015 |
| | | (0.049) | (0.049) | (0.049) | (0.049) |
| $\lambda_4$ | $Year93$ | -0.180 | -0.175 | -0.179 | -0.166 |
| | | (0.045) | (0.045) | (0.045) | (0.045) |

This table presents nonlinear least squares and nonlinear two stage least squares specifications. The 1056 observations are fund-years for growth and growth and income funds from 1992-1994. To be included in the specification, a fund had to have assets of greater than $10 million. The dependent variable, $NetInflow_{t+1}$, is the percent change in fund assets from the end of year $t$ to the end of year $t+1$ minus the fund's return in year $t+1$. The nonlinearity stems from allowing the slope of the flow-performance relationship to differ between those funds whose manager changed between year $t$ and year $t+1$ and those funds whose managers did not change. Standard errors are in parentheses.

Table VIII: Promotion-Performance Relationship

| Independent Variable | Dependent Variable $Promotion_t$ |
|---|---|
| $Alpha_t$ | 1.460 |
| | (1.233) |
| $Alpha_t \times (MgrAge - \overline{Age})$ | 0.010 |
| | (0.107) |
| $Alpha_{t-1}$ | 1.561 |
| | (0.893) |
| $Alpha_{t-2}$ | -0.438 |
| | (1.108) |
| $ManagerAge$ | -0.021 |
| | (0.009) |
| $Age60+$ | 0.429 |
| | (0.378) |
| $GrowIncDummy$ | -0.054 |
| | (0.142) |
| $Year92$ | -0.297 |
| | (0.155) |
| $Year93$ | -0.835 |
| | (0.257) |
| Constant | -0.771 |
| | (0.363) |
| Number of Observations | 1320 |

This table presents a probit specification in which the dependent variable takes the value one if a fund manager managing a growth or growth and income fund at time $t$ no longer manages that fund at time $t+1$ but manages greater total assets in the Morningstar database at time $t+1$ than he did at time $t$, adjusting for the overall growth in the fund industry. Observations are manager-fund-years. Standard errors allow for within-fund correlation of the error terms and are in parentheses.

Table IX: Increase in Promotion Probability from One Standard Deviation Increase in Boldness

| Manager Age and Performance | Measure of Boldness | | |
|---|---|---|---|
| | $SectorDeviation$ | $UnsysDeviation$ | $BetaDeviation$ |
| Age 35 $Alpha_t < 0$ | -0.001 | -0.016 | -0.007 |
| Age 35 $Alpha_t > 0$ | 0.019** | 0.002 | 0.011 |
| Age 45 $Alpha_t < 0$ | 0.002 | -0.008 | -0.001 |
| Age 45 $Alpha_t > 0$ | 0.009* | 0.007* | 0.008 |

This table uses the estimates from a probit specification of the promotion-performance relationship to construct predicted increases in the probability of promotion implied by a one standard deviation increase in boldness for managers with different characteristics. * denotes significance at the 5 percent level. ** denotes significance at the 1 percent level.