Governance in the U.S. Mutual Fund Industry

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GOVERNANCE IN THE U.S. MUTUAL FUND INDUSTRY

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[To my husband Steve and son Daniel]

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SUMMARY

The first essay examines how board structure affects manager dismissal decisions in mutual funds. We first find some evidence suggesting that the likelihood of managerial replacement is higher when fund boards are more independent and receive lower levels of compensation. Manager turnover is more likely when funds underperform the objective average. We then investigate the manager turnover decision conditional on the funds experiencing a merger. We find that funds with more independent boards are more likely to employ target managers with a track record of superior performance. Overall, these results suggest that more independent boards make manager retention/replacement decisions in the interests of their shareholders. The second essay studies the relationship between managerial ownership and mutual fund performance. We first document that almost half of the mutual fund managers own shares in their funds, though the absolute amount of investment is modest. Fund future performance is positively related to the level of manager ownership. Manager ownership is higher in equity funds than bond funds, in funds with better past performance, smaller sizes, and where managers have been in charge for a longer time period. When we decompose manager ownership into predicted and residual parts, we find that both components are significant in explaining fund future performance. Our findings suggest that managerial ownership has desirable incentive attributes for mutual fund investors. The third essay investigates how managerial ownership affects the investment behavior of portfolio managers. We first examine the disposition effect exhibited by different fund managers, and find that those with positive ownership show significantly less disposition

effect. Specifically, they sell losers faster and hold on to winner stocks for a longer period. Disposition effect is less pronounced in bigger funds, funds with smaller boards, and funds with higher percentage of board independence. We then test the relation between managerial ownership and the tournament behavior, investigating how the degree of managers' manipulation of fund volatilities in the latter part of a year is related to their personal stakes in the funds. However, we do not find evidence suggesting the existence of such a relationship.

CHAPTER 1

INTRODUCTION

The mutual fund industry in the United States has been absent of scandals until recently. However, in the past few years, the high-profile scandals of market timing and late trading have cost long-term shareholders billions of dollars. By now, the Securities and Exchange Commission (SEC) has prosecuted more than two dozens investment companies and fined them a total of about five billions dollars in settlements and penalties. To impose more stringent regulations on mutual funds and better protect the interests of shareholders, the SEC has passed a series of rules in an attempt to improve mutual fund governance.

Among the new rules, the most important ones are those which require higher percentage of board independence and mandate disclosure of managerial ownership. In June 2004, the SEC adopted amendments requiring mutual funds to have a minimum of 75% independent directors, as well as an independent chairman after January 2006. They believe that boards with higher percentage of independent directors and an independent chairman are more effective at protecting shareholders' interests. In October 2004, the SEC passed another rule mandating registered investment companies to disclose the dollar ownership range of portfolio managers beginning March 2005. The SEC believes that the disclosure of managerial ownership provides shareholders with significant information in evaluating whether fund managers have sufficient incentives to act in the best interests of the shareholders.

However, both sets of rules have been subject to intense debate. Investment companies have all the motivation to postpone the compliance with these rule changes. Some other practitioners have been challenging the usefulness of these rules. For example, the U.S. Chamber of Commerce filed a prolonged lawsuit against the SEC. Its criticism is based on the lack of empirical evidence supporting the notion that these new rules on board structure improve the governance in the mutual fund industry. The Investment Company Institute (ICI), the national association of U.S. investment companies, also had deep initial concerns that the disclosure of managerial ownership might reveal material information and raise privacy issues. Hence, we design empirical tests to examine the effectiveness of the aforementioned rule changes, and test how they help align the interests of portfolio managers with those of shareholders.

The second chapter studies the relation between board structure and mutual fund manager replacement in an unconditional and conditional setting. Previous literature such as Khorana (1996) documents an inverse relation between fund performance and the probability of managerial turnover. We further investigate how board characteristics such as board size, percentage of board independence, and board member compensation, affect the manager dismissal decision after controlling for a fund's prior performance. In the conditional setting, we examine the role of boards in manager turnover decisions around fund mergers. Since the boards of acquiring funds are responsible for monitoring the new combined funds, we study how their characteristics affect the decision of retaining the portfolio managers of targets and acquirers.

The third and fourth chapters study managerial ownership in mutual funds. The third chapter examines the relation between managerial ownership and mutual fund

performance. We first test the impact of managerial ownership on future fund performance. Since previous literature argues that managerial ownership is not exogenous and may be affected by fund characteristics, we decompose managerial ownership into a component that can be predicted by fund characteristics and a residual part. Finally, we study whether the residual managerial ownership affects fund future performance.

The fourth chapter investigates how managerial ownership affects the investment behavior of portfolio managers. Two types of risk-taking behavior, namely disposition effect and tournament behavior have been widely studied in previous literature. Disposition effect describes the tendency of investors holding losing investments too long and selling winning investments too soon. Tournament behavior illustrates the degree to which managers alter the volatility of their portfolios at mid-year, conditional on their year-to-date performance. First, we study the degree of disposition effect exhibited by managers with different levels of ownership. Then we examine their relation after controlling for various fund characteristics and their investment objectives. Second, we investigate the relation between managerial ownership and tournament behavior, and test whether a significant relation exists.

This study is interesting not only to practitioners regarding the SEC rule changes, but also to academic research with few existing studies on mutual fund governance. Prior to this study, only a few papers investigate the relation between board structure and the decisions made by mutual funds, such as fee setting and fair value pricing. [Tufano, and Sevick (1997), Del Guercio, et. al. (2003), and Zitzewitz (2003)] This paper examines the decision to replace portfolio managers, a decision that mutual fund boards have an

impact on, and contributes to the fund governance literature. Our study also provides the first empirical evidence on managerial ownership of portfolio managers, and studies its relation with fund performance and future risk-taking behavior.

CHAPTER 2

BOARD STRUCTURE AND MUTUAL FUND MANAGER TURNOVER

2.1. Introduction

Recent mutual fund scandals have triggered significant changes in the fund industry.[1] Boards of directors, who are supposed to represent the interests of shareholders and act on their behalf, have been criticized as "ineffective watchdogs" or "rubber stamps". The Security and Exchange Commission has passed at least 10 new mutual fund regulations, mostly on fund governance issues. For example, all mutual funds are required to have a chief compliance officer (CCO), who directly reports to mutual funds' board instead of the management. The CCOs are responsible for ascertaining that the fund is following government regulations and internal policies. In addition, beginning Jan 2006, mutual funds will be required to have an independent chairman and at least 75% independent directors on the board. The SEC believes this will improve the quality of board oversight.

The SEC's proposal on a more stringent mutual fund governance system has been challenged by a number of investment companies and institutions. Fund sponsors such as Fidelity, Vanguard and T. Rowe Price have publicly expressed their opposition, particularly against the ruling on having an independent chairman on the board. The U.S. Chamber of Commerce filed a lawsuit with the federal court in an attempt to overturn the

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[1] Recent mutual fund scandals include "late trading" and "market timing" allowed by certain management companies, e.g. Bank of America allowed Canary Hedge Funds to purchase shares at the same-day fund net asset value even though orders were submitted after market closed at 4 p.m. Investors who use these practices generate short-term profits at the expenses of long-term shareholders. Since 2003, the SEC has been investigating these companies and penalizing them severely.

regulation on independent chairman and a minimum of 75% of independent directors. In the lawsuit, they claimed a lack of empirical evidence supporting the effectiveness of a more independent mutual fund board.

In this paper, we want to shed light on an important aspect of fund governance– the relation between board structure and manager turnover. It is known that mutual fund boards do not have direct control over the performance of the fund, which is usually attributed to the ability of individual portfolio managers. However, since independent boards have the power to select fund sponsors and other service vendors, an effective board can easily impose pressure on the fund sponsor if the portfolio manager has persistent poor performance, and initiate the manager turnover. In the pecking order of governing underperforming funds, boards should always resort to fund sponsors first for measures of improving performance, such as negotiating a lower fee, requesting a better portfolio manager, or eliminating the fund within the family/complex. In the case where internal coordination fails, they can terminate the contract with fund sponsor and award it to a new sponsor, or merge the fund into another family.

Even though mutual fund governance has been the center of such a heated debate, research on the topic has been scarce. Tufano and Sevick (1997) were the first to study the board structure of open-end mutual funds. Since one important role of mutual fund boards is to negotiate fees with the advisor, they investigate how different board characteristics could affect fee setting. They find that fees charged to fund investors tend to be lower when boards are smaller, more independent and are composed of directors who sit on a larger fraction of fund boards across the family. They also suggest that

better compensated boards tend to approve higher fees. Del Guercio, et. al. (2003) confirm the above findings for the closed-end funds.

Zitzewitz (2003) analyzes the relationship between board structure and funds' adoption of fair value pricing. He finds that funds with more independent boards are more likely to adopt fair value pricing, which protects the interests of shareholders from market timers. Khorana, et. al. (2005) study the role of board of directors in merger decisions of mutual funds. They find that controlling for previous performance, funds with more independent boards are more likely to be acquired, and the result is primarily driven by across-family mergers. However, regardless of board structure, post-merger fund performance and fees revert to the mean of their objectives. In summary, even though board independence leads to quick action and less tolerance for underperformance, they cannot generate superior post-merger performance.

This paper studies the impact of a fund board on manager turnover in both an unconditional and conditional settings. First, we test the hypothesis that funds with different levels of independent boards behave differently in replacing portfolio managers with prior poor performance. Other board characteristics analyzed include board size and board member compensation, and Lipper 2003 board dataset is our primary data source. Due to the fact that it is difficult to document manager turnover when the fund is team managed, we limit our analysis to funds managed by a single manager. We examine those funds that were managed by single managers and had manager turnover over a two-year period from 2002-2003. Our findings supplement existing literature on mutual fund board structure–we find some evidence that manager turnover is more likely to happen to

funds with prior poor performance, more independent boards, and lower compensation to board members.

Second, we investigate the role of mutual fund boards in the manager turnover decisions around fund mergers. Specifically, we analyze how the boards of acquiring funds decide whether to keep their own portfolio managers or the managers of target funds. Studying all qualifying sample during 1999-2001, we find some evidence suggesting that funds with more independent boards are more sensitive to the target fund performance and are more likely to hire target managers with good track records.

This study contributes to the literature for the following reasons: First, it adds to the empirical evidence on the effectiveness of SEC's new regulations. Since the impact of board structure on mutual fund performance cannot be directly tested, the analysis of manager turnover is used as an indirect measure of the relationship between boards and performance. Second, investors will be interested in knowing which board structure best protects their interest and the knowledge will help them while proxy voting. Third, fund sponsors also may want to know how the boards affect manager turnover decisions in all families. Lastly, the study will complement the corporate governance literature. Numerous articles in the corporate governance field have shown a stronger association between prior performance and CEO resignation in firms with more independent boards.[2]

The paper is organized as follows. Section 2 reviews the role of board of directors and discusses the hypotheses. Section 3 describes the data and methodology. Section 4 presents the empirical results. Section 5 includes various robustness checks. Section 6 briefly concludes.

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[2] For example, Weisbach (1988), and Borokhovich et. al (1996).

2.2. Role of Mutual Fund Directors and Hypotheses

In the mutual fund industry, though funds are individual legal entities, they are usually organized by fund sponsors, who choose portfolio managers to deploy assets. Every fund in the family has its own board, but across the entire family, it is common to have a high overlap of board of directors. General duties of fund boards include selecting fund sponsors, distributors, overseeing fund administration and custody, reviewing insurance and security transactions, monitoring funds' investment performance, regulatory compliance and overall business operations, and approving fee contracts and any merger decisions. Thus, mutual fund boards normally do not fire underperforming portfolio managers directly. Instead, boards will bring the issue up in the board member meetings and request the fund sponsor to assign a new fund manager. This is quite different from boards of corporations who are responsible for evaluating senior management and replacing them when they fail to perform well.

Performance. Performance is always the most important factor in evaluating top executives, and a weak or poor stock performance can be the primary reason to cause management turnover. Coughlan and Schmidt (1985) and Warner et. al. (1988) both show an inverse relationship between the rate of top management changes and prior stock price performance. Denis and Denis (1995) also document forced manager resignation preceded by declines in operating performance.

To mutual fund shareholders, fund performance is also crucial – how the fund is performing compared to the market, and to the rest of the funds in the same objective. Khorana (1996) finds an inverse relation between the probability of managerial replacement and fund performance. Mutual funds are not designed to be a short-period

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investment vehicle. This is especially true now that most funds charge short-term redemption fees. Also many funds charge a front and back-load to make the in-and-out of fund rather expensive. As the representative of shareholders, fund boards have the responsibility to make sure that managers improve the performance. When managers do not seem to meet the expectation of shareholders, fund boards are more likely to request the fund sponsor to replace the portfolio manager.

Thus, we hypothesize that funds with more effective mutual fund boards are more likely to replace a poorly performing fund manager. Along the lines of previous literature, we use the following characteristics to measure the board effectiveness: board size, percentage of independent board members and board member compensation.[3]

Board independence. Corporate finance literature has a long history in studying the relation between board independence and management turnover issues. Weisbach (1988) finds a stronger association between prior performance and CEO turnover in firms dominated by outside boards than those with inside boards. Borokhovich et. al. (1996) also document a strong positive relation between the percentage of outside directors and the frequency of outside CEO succession. Hermalin and Weisbach (1998) offer a model in which board effectiveness is a function of its independence.

Studies on mutual fund board structure have also shown that the percentage of independent board is a good measure for their effectiveness. Tufano and Sevick (1997), Del Guercio et. al. (2003), Khorana et. al. (2005), and Zitzewitz (2003) all find that more independent boards make more effective decisions in governing their funds. We also hypothesize that funds with more independent board are more likely to replace managers with poor performance.

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[3] Khorana et. al. (2005) have a thorough discussion on how these variables capture the board effectiveness.

Board Size. Arguments about how board size measures the board effectiveness are always twofold. Tufano and Sevick (1997), and Del Guercio et. al. (2003) document that funds with smaller boards enjoy lower fees. In the corporate finance literature, Yermack (1996) finds an inverse relation between board size and firm value, and a higher probability of smaller boards to initiate CEO replacement due to poor performance. On the other hand, board sizes are highly correlated with sponsor sizes. Larger families tend to have larger boards. If larger families, who have access to richer management resources, are more sensitive to portfolio performance, they can more easily replace poor performing managers. As a consequence, we might find a positive relation between board size and manager turnover decisions.

Board member compensation. The debate about board compensation also has two views: one side believes that higher board compensation represents greater monitoring skills and better governance, while the other side argues that better compensated boards have their interests more in line with fund sponsors and are less effective. Previous literature has found support for the second view. Tufano and Sevick (1997) and Del Guercio et. al. (2003) both find that better compensated boards of directors tend to approve higher mutual fund fees. Khorana et. al. (2005) also find an inverse relation between board compensation and the likelihood of a fund merger, especially in mergers where targets are acquired by funds from outside of the family. In our study, we hypothesize that better compensated boards share more monetary interests with the advisors, and they are less likely to request the advisors to replace those underperforming managers.

Conditional manager turnover decisions. There are two types of fund mergers: in family merger where target is acquired by another fund in the same family, and across-family merger where an outside fund takes over the target. For the in-family mergers, board members are usually unchanged afterwards, especially if the target and the acquirer shared the same board before. For across-family mergers, generally target board members are eliminated, except in rare cases selected members will receive board seats in the new combined fund. Therefore, the governance role of the new combined fund is usually left to the acquiring fund board, no matter whether the acquirer is from inside or outside the family. In the conditional setting where fund mergers occur, either target or acquirer manager can become the manager of the new combined fund. The choice of the new manager is partly to the discretion of the acquiring fund board, as well as to the fund advisor. We hypothesize that more effective acquiring fund boards will be more sensitive to managers' prior performance, and they will play a more active role in the selection of the new manager. Since the level of board independence is one of the most important measures of board effectiveness, we hypothesize that acquiring funds with more independent board are more likely to hire the target manager who had good prior performance.

2.3. Data and Methodology

2.3.1. Data

Lipper Inc. generously provides us with the 2003 equity and bond mutual fund board data.[4] They combine the share classes and generate a total of 5,982 funds with the following board variables: board size, number of interested board members, number of

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[4] Special thanks to Donald Cassidy who provided us with the data.

independent board members, number of board meetings in the past calendar year, total board compensation, a dummy variable for whether board members defer their compensation package. Lipper data also includes fund tickers, total net assets, and investment objectives. We match their data with CRSP Mutual Fund Database to obtain other fund variables such as performance, net asset value, age, manager names, manager inception dates, etc. We merge the two databases by fund names and use the total net assets in both datasets for crosschecks. Any fund with total net assets deviated by over 100 million or 20% is dropped as no-match. We randomly select 10% of the matched data to check with the SEC filings on board characteristics and find them to be reliable.

Mutual fund boards have been shown to be relatively stable. In fact, many funds do not have openings for new directors until current members retire. It is safe to assume that board members remain the same within a short time period. Within our sample, we assume all funds have the same board members in year 2002 as in year 2003. Then we manually code the manager turnover. We can only document turnover when CRSP reports names of all managers and their respective inception dates. In total we have 6,226 fund-year observations with available manager information obtained from CRSP and board information from Lipper.

In the past decade, it has become more common that mutual funds are team managed. A few reasons explain this phenomenon: mutual funds have become larger in size and team management can diversify some risks, fund sponsors choose to have team management to diversify the talent pool and minimize the likelihood of poor performance, and cash inflows and performance are less affected when one manager leaves or is replaced. For the purpose of this study, team managed funds make it difficult

to contribute superior or poor performance to any one of the managers and examine the change in performance with partial manager turnover. Hence, in this paper we exclude all funds managed by multiple managers and are left with 3,187 fund-year observations.

However, CRSP data on manager inception dates are rather unreliable. We manually search the SEC filings to confirm their true turnover dates. Sometimes funds report turnover dates of their managers in the 485APOS or 485BPOS filings. In the cases where 485 filings do not disclose the manager turnover dates, we search all 497 filings. Our final sample includes 237 funds with managers being replaced during the two-year period 2002-2003, and they account for about 8% of all funds managed by single managers in the sample period.

We use all mergers that took place during 1999-2001 to study the conditional manager turnover. This data is complied in Khorana et. al. (2005). Since our study focuses on the decision of retaining one manager, the sample has to be restricted to those targets and acquiring funds that are managed by different managers. As reported in Table 2.5, in total, we have 134 funds, in which 25 target managers and 109 acquiring managers survived.

2.3.2. Variables Construction and Methodology

Fund performance is measured by the objective adjusted return (OAR), defined as the annual return of the fund less that of the median fund within the same investment objective.[5] It is computed as follows:

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[5] Fund objectives include: aggressive, balanced, corporate bond, equity income, government bond, government mortgage, growth, growth and income, international bond, international equity, municipal bond, small cap, specialty environment, specialty finance, specialty health, specialty metal, specialty natural resources, specialty real estate, specialty technology and specialty utility.

$$OAR_i = \left[\prod_{t=1}^{12}(1+R_{i,t})-1\right] - \left[\prod_{t=1}^{12}(1+R_{o,t})-1\right]$$

where $R_{i,t}$ is the return of fund i in month t and $R_{o,t}$ is the median return of all funds within the same investment objective in month t. We also compute the cumulative annual objective adjusted return in the periods prior to and after manager turnover.

Net asset flow measures the total asset flow in percentage to a portfolio net of the effect of portfolio returns. It is measured as follows:

Net Asset Flow$_{i,t}$ = [Assets$_{i, t}$ - Assets$_{i, t-1}$ (1 + R$_{i, t}$)]/ Assets$_{i, t-1}$

where *Assets$_{i,t}$* is total assets in fund i at the end of year t and $R_{i,t}$ is the return of fund i during year t. Similar to the above computation of OAR, we also compute the objective adjusted asset flow, which is the net asset flow of the fund less the median flow of all funds in the same investment objective.

We use the following logistic models in studying the determinants of manager turnover:

Probability (Manager turnover) $_{i,t}$

= $\alpha_0 + \beta_1$ (performance measures) $_{i,t-1 \text{ or } i, (t-2, t-1)} + \beta_2$ (fund size) $_{i,t}$

  + β_3 (asset flow measure) $_{i,t-1} + \beta_4$ (fund age) $_{i,t}$

  + β_5 (board characteristics) $_{i,t}$

  + β_6 (performance measures) $_{i,t-1 \text{ or } i, (t-2, t-1)}$ *(board characteristics) $_{i,t}$

Performance measures are OAR of year (-1) or the cumulative OAR of (-2, -1). Cumulative OAR of (-2, -1) is included because board and fund sponsors are more likely to consider the manager's performance over a period longer than a year, in making the manager replacement decisions. *Asset flow measure* is the objective adjusted flows of

year (-1). *Board characteristics* include board size, percentage of independent board members, and per board member compensation. The interactions between performance measures and board characteristics examine the marginal effect of boards on the turnover decision given the fund performance.

Among all funds managed by single managers, we first select those with manager turnover during 2002-2003. Then we generate control funds by objective and size match in the same calendar year. These funds form our sample in the logistic regression. To address the concern that mutual fund families have overlapping boards, we also run clustered logistic regressions in testing the determinants of manager turnover. As a robustness check, we also select control funds by objective match or objective and performance match. Since large and small fund families might have different sensitivity to their portfolio manager performance, we want to control for that in the robustness check as well. We define the ones with asset sizes above median to be large families, and those below median to be small families. Our last approach is to ensure that control funds for large-family-funds are from large families, and those for small-family-funds are from small families as well.

In the fund mergers, the retention of either target manager or acquiring manager is more dependent upon their previous performance. Thus, we use the following simplified model to study the determinants:

Probability (Manager turnover) $_{i,t}$

$= \alpha_0 + \beta_1$ (target performance) $_{i,\ (t-2,\ t-1)}$

$+ \beta_2$ (target asset flow) $_{i,\ (t-2,\ t-1)}$

$+ \beta_3$ (acquirer performance) $_{i,\ (t-2,\ t-1)}$

$$+ \beta_4 \text{ (acquirer asset flow)}_{i,\,(t\text{-}2,\,t\text{-}1)}$$

$$+ \beta_5 \text{ (acquirer board characteristics)}_{i,t}$$

$$+ \beta_6 \text{ (target performance)}_{i,\,(t\text{-}2,\,t\text{-}1)} *\text{(acquirer board characteristics)}_{i,t}$$

$$+ \beta_7 \text{ (target performance)}_{i,\,(t\text{-}2,\,t\text{-}1)} *\text{(acquirer board characteristics)}_{i,t}$$

2.4. Empirical Results

2.4.1. Univariates on Fund Characteristics

Table 2.1 reports the fund characteristics of funds with manager turnover and their control funds. Our turnover sample includes 237 funds managed by a single manager, had the manager replaced during the period 2002-2003, and had available board information. Control funds are generated by objective and size match, from a pool of solo-managed funds. In unreported tables, we show that funds managed by single managers are not different from the whole universe,

Not surprisingly, funds with manager turnover tend to come from larger families. The median family total net asset for turnover funds is $63 billion, five times as big as control funds. This is understandable since larger families have a richer pool of managers for a replacement. It is also possible that larger families are more sensitive to manager performance for reputation effect. Not all manager turnovers are a result of prior poor performance. In fact, our sample shows about two-thirds of the turnover funds have negative cumulative objective adjusted returns in the two-year (-2, -1) period. (This result is not reported in the table) In the rest of turnover cases, fund managers could get promoted to a larger fund, take a new job in another investment company, start their

own hedge fund, or even retire from the profession. However, it is difficult to document the reasons of manager turnover and our sample includes manager turnover for all reasons. Nevertheless, this bias shouldn't affect the validity of our results and conclusions. It is only likely to understate our results and conclusions.

Univariate comparison does not indicate significant difference in the fund size between turnover and non-turnover funds. Turnover funds have a median one-year objective adjusted asset flow of –4.35%, insignificantly different from the –3.95% of the non-turnover funds. In contrast, one-year objective adjusted return of turnover funds is 0.16%, significantly lower than the 1.30% of non-turnover funds. Note that the performance and asset flows correspond to the calendar year rather than the actual turnover date. These results suggest that turnover funds are, in general, worse performing than non-turnover funds. Meanwhile, turnover fund mangers appear to be less experienced. The median tenure of turnover funds' managers is 3 years, significantly shorter than the 5 years of non-turnover funds' managers.

We also separate all funds into negative and positive OAR in the prior year. Since we are unable to distinguish two types of turnover–enforced turnover due to bad performance and voluntary turnover to pursue better opportunities, we use previous performance to proxy for this difference. Among all funds with negative OAR, median turnover fund underperforms its objective by 4.35%, compared to the 3.07% of non-turnover funds. On the other hand, we do not observe significant difference in performance between turnover and non-turnover funds (2.42% and 3.22%), among all those with positive OAR.

Table 2.1
Characteristics of funds with manager turnover and control sample

This table reports the characteristics of funds with manager turnover and control sample during the period of 2002-2003. Turnover sample includes all funds managed by single managers and experienced manager turnover during 2002-2003. Control sample is generated by objective and size match, from the pool of funds managed by single managers. *Objective adjusted return (OAR) (-1)* is computed as the annual return of the fund less that of the median fund within the same investment objective during the preceding year. *Objective adjusted flow (-1)* is computed in a similar manner. Both objective adjusted return and flow are expressed in %. *Funds with negative (positive) performance* refer to those with previous one-year OAR negative (positive). All numbers reported in this table are medians and p-values are included in brackets.

	Number of Observations	Family TNA ($ million)	Number of Funds in Family	TNA ($ million)	Manager Tenure (years)	Objective Adjusted Flow (-1)	Objective Adjusted Return (-1)
All Funds							
Turnover Sample	237	62,873	198	145	4	-4.35	0.16
Control Sample	237	11,766	67	143	5	-3.95	1.30
p-value		(0.00)	(0.00)	(0.48)	(0.00)	(0.12)	(0.00)
Funds with negative performance							
Turnover Sample	119	144,025	151	145	3	-7.55	-4.35
Control Sample	86	9,961	67	180	6	-5.57	-3.07
p-value		(0.00)	(0.00)	(0.19)	(0.00)	(0.12)	(0.22)
Funds with positive performance							
Turnover Sample	118	741,142	245	153	4	-0.62	2.42
Control Sample	151	14,243	67	142	5	-1.92	3.22
p-value		(0.00)	(0.00)	(0.21)	(0.00)	(0.38)	(0.13)

Table 2.2
Board characteristics of funds with manager turnover and control sample

This table reports the characteristics of funds with manager turnover and control sample during the period of 2002-2003. Turnover sample includes all funds managed by single managers and experienced manager turnover during 2002-2003. Control sample is generated by objective and size match, from the pool of funds managed by single managers. *Funds with negative (positive) performance* refer to those with previous one-year OAR negative (positive). Numbers included in brackets are p-values.

	Number of Observations	Board Size	Percent of Indep. Board	Per Board Member Comp. ($)	Number of Board Meetings
Panel A. Board characteristics (medians)					
All Funds					
Turnover Sample	237	8	0.75	600	5
Control Sample	237	7	0.75	1,143	4
p-value		(0.00)	(0.09)	(0.00)	(0.00)
Funds with negative performance					
Turnover Sample	119	8	0.78	780	4
Control Sample	86	8	0.76	1,341	4
p-value		(0.02)	(0.14)	(0.00)	(0.09)
Funds with positive performance					
Turnover Sample	118	9	0.71	544	6
Control Sample	151	7	0.75	1,038	4
p-value		(0.00)	(0.28)	(0.01)	(0.00)
Panel B. Board characteristics (means)					
All Funds					
Turnover Sample	237	9.09	0.78	1,280	6.70
Control Sample	237	7.81	0.76	2,519	5.55
p-value		(0.00)	(0.08)	(0.00)	(0.00)
Funds with negative performance					
Turnover Sample	119	8.77	0.79	1,405	6.35
Control Sample	86	7.70	0.76	3,032	5.57
p-value		(0.01)	(0.20)	(0.00)	(0.12)
Funds with positive performance					
Turnover Sample	118	9.42	0.77	1,153	7.08
Control Sample	151	7.87	0.76	2,226	5.55
p-value		(0.00)	(0.35)	(0.01)	(0.00)

2.4.2. Univariates on Board Characteristics

Table 2.2 reports the median and mean board characteristics of funds with manager turnover and control funds. The univariate comparison shows statistical difference: funds that experienced manager turnover seem to have larger boards, more independent boards, lower per board member compensation, and more board meetings every year. Funds experiencing management turnover have an average (median) 9.09 (8) board members versus 7.81 (7) for control funds, and their board members are 78% (75%) independent, compared with 76% (75%) for control funds. Average (median) compensation to each board member of funds with management turnover is $1,280 ($600), significantly lower than the $2,519 ($1,143) to control fund boards, and their boards hold an average (median) of 6.70 (5) board meetings every year versus 5.55 (4) of control fund boards. In general, these findings are consistent with our hypothesis that funds experiencing management turnover have more effective boards.

2.4.3. Fund Performance Around Manager Changes

Table 2.3 investigates the cumulative excess performance surrounding the manager turnover. CRSP does not explicitly report the manager turnover date, but reports the inception date of the new manager. So we use the inception date of the new manager as the date the old manager is replaced. If the new manager inception date is different from the date that we collect from the SEC filings, we use the latter one for our analysis. We compute their cumulative objective adjusted return and flow for these funds during the months (-12,0), (-6,0), (-3,0), (0,3), (0,6) and (0,12).

Table 2.3
Cumulative excess performance surrounding manager turnover

This table reports median cumulative excess performance to funds in the year before and in the year after the manager turnover. Turnover sample includes all funds managed by single managers and experienced manager turnover during 2002-2003. Control sample is generated by objective and size match, from the pool of funds managed by single managers. Excess performance is measured by objective-adjusted return, which is computed as the difference between a fund's annual return and the average return of all funds within the same objective. Numbers reported in this table are medians and p-values are included in brackets.

Panel A. Median cumulative excess performance surrounding manager turnover							
				Months			
	N	-12 to 0	-6 to 0	-3 to 0	0 to 3	0 to 6	0 to 12
Turnover Sample	237	-0.46 (0.09)	0.04 (0.71)	0.06 (0.25)	-0.03 (0.68)	0.20 (0.12)	0.45 (0.00)
Control Sample	233	0.05 (0.90)	-0.14 (0.51)	0.05 (0.89)	-0.01 (0.99)	0.20 (0.08)	0.08 (0.18)
p-value		0.07	0.46	0.22	0.36	0.48	0.19
Panel B. Percentage of independent board >= 75%							
Turnover Sample	125	-0.90 (0.02)	-0.27 (0.26)	-0.20 (0.22)	-0.09 (0.72)	-0.06 (0.74)	0.28 (0.48)
Control Sample	131	0.15 (0.73)	-0.14 (0.63)	0.06 (0.53)	-0.07 (0.40)	0.06 (0.43)	-0.20 (0.87)
p-value		0.03	0.12	0.09	0.37	0.39	0.31
Panel C. Percentage of independent board < 75%							
Turnover Sample	112	0.07 (0.85)	0.32 (0.09)	0.31 (0.00)	0.15 (0.33)	0.39 (0.07)	1.00 (0.00)
Control Sample	102	-0.27 (0.92)	-0.14 (0.62)	0.05 (0.62)	0.02 (0.38)	0.31 (0.09)	0.55 (0.06)
p-value		0.43	0.09	0.01	0.46	0.42	0.30

Results in Table 2.3 show that funds do significantly improve their performance after manager turnover. In the 12-month (-12, 0) period, funds that experienced manager turnover had a median objective adjusted return of –0.46%. During the one year after the manager turnover, objective adjusted return improves to 0.45%. On the other hand, we do not observe a significant change in the objective adjusted return in the same time periods for control funds. As we discussed previously, our turnover sample includes funds whose managers left for better career opportunities or got promoted to manage other funds. Thus the true performance enhancement from replacing poor-performing managers should be even higher than what we observe here.

We also compare the two groups of funds based on different levels of independent board. In Panel B, where the percentage of independent board is over 75%, funds with manager turnover had significantly worse one-year performance of –0.90%, whereas median control funds outperform their objective by 0.15%. This univariate comparison suggests that funds with more independent boards are more likely to replace underperforming managers. As a contrast, we do not find any significant difference in the prior one-year performance between turnover sample (0.07%) and control funds (-0.27%), when their independent board members are less than 75%. During the post-turnover period, we do not find difference in the performance of both groups. This indicates that the new managers are able to improve the performance to the level of non-turnover funds.

2.4.4. Determinants of Manager Turnover

We use logistic regression to study the determinants of manager turnover. To investigate the role of mutual fund board in the decision of portfolio manager turnover, we test the significance of various board characteristics in the regression after controlling for the fund level factors that directly affect managers' positions.

Panel A of Table 2.4 reports the results of logistic regressions. We find that coefficients on both performance measures, OAR of (-1) and cumulative OAR of (-2, -1) are significantly negative, which suggests that managers with poor performance are more likely to be replaced. To provide some economic perspective, we first compute the probability of manager turnover (0.5027) in Model I when holding every independent variable at its mean. Then we increase the mean of OAR in year -1 by one standard deviation, and the probability of manager turnover reduces to 0.4349, a drop by almost 14%. Similarly, in Model III, increasing one standard deviation of OAR of (-2, -1) reduces the probability of manager turnover from 0.4928 into 0.4187, a decrease of 15% as well. Other control variables, such as fund size, asset flows, fund age and manager tenure are insignificant in all models.

Table 2.4
Determinants of single manager turnover: logistic results

Panel A reports the results of logistic regressions examining the determinants of the fund manager turnover decision, and Panel B reports the clustered results. Turnover sample includes all funds managed by single managers and experienced manager turnover during 2002-2003. Control sample is generated by objective and size match, from the pool of funds managed by single managers. Both turnover funds and control funds exclude all targets, acquiring and liquidated funds. *OAR* is computed as the annual return of the fund less that of the median fund within the same investment objective. *Fund Size* is measured as the logarithm of total net assets in the fund. *Asset Flows* are computed as the objective-adjusted net asset flows into the fund in the year preceding the turnover. *Fund age* is the logarithm of fund age computed in years. *Independent Board %* is the fraction of the board members that are considered to be unaffiliated with the fund, i.e. independent directors. *Compensation* is the average fund compensation received by a board member over the course of one year. In Panel B, All models are clustered by fund families. Numbers included in brackets are p-values.

	Model I	Model II	Model III	Model IV
		Panel A. Standard logistic models		
Intercept	0.28 (0.80)	0.22 (0.84)	-0.10 (0.93)	0.02 (0.99)
OAR (-1)	-2.76 (0.02)	0.14 (0.99)		
Cumulative OAR (-2, -1)			-1.78 (0.01)	-6.04 (0.36)
Fund Size	0.10 (0.24)	0.09 (0.28)	0.12 (0.15)	0.13 (0.14)
Asset Flows (-1)	0.12 (0.78)	0.12 (0.79)	0.29 (0.53)	0.22 (0.65)
Fund Age	0.22 (0.24)	0.23 (0.23)	0.28 (0.15)	0.27 (0.16)
Board Size	0.03 (0.45)	0.03 (0.45)	0.03 (0.51)	0.03 (0.50)
Independent Board %	1.92 (0.06)	1.97 (0.05)	1.98 (0.05)	1.97 (0.05)
Compensation	-0.44 (0.00)	-0.43 (0.00)	-0.42 (0.00)	-0.44 (0.00)
OAR (-1) * Board Size		0.11 (0.79)		
OAR (-1) * Indep Board %		-6.21 (0.61)		
OAR (-1) * Compensation		0.14 (0.85)		
OAR (-2, -1) * Board Size				-0.07 (0.74)
OAR (-2, -1) * Indep Board %				2.97 (0.64)
OAR (-2, -1) * Compensation				0.36 (0.52)
Number of Observations	412	412	404	404
Pseudo R^2	0.08	0.08	0.08	0.08

	Model I	Model II	Model III	Model IV
	Panel B. Clustered logistic models			
Intercept	0.28 (0.81)	0.22 (0.85)	-0.10 (0.94)	0.02 (0.99)
OAR (-1)	-2.76 (0.02)	0.14 (0.99)		
Cumulative OAR (-2, -1)			-1.78 (0.03)	-6.04 (0.40)
Fund Size	0.10 (0.29)	0.09 (0.34)	0.12 (0.18)	0.13 (0.17)
Asset Flows (-1)	0.12 (0.58)	0.12 (0.60)	0.29 (0.26)	0.22 (0.42)
Fund Age	0.22 (0.33)	0.23 (0.31)	0.28 (0.25)	0.27 (0.24)
Board Size	0.03 (0.54)	0.03 (0.54)	0.03 (0.59)	0.03 (0.58)
Independent Board %	1.92 (0.04)	1.97 (0.03)	1.98 (0.03)	1.97 (0.03)
Compensation	-0.44 (0.00)	-0.43 (0.00)	-0.42 (0.00)	-0.44 (0.00)
OAR (-1) * Board Size		0.11 (0.82)		
OAR (-1) * Indep Board %		-6.21 (0.70)		
OAR (-1) * Compensation		0.14 (0.83)		
OAR (-2, -1) * Board Size				-0.07 (0.78)
OAR (-2, -1) * Indep Board %				2.97 (0.64)
OAR (-2, -1) * Compensation				0.36 (0.47)
Number of Observations	412	412	404	404
Pseudo R^2	0.08	0.08	0.08	0.08

After controlling for fund-level characteristics and performance, board characteristics such as percentage of independence and compensation are significant. Coefficient on percentage of independent board is positive while negative on board compensation. We also quantitatively compute the impact of those characteristics on the probability of manager turnover: In Model I, an increase of one standard deviation in percentage of independent board boosts the likelihood of manager turnover by 11%, while an increase of one standard deviation of the board member compensation decreases the probability of manager turnover by 33%. A test of Model III yields about the same magnitude of impact from these board characteristics. Our results of percentage of board independence and board compensation are consistent with previous literature and they seem to capture board effectiveness.

We include the interaction terms between all board characteristics and performance measures in Models II and IV, but we do not observe statistical significance. Our explanation is that since boards do not have direct control over fund performance, we do not find a marginal effect of including the interactions between performance and board variables. When we control for performance and other fund-level factors, we do find strong governance impact of more effective boards.

To control for the lack of independence among funds from the same families, we also run clustered logistic regressions in Panel B. Specifically, we estimate all models in Panel A by clustering family names. We find that all results are very close to those in Panel A, and magnitude of significance is slightly higher for board level variables.

Table 2.5
Descriptive statistics on managerial survival

This table documents the manager survival information for the new combined funds. Sample is limited to the target/acquirer sets that had different mangers prior to merger. Annual target and Acquirer OAR is the average of target and acquirer objective adjusted return in percentage in two years (-2, -1) preceding the merger. Annual target and acquirer flow is computed as the average objective adjusted net asset flow in percentage in (-2, -1). Numbers reported in this table are medians.

	N	Annual target OAR (-2, -1)	Annual acquirer OAR (-2, -1)	Annual target flow (-2, -1)	Annual acquirer flow (-2, -1)	Acquirer board size	Acquirer percent of independent board
			In-family merger				
Target manager survival	6	-0.99	-1.14	-9.36	-2.31	8.50	0.78
Acquirer manager survival	42	-1.47	-0.09	-6.01	-4.48	9.00	0.78
p-value		0.31	0.08	0.38	0.09	0.32	0.10
			Across-family merger				
Target manager survival	19	0.22	0.69	-1.22	3.17	6.00	0.83
Acquirer manager survival	67	-1.14	0.18	-5.10	14.6	8.00	0.78
p-value		0.04	0.18	0.30	0.16	0.06	0.09

2.4.5. Determinants of Manager Turnover in Fund Mergers

We report the univariate statistics of the targets and acquiring funds in Table 2.5. It is common for acquiring managers to remain the manager of the new combined funds. Among the 25 cases where target managers survived post merger out of a sample of 134, 19 are from across-family targets, and only 6 are from in-family targets. We find that when target managers are hired to manage the across-family new combined funds, their prior average two-year performance of 0.22% is significantly better than -1.14% in the case where they are dismissed. In those combined funds where the target managers are hired, percentage of independent board for the acquiring funds is 83%, significantly higher than the 78% where acquiring managers are retained.

Table 2.6 studies the determinants of managerial survival under the condition of fund mergers. Since the prior performance is the most important factor in determining which fund manager to retain, we control for both target and acquiring fund managers' average objective adjusted return in the past two years. We find that, after controlling for performance and the interaction of performance and board characteristics, acquiring funds with more independent boards are more likely to hire the target fund managers who had good previous performance. This is consistent with our hypothesis that more effective acquiring fund boards have a more active role in selecting new managers.

2.5. Robustness Checks

Since we use logistic models to predict the determinants of manager turnover, we have to choose control funds for the regressions. In the main test, we use objective-size matched funds as control group and find that boards play an important role in manager

Table 2.6
Determinants of managerial survival

This table models the manager survival with the logistic regression. Sample is limited to the target/acquirer sets that had different mangers prior to merger. In the logistic regression, the dependent variable is equal to 0 when the acquirer manager survives and 1 when the target manager survives. Target and Acquirer *OAR* is average of target and acquirer objective adjusted return in two years (-2, -1) preceding the merger. All funds are categorized into 20 objectives with their benchmark returns obtained from CRSP and Datastream. Target and acquirer *asset flow* is computed as the average objective adjusted total net asset flow in percentage in (-2, -1). Numbers included in brackets are p-values.

	Model I	Model II	Model III	Model IV	Model V	Model VI
Intercept	-3.64 (0.09)	-5.13 (0.05)	-4.09 (0.07)	-6.34 (0.03)	-4.45 (0.08)	-6.39 (0.04)
Target OAR	0.09 (0.10)	-0.04 (0.88)	0.08 (0.14)	-0.29 (0.43)	0.09 (0.13)	-0.24 (0.60)
Target Flow			-0.01 (0.87)	-0.01 (0.79)	-0.00 (0.88)	-0.01 (0.88)
Acquirer OAR	-0.08 (0.13)	-0.09 (0.09)	-0.06 (0.27)	-0.08 (0.17)	-0.05 (0.37)	-0.07 (0.25)
Acquirer Flow			0.13 (0.47)	0.17 (0.55)	0.09 (0.23)	0.09 (0.28)
Acquirer Board Size	-0.09 (0.36)	-0.08 (0.42)	-0.04 (0.69)	-0.02 (0.80)	-0.04 (0.69)	-0.02 (0.82)
Acquirer Percent of Indep. Board	3.60 (0.15)	5.45 (0.08)	3.54 (0.18)	6.30 (0.07)	3.85 (0.19)	6.18 (0.09)
Acquirer Per Board Compensation					0.01 (0.51)	0.01 (0.51)
Target OAR * Acq Indep. Board		0.18 (0.62)		0.49 (0.31)		0.44 (0.47)
Acquirer OAR * Acq Indep. Board		0.26 (0.31)		0.25 (0.38)		0.25 (0.36)
Number of Observations	111	111	107	107	95	95
Adjusted R^2	0.07	0.09	0.13	0.16	0.12	0.14

turnover decisions after controlling for fund characteristics. As a robustness check, we test different specifications of control samples.

We first select funds by objective match. More specifically, for every fund with manager turnover in a year, we randomly generate a control from the same objective. Because this procedure can produce different groups of control funds every time, we repeat it multiple times and rerun the logistic models. Even though the significance levels of independent variables vary with different groups of control sample, our findings in general hold well.

Then we choose the control funds by objective and performance match. For every fund that experienced manager turnover in a year, we select the matched fund with the closest objective adjusted return in the same objective. Hence, every turnover fund will have only one control. When we redo the analysis with these control funds, we find that our results on board characteristics are unchanged while the coefficients on performance become less significant. This is understandable since we lose the variability in performance when we use it as one measure to create the control sample.

We also generate different sets of control funds based on above criteria and ensure that control fund for large-family-funds are from large families, and those for small-family-funds are from small families as well. Thus we avoid the potential bias that large and small families have different board characteristics. We do not find any of our previous results significantly changed by introducing the additional family size match.

Our last robustness check is to use alternative measures for performance and board size. We replace the objective adjusted returns with four-factor alphas.[6] Even though we lose some observations when employing these multi-factor alphas, the

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[6] The four-factor models for stock and bond funds are consistent with Khorana (2001).

economic and statistical significance of our board level variables remain unchanged. We also scale the board size by fund assets. The normalized board size can more effectively capture the relative size of mutual fund boards. All previous findings on board level variables are robust to the inclusion of normalized board size, and the coefficient on normalized board size remains insignificant.

2.6. Conclusion

Mutual fund boards have been under strict scrutiny recently. Many practitioners and investors believe that "sleeping" fund boards are at least partly responsible for the recent scandals in the industry. The SEC has been making dramatic changes in regulating fund boards, such as increasing the percentage of independent board to 75%, and requiring an independent chairman. Opponents of these changes quote a lack of empirical evidence supporting these new rules. In fact, though scarce, previous literature does find evidence supporting the SEC rule changes on mutual fund boards.

In this study, we investigate another aspect where mutual fund boards can play an important role – portfolio manager turnover. One of the job responsibilities of fund boards is to monitor the fund performance. Since boards do not have direct control over the fund performance, they can only influence and attempt to improve the fund performance by pressuring on the sponsors, such as requesting a new portfolio manager. We hypothesize that effective board characteristics are positively related to higher manager turnover.

Our empirical findings support our hypothesis. In the study of determinants of manager turnover, we find that funds with more independent boards and boards who

receive a lower compensation have a higher probability of manager turnover, after controlling for prior performance. When we investigate manager turnover in the event of mergers, we find that acquiring funds with more independent boards are more likely to hire target managers who had prior good performance. Our results suggest that boards do play an active role in the mutual fund manager turnover decisions and effective board characteristics are desirable attributes to investors and regulators. Our study contributes to the mutual fund governance literature and provides support for the new SEC rulings.

CHAPTER 3

PORTFOLIO MANAGER OWNERSHIP AND FUND PERFORMANCE: AN EMPIRICAL ANALYSIS

3.1. Introduction

In light of the recent scandals in the mutual fund industry, the Securities and Exchange Commission (SEC) has mandated a variety of rule changes in an attempt to regulate the behavior of investment companies and protect the interests of fund shareholders. The new rulings have been applied to both board of directors and portfolio managers.[7]

On July 27, 2004, the SEC finalized rule IC-26520 "Investment Company Governance" requiring fund boards to comprise of at least 75 percent independent directors as well as an independent chairman of the board. More recently on August 23, 2004, the SEC passed act IC-26533 "Disclosure regarding portfolio managers of registered management investment companies," requiring each fund to disclose their portfolio managers' ownership in their statement of additional information (SAI). The SEC states, "We continue to believe, however, that a portfolio manager's ownership in a fund provides a direct indication of his or her alignment with the interests of shareholders in that fund." All series of SAI filed on or after February 28, 2005 must comply with this amendment.

Although the SEC believes that more transparent disclosure of a fund manager's ownership in his/her fund can help to maintain the integrity of the mutual fund industry, these rulings have been subject to major debates. David Cliffe at the Financial Services

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[7] For example, www.ici.org under "key issues".

Authority (an independent non-government agency in UK that provides services to firms it regulates) says: "From a cost-benefit analysis, we just don't see meaningful value for investors in requiring funds to disclose such information."[8] Even the Investment Company Institute (ICI), who eventually became supportive of the policy, had some initial concerns that such disclosures might inadvertently emphasize issues immaterial to investors and raise privacy issues. Objections have also come from large fund families such as Vanguard and Fidelity. Both have publicly expressed their doubts regarding the impact of fund managers' personal stake in their own funds.[9] For example, Fidelity spokeswoman Anne Crowley claims that knowing a manager's stake in a fund may tell potential investors whether the fund makes sense for the manager's personal portfolio, but does not tell investors whether the fund fits into their own portfolio.

To shed some light on the above debate we address the following questions in this paper. First, we study how managerial ownership affects future fund performance. Second, we examine the determinants of managerial ownership. Third, we decompose manager ownership into the part that can be predicted by other variables and the residual part, and study how they affect the future fund performance.

This study is interesting not only because it examines the effectiveness of the recent SEC rule change mandating fund managers to disclose their ownership stakes in their funds, but also because it more broadly contributes to the "managerial ownership-firm performance" literature in the mutual fund context. Corporate finance researchers have devoted considerable attention to studying the relation between a firm's ownership structure and value. Earlier work by Jensen and Meckling (1976) predicts that the cost of

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[8] "Industry Divided Over New Rules", Eric Uhlfelder, Financial Times, Sept 12, 2005.
[9] "A Look at Which Managers Back Their Funds", Karen Damato, Wall Street Journal, July 15, 2005.

deviating from maximizing firm value declines as management ownership rises. They find that market value increases with managerial ownership. Later empirical studies find a more specific relationship, e.g. Morck, et. al. (1988) find a non-monotonic relation between Tobin's Q and managerial stock ownership. McConnell and Servaes (1990) also find a significant curvilinear (hump-shaped) relation between Q and the corporate insider ownership.

Our study also contributes significantly to the literature on mutual fund governance. The SEC believes that independent boards are effective in mitigating conflicts of interests between fund sponsors and investors, and requires all funds to have at least 75% independent boards. Research ideas have been examined in response to some practitioners' criticism of lacking empirical evidence.[10] A few studies document that boards that are more independent indeed do make better decisions in negotiating fees (Tufano and Sevick (1997); Del Guercio et. al. (2003)), preventing market timing (Zitzewitz (2003)), and approving mergers (Khorana et. al. (2006)). In our study, we want to examine whether managers are more likely to own shares in funds with more independent boards.

This paper presents the first empirical examination of the relation between fund performance and managerial ownership. It makes an important contribution in understanding the management ownership structure in the mutual fund industry, as well as investigating the importance of fund governance. In another related paper by Cremers et. al. (2005), the authors find that funds with higher director ownership show better

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[10] The U.S. Chamber of Commerce filed lawsuit opposing this change, claiming, "There is no empirical evidence that an independent chairman or a 75 percent majority will have a positive effect on the performance of mutual funds."

performance compared to those with low director ownership. But the relation is not due to directors' ex-ante picking the best performing fund. Given the average small dollar amount of board members' ownership, it is difficult to find economically significant relationship between their holdings and fund performance.

Our primary results are as follows. First, in the ordinary least square regressions studies, we find fund performance is negatively related to portfolio turnover, and is positively related to the percentage of managerial ownership. Second, after controlling for fund-level characteristics, we find that managers are more likely to invest in their own funds if they had superior past performance, but board characteristics do not matter. This result is robust to various specifications of the tests. Third, we decompose manager ownership into a predicted part and a residual part, and find that both components are significant in explaining fund performance.

This paper is organized as follows. Section 2 discusses the institutional background and related literature. Section 3 describes the data, hypotheses and methodology. Section 4 discusses the results and empirical findings. Section 5 concludes the paper.

3.2. Institutional Background and Related Literature

3.2.1. Managerial Ownership

Mutual funds are investment companies that pool the money from shareholders and invest in diversified portfolio of assets. According the ICI 2005 Investment Company Fact book, mutual funds managed a record $8.1 trillion in total assets by year-

end 2004. The U.S. mutual fund market is the largest in the world, accounting for half of the total $16.2 trillion total fund assets around the world. The total number of fund sponsors is close to 600, and they manage a total of 8,044 funds in the U.S. In year 2004, 19.5% of total household financial assets are invested in mutual funds, and nearly half of all U.S. households owned mutual funds.

Mutual funds have a distinctive organizational structure. A typical mutual fund consists of shareholders, board of directors, the fund adviser and the portfolio manager. Shareholders, who are also consumers of funds, are the owners of the funds with voting rights. They select funds that meet their investment objective and purchase shares through different channels such as brokerage accounts, retirement plans, or insurance policies. Mutual fund shareholders entrust the board of directors to represent their interests, who in turn negotiate contracts with the fund adviser for the funds' daily management. Portfolio managers are employees of the fund advisers and their compensation is under the advisors' discretion.

The relationship between mutual fund shareholders and portfolio managers fit the definition of a pure agency relationship, and it should come as no surprise at the existence of agency costs in the fund industry. Even though one may argue that fund shareholders can use external mechanisms such as redeeming shares to protect their interests, these options are sometimes difficult to execute. For example, back-end loads can easily deter investors from redeeming fund shares. The internal control mechanisms include board of directors, the underlying contracts between the fund and the adviser, compensation structure of the portfolio managers, and their ownership in the fund. Due to data limitations, only board effectiveness and contracting have been studied. Almazan, et. al.

(2004) study the constraints in the mutual fund managers' investment policies. They find that restrictions are more common when fund boards contain a higher proportion of inside directors, but variations in restrictions do not affect risk-adjusted returns.

Earlier work by Jensen & Meckling (1976) was the first to formalize the relation between corporate value and managerial equity ownership. In their framework, there are two types of shareholders – insiders and outsiders. Insider shareholders have the incentive to adopt policies that benefit themselves, but reduce the payoff to outside shareholders. Corporate value thus becomes a function of manager ownership. Therefore, they predict that firms with higher percentage of insider ownership enjoy higher corporate value. Their prediction was confirmed in later research with some variation in results. Morck et. al. (1988) find that corporate value (measured by Tobin's Q) first increases, then declines, and finally rises slightly as ownership by the board of directors rises. McConnell and Servaes (1990) also confirm corporate value as a function of managerial ownership. They find the curve slopes upward until insider ownership reaches about 40% to 50%, and then slopes slightly downward.

3.2.2. Mutual Fund Board Governance

In the mutual fund industry, directors are the "watchdogs" who are supposed to act in the best interest of shareholders. Their responsibilities include approving contracts with the adviser, negotiating fees, evaluating performance, monitoring portfolio management and approving major decisions such as mergers or liquidations. However, fund advisers usually choose the initial boards of directors for the funds at their inception.

Under the 1940 Investment Company Act, at least 40 percent of a fund's board must be unaffiliated with the fund, its investment adviser or its principal underwriter. In 2001, the SEC amended the above rules to require fund boards to have a majority of independent directors.

The mutual fund industry had been free of scandals for decades until recently, when late trading and market timing emerged. U.S. regulators have reached civil settlements with more than two dozen fund advisers and brokerage firms. Total penalties already exceeded $3.4 billion. To better protect the interests of shareholders, the SEC increased the minimum percentage of independent board members to 75% in 2004. Many doubts have been cast upon this act. Practitioners who were opposing the rule always cite a lack of empirical evidence showing the effectiveness of a more independent mutual fund board.

In fact, quite a few papers do show that more independent fund boards indeed make better decisions. Tufano and Sevick (1997) study the board composition and the fee-setting in the U.S. mutual fund industry. They find that fees are lower for funds with smaller boards, higher percentage of independent boards, and with board members sitting on a large fraction of fund sponsor's other boards. Del Guercio, et. al. (2003) confirm their findings using a sample of closed-end funds. Zitzewitz (2003) investigates the funds' decision of adopting fair value pricing to protect the interest of shareholders. He finds that the adoption of fair value pricing is negatively related to the percent of insider board members. More recently, Khorana et. al. (2006) examine board structure related to the fund mergers. They find that more independent boards do tolerate less poor performance and are more likely to initiate a fund merger.

However, a new paper by Ferris and Yan (2005) challenges the usefulness of the SEC rule changes, since they do not find evidence that neither recent trading scandals nor fees charged are related to board independence. Another paper by Meschke (2005) studies the determinants of fund board characteristics. He also does not find that more independent boards are related to lower fees or higher fund performance.

In summary, the ongoing research about the effectiveness of more independent mutual fund board does not have conclusive findings. In this article, we want to examine the relation between board characteristics and managerial ownership, and the study will compliment the existing literature from a new aspect.

3.3. Data, Methodology, and Hypotheses

3.3.1. Data

Lipper Inc. generously provides us with data of mutual fund boards for 2004, which includes 4,119 equity funds and 1,863 bond funds.[11] Their dataset combines all share classes and has the following board variables: board size, number of interested board members, number of independent board members, number of board meetings in the past calendar year, total board compensation, a dummy variable for whether board members defer their compensation. The dataset also includes fund tickers, total net assets, and investment objectives. We match Lipper data with CRSP Mutual Fund Database by fund names to obtain other fund-level variables. The two databases are cross-checked by total net assets. Any fund with total net assets deviated by over 100

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[11] We would like to thank Donald Cassidy for providing us with the data.

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million or by 20% is dropped as no-match. In total we have a sample size of 5,034 funds.

We randomly select 10% of the matched sample, and compare with the SEC filings for

board characteristics. The board data from Lipper are rather consistent with their SAIs.

Starting February 28, 2005, all funds have to disclose the ownership of their

portfolio managers. However, the SEC only requires them to report the range of each

manager's holdings: $0, $1-$10,000, $10,001-$50,000, $50,001-$100,000, $100,001-

$500,000, $500,001-$1,000,000, or above $1,000,000. We gather these data for funds

that filed form 485APOS or 485BPOS between March and December 2005. We obtain a

sample of 2,006 funds with ownership data distributed over the December 2004 -

December 2005 period.[12] To appropriately conduct our performance predictability tests

where we explain fund performance in 2005 as a function of lagged ownership, we use

the sample of manager ownership reported as of year end 2004. This results in a sample

of 1,406 funds; approximately 70% of the original sample.

In order to estimate fund managers' ownership, we first convert above ranges into

exact dollar amounts, by assuming their holdings to be the low end or midpoint of the

ranges. For example, a manager who has holdings in the $100,001-$500,000 range will

be assumed to have either $100,001 or $250,000 invested in his fund. (The only

exception is for the range of above $1,000,000 where we always assume managers hold

the minimum amount of $1,000,001) Then we compute managers' ownership percentage

as the dollar term of all managers' holdings scaled by the total net assets. For the funds

that are team managed, we sum up each individual manager's holding to find the fund

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[12] Below is the sample distribution of ownership data: 1,406 funds (12/04), 28 (2/05), 199 (3/05), 47 (4/05), 72 (5/05), 71 (6/05), 56 (7/05), 59 (8/05), 13 (9/05), 54 (10/05), and 1 (12/05).

level managerial ownership. At the end, we match the 2005 Morningstar data into the above database we constructed to obtain the fund-level characteristics.

3.3.2. Methodology and Hypotheses

3.3.2.1. Ordinary least square analysis of fund performance

In order to study the determinants of fund performance, we run the following ordinary least square model:

Fund performance$_{i,t}$

$= \alpha_0 + \beta_1 (manager\ ownership)_{i,t-1} + \beta_2 (expenses)_{i,t} + \beta_3 (fund\ size)_{i,t}$

$+ \beta_4 (back\text{-}end\ load)_{i,t} + \beta_5 (front\text{-}end\ load)_{i,\ t} + \beta_6 (portfolio\ turnover)_{i,t}$

$+ \beta_7 (category\ dummies)_{i,t}$

We measure the fund *performance* by the objective adjusted return (OAR), computed as the annual return of the fund less that of the median fund within the same investment objective.[13] It is measured as follows:

$$OAR_i = \left[\prod_{t=1}^{12}(1 + R_{i,t}) - 1 \right] - \left[\prod_{t=1}^{12}(1 + R_{o,t}) - 1 \right]$$

where Ri,t is the return of fund i in month t and Ro,t is the median return of all funds within the same investment objective in month t.

We also use four-factor alphas as an alternative measure of performance in our robustness check. Alphas based on a four-factor model are separately computed for the

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[13] Fund objectives include: aggressive, balanced, corporate bond, equity income, government bond, government mortgage, growth, growth and income, international bond, international equity, municipal bond, small cap, specialty environment, specialty finance, specialty health, specialty metal, specialty natural resources, specialty real estate, specialty technology and specialty utility.

equity and bond funds. For equity funds, we use the three Fama and French (1992) factors: excess return on the CRSP value-weighted index, difference in returns across small and big portfolios controlling for the same weighted-average book-to-market equity in the two portfolios, the difference in returns between high and low book-to-market equity portfolios, and the momentum factor used by Carhart (1997). For bonds funds, we use the excess return on the Lehman Brothers government/corporate bond index, the excess return on the mortgage-backed securities index, the excess return on the long-term government bond index, and the excess return on the intermediate-term government fund bond index. These factor-model specifications are consistent with those in Blake et. al. (1993).

We expect a positive relation between managerial ownership and fund performance. In a traditional corporation, top management could control a high percentage of ownership due to the following reasons: being founders of the business, receiving equity-based compensations, or exercising the stock options. Different from the corporate world, portfolio managers usually voluntarily choose to invest personally in their funds. Therefore, portfolio managers' ownership to a large extent indicates their confidence in their investment skills, and we predict a positive relation between their ownership and fund performance.

We hypothesize a negative relation between fund size and performance. Chen et. al. (2004) documents that fund returns, both gross and net returns, decline with lagged fund size, even after accounting for various performance benchmarks. This effect is most pronounced among funds invested in small and illiquid stocks. Expenses are objective-adjusted. Many articles already document a significant negative relation between expenses and fund performance, since expenses will be subtracted from fund raw

performance (e.g. Carhart (1997), Wermers (2000), and Elton et. al. (2004)). Similarly, front and back-end load also hurt fund performance. We therefore expect the impact of expenses, front and back-end load on performance to be negative.

The relation between portfolio turnover and performance is predicted to be negative. Carhart (1997) documents a negative impact of turnover on performance. He estimates that trading reduces performance by approximately 0.95 percent of the trade's market value. However, other articles find inconsistent results. Grinblatt and Titman (1994) suggest that turnover is significantly positively related to the ability of fund managers to earn abnormal returns. It is possible that higher turnover ratio indicates the managers' trading skills, but meanwhile, excessive trading definitely causes higher transaction costs and costs more expenses for fund shareholders.

We also control for the category dummies. We categorize all funds into following objectives: domestic equity, international equity, domestic bond, international bond, sector, and balanced funds. Since international bond funds have the smallest number of observations, those dummies are left out in the regressions to avoid multicollinearity. Based on risk, different funds have different expected rates of return. It is important to control for the category effect.

3.3.2.2. Determinants of Managerial ownership

We use the following ordinary least square model to study the determinants of managerial ownership:

Managerial ownership percentage$_{i,t}$

$$= \alpha_0 + \beta_1 \text{ (fund size)}_{i,t} + \beta_2 \text{ (performance measures)}_{i,t-1}$$

$$+ \beta_3 \text{ (performance measures)}_{i,t-2} + \beta_4 \text{ (performance volatility)}_{i,(t-2, t-1)}$$

$$+ \beta_5 \text{ (expenses)}_{i,t} + \beta_6 \text{ (back-end load)}_{i,t} + \beta7 \text{ (front-end load)}i,t$$

$$+ \beta8 \text{ (manager tenure)}i,t + \beta9 \text{ (board characteristics)}i,t + \beta10 \text{ (family size)}i,t$$

$$+ \beta11 \text{ (single manager dummy)}i,t + \beta12 \text{ (category dummies)}i,t$$

The relation between fund size/ family size and managerial ownership is expected to be negative. Since managerial ownership is computed as a proportion of fund size, the larger asset size a fund has, the smaller percentage the manager may own. Nevertheless, it is possible that fund sizes are positively correlated with past success, and thus may be related with higher managerial ownership. Berk and Green (2004) argue that fund size is the right metric for managerial skills. They may increase the size of their funds, and their own compensation, to the point at which expected returns to investors are competitive going forward.

We predict a positive relation between performance and managerial ownership. It is well documented in the literature that investors chase good performance and funds that receive money do subsequently perform better (see Gruber (1996), Sirri and Tufano (1998), and Zheng (1999)). Portfolio managers, however, do not necessarily act like ordinary investors, because they have more inside information about their own investment style and strategies. One can hypothesize that only if managers believe that they can generate superior returns based on their security selection and market timing skills instead of sheer luck, they will be more willing to invest or increase the ownership in their own funds. Existing literature also shows the persistence in mutual fund managers' performance (see Brown and Goetzmann (1995), Hendricks et. al. (1993)). If

good portfolio managers are confident about their investment skills and believe in their performance persistence, they are more likely to have higher percentage of ownership in the funds. Chen et. al. (2005) study the determinants of mutual fund directors' ownership, and find some evidence that directors exhibit performance chasing in their ownership choice.

Volatility is the annualized standard deviation of the monthly returns in the year (-2, -1). We hypothesize a negative relation between a fund's return volatility and managerial ownership. Volatility may add to managers' risk aversion and make it less likely for them to voluntarily invest in their own funds.

Expenses are objective-adjusted. The relation between fund expenses and managerial ownership is less clear. Since expenses directly hurt fund net performance, it has become common knowledge to more investors that it is better to hold less expensive funds, especially among funds that deliver similar gross returns and risk. We predict that portfolio managers, who clearly understand how higher expenses can attribute to a lower performance, are less willing to invest in expensive funds themselves. Similar arguments can apply to front and back-end loads, which investors, including portfolio managers would like to avoid. (Load is also found to be negatively related to fund performance. e.g. Carhart (1997)) However, if funds are able to charge higher expenses in exchange of superior management skills, expenses could proxy for abnormal returns. This could cause a positive relation between fund expenses and managerial ownership. On the other hand, back-end loads are used as a method to smooth fund outflows and they effectively alleviate the liquidity risk for mutual funds. (Almazan et. al. (2004) also argues load charges dissuade share redemption and reduce flow-to-performance sensitivity) In that

case, back-end loads could be a desirable attribute and encourage portfolio managers to invest in their own funds.

We expect a positive relationship between percentage of independent board and managerial ownership. Effectiveness of mutual fund board structure has been examined in multiple papers, and more independent boards do seem to make better decisions (see Tufano and Sevick (1997), Del Guercio et. al. (2003), Zitzewitz (2003), Khorana et. al. (2006)). Hence we predict that portfolio managers, who are clearly aware of the benefits of a more effective fund board, are more likely to own shares in the funds they manage. However, this relation could be changed if percentage of board independence and managerial ownership are substitute governance mechanisms instead of complements.

Arguments about how board size affects board effectiveness are always twofold. Tufano and Sevick (1997) and Del Guercio et. al. (2003) find that funds with smaller boards enjoy lower fees. In the corporate finance literature, Yermack (1996) documents an inverse relation between board size and firm value, and a higher probability of smaller boards to initiate CEO replacement due to poor performance. Along the line with these articles, we expect higher managerial ownership in funds with smaller boards. Nonetheless, board sizes are highly correlated with sponsor sizes. Larger families tend to have larger boards. The correlation could change our prediction into a different direction.

Managerial ownership could be either negatively or positively related to board member compensation. Previous literature documents inefficiency in the decision making when board members are compensated highly. For example, Tufano and Servick (1997) find that directors who are compensated higher are more likely to approve higher fees, and Khorana et. al. (2006) show that better compensated board members are less

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likely to approve across-family mergers where they will suffer a higher present value of future annuity losses. If higher board compensation does suggest a weaker governance structure, we should expect a negative relation between board compensation and the percentage that managers invest in their own funds. However, to the extent that board compensation proxies for their management skills and the quality of monitoring service they provide to the mutual funds, we might observe a positive relation between board member compensation and managerial ownership.

To control for the difference in the ownership between single manager and multiple managers, and capture the different impact of fund performance on the manager ownership, we also include a dummy variable that equals one if the fund has a single manager. We argue that single managers are more likely to invest in their funds, since they are solely responsible for the management of funds and they have a better understanding of their own performance. We also include average manager tenure in selected models. Managers with longer tenure in the fund have a longer time period to accumulate their investments in the funds and are predicted to have a higher ownership.

At the last, we control for the category dummies. Before managers decide to invest their personal stake in the funds, they have to evaluate whether the fund style fits in their own portfolio choices. Most fund managers, at the stage of their career and life, are more likely to pursue a growth instead of an income approach for their personal wealth. Therefore, we predict a positive relation between all equity dummies (domestic equity, international equity, and sector) and managerial ownership.

3.4. Results

3.4.1. Univariates of sample funds

Table 3.1 provides the dollar amount and percentage of managerial ownership as of the year-end 2004. Panel A employs the minimum of the range to compute the level of manager ownership, while Panel B utilizes the midpoint of the lower and upper bound of the range. Our sample includes 1,406 funds, and 43 percent of the portfolio managers have holdings in their own funds. Using the most conservative assumption of minimum holding, managers own an average of $96,993, or 0.04 percent in their own funds. Maximum holding of managers is $3.7 million, while maximum percentage holding is 0.98 percent. One might question the economic magnitude of these numbers. We would argue that these are significant personal holdings. As we discussed previously, portfolio manager voluntarily choose to have additional personal stake in their own funds, given that their compensation is already largely tied to the fund performance. Also, note that the SEC only provides the dollar range of their ownership, and we are unable to know how much each manager owns in excess of the top range of $1 million.

Not surprisingly, portfolio managers of equity funds hold significantly greater ownership stakes than their bond fund counterparts. About fifty-one percent equity fund managers own shares in their funds, while only twenty-six percent of bond fund managers do so. On average, domestic equity managers own $154,861, international equity managers own $84,115, and sector fund managers own $115,034 in their funds. Similar patterns are found for the percentage of managerial ownership. Portfolio managers hold much higher percentage in equity funds than in bond funds.

Table 3.1
Ownership of portfolio managers

This table reports the dollar amount and percentage ownership of portfolio managers in their own funds, as of year-end 2004. All funds are classified into the following six categories: balanced, bond, equity, international bond, international equity and sector. The mean, 50th, 75th, 90th, and 100th percentile of manager ownership figures are reported. Funds only report the range of each manager's holdings ($0, $1-$10,000, $10,001-$50,000, $50,001-$100,000, $100,001-$500,000, $500,001-$1,000,000, or above $1,000,000). In Panel A, we convert these ranges into dollars by using the lowest value of the range and sum up across all managers in a fund. In Panel B, we convert them into dollars by using the average (midpoint) of each category and sum up across all managers in a fund. For the over $1 million category, we set the ownership level the bottom of the range. Managerial ownership percentage is computed as the dollar ownership of all the portfolio managers of a fund, divided by total fund assets. % own refers to the percentage of managers with positive ownership.

Panel A. Summary statistics of manager holdings (based on lowest value of range)

	N	% Own	Managerial Ownership (in $)					Managerial Ownership (in %)				
			Mean	50th	75th	90th	100th	Mean	50th	75th	90th	100th
All Funds	1,406	43	96,663	0	50,001	160,003	3,700,006	0.04	0.00	0.01	0.09	0.98
Balanced	62	47	82,904	0	20,003	110,002	2,000,002	0.03	0.00	0.01	0.15	0.33
Domestic Bond	405	26	15,444	0	1	50,001	600,002	0.01	0.00	0.00	0.02	0.98
Domestic Equity	606	51	154,861	1	100,001	510,003	3,700,006	0.05	0.00	0.02	0.15	0.97
Intl Bond	26	42	10,001	0	10,001	50,001	100,001	0.01	0.00	0.01	0.03	0.14
Intl Equity	158	47	84,115	0	100,001	200,002	3,000,003	0.05	0.00	0.02	0.09	0.90
Sector	149	56	115,034	1	50,001	500,001	2,000,002	0.05	0.00	0.02	0.18	0.69

		Managerial Ownership (in $)				Managerial Ownership (in %)				
Panel B. Summary statistics of manager holdings (based on midpoint of range)										
	N	Mean	50th	75th	90th	100th	Mean	50th	75th	90th	100th
All Funds	1,406	149,570	0	75,000	405,000	4,350,003	0.08	0.00	0.03	0.22	2.91
Balanced	62	134,274	0	65,000	330,000	2,000,002	0.08	0.00	0.02	0.33	0.93
Domestic Bond	405	36,219	0	5,000	75,000	1,050,000	0.03	0.00	0.00	0.04	2.24
Domestic Equity	606	226,227	5,000	300,000	885,000	4,350,003	0.11	0.00	0.06	0.35	2.91
Intl Bond	26	25,000	0	30,000	75,000	300,000	0.03	0.00	0.03	0.08	0.42
Intl Equity	158	161,203	0	210,000	600,000	3,000,003	0.11	0.00	0.06	0.24	2.21
Sector	149	161,913	5,000	75,000	750,000	2,000,002	0.09	0.00	0.04	0.34	1.47

Table 3.2
Summary statistics of fund characteristics in 2005

All variables are in percent, with the exception of fund size which is reported in $ millions. All money market funds are excluded from the analysis. [*], [**], [***] indicates that the difference between the top and bottom portion of each panel is significant at the 10%, 5%, and 1% levels. A t-test is conducted for differences in means and a rank sum test for differences in medians.

		Objective Adjusted Expenses	Objective Adjusted Return	Expenses	Return	Fund Size	Front-end Load	Back-end Load	Portfolio Turnover
				Panel A. Comparing sample funds to the rest of the universe					
Sample Funds	N	1,321	1,327	1,321	1,327	1,321	1,327	1,327	1,315
	Minimum	-1.32	-29.18	0.05	-22.28	0.4	0.00	0.00	0
	Mean	0.08	0.79	1.27	7.29	1,413	1.53[**]	0.13	92
	Median	0.00	0.03	1.18	4.85	271	0.00[**]	0.00	51[**]
	Maximum	9.62	45.41	10.90	60.05	108,008	5.75	5.00	1,299
Rest of Universe	N	4,916	4,952	4,916	4,952	4,834	4,955	4,955	4,857
	Minimum	-2.09	-75.08	0.02	-68.18	0.1	0.00	0.00	0
	Mean	0.08	0.57	1.28	7.11	1,622	1.37[**]	0.14	96
	Median	0.00	-0.01	1.17	4.92	278	0.00[**]	0.00	55[**]
	Maximum	21.87	55.67	23.37	70.94	123,739	8.50	5.00	1,947

		Objective Adjusted Expenses	Objective Adjusted Return	Expenses	Return	Fund Size	Front-end Load	Back-end Load	Portfolio Turnover
No Ownership	N	741	746	742	746	745	746	746	736
	Minimum	-1.32	-26.27	0.05	-19.37	0.4	0.00	0.00	0
	Mean	0.11*	0.29***	1.26	6.20***	1,057***	1.60	0.14	105
	Median	0.00	-0.02**	1.13***	3.99***	204***	0.00	0.00	51
	Maximum	9.62	39.71	10.90	54.98	88,788	5.75	5.00	1,299
With Ownership	N	579	581	579	581	576	581	581	579
	Minimum	-1.20	-29.18	0.12	-22.28	4	0.00	0.00	0
	Mean	0.05*	1.44***	1.29	8.70***	1,873***	1.44	0.13	76
	Median	-0.03	0.21**	1.22***	6.39***	360***	0.00	0.00	51
	Maximum	2.73	45.41	4.24	60.05	108,008	5.75	5.00	1,157

Panel B. Comparing funds with/without managerial ownership

Table 3.2 reports summary statistics of our sample fund characteristics compared with the rest of the universe. The median sample fund has 271 million dollar of assets under management, charges an average 1.18% expense ratio, and does not charge front-end or back-end loads. Though the median fund has virtually zero objective-adjusted return, there is substantial difference in performance of all funds. The best performing fund outperformed the median fund in the same objective by 45% while the worst underperformed the peers by 29%. To avoid the problem of extreme outliers, we focus our study on the fund with performance within two standard deviations (-12.28% to 18.26%). This procedure removes a total of 59 observations from the regressions.[14]

There is almost no significant difference between our sample funds and the rest of the universe, and our sample represents more than 20% of all existing funds. One interesting phenomenon to note is the huge disparity between high and low expenses ratios. Sample funds charge as high as 9.62% above peers, while some fund in the universe charges 21.87% above the median.

3.4.2. Analysis of fund performance

Table 3.3 investigates the impact of managerial ownership on fund performance. Model I is a basic model that only contains manager ownership (computed using the lower end of the dollar ranges) as the explanatory variable. We find a significant positive relation between manager ownership and fund performance. For every 1 percent increase

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[14] Further study of the observations that have been removed indicates that these funds are mostly from three investment objectives: sector funds, international equity funds, and international bond funds. Our procedure of computing objective adjusted return, is likely to be less appropriate for these funds because there is substantial heterogeneity in the types of assets they invest in.

Table 3.3
Explaining fund performance for 2005

This table reports OLS regression results where fund performance (measured using objective-adjusted returns and four-factor alphas) is the dependent variable. The objected adjusted return *(OAR)* is computed as the annual return of the fund less the return of the median fund in the matched investment objective. *Alpha* is the abnormal fund return estimated using separate four-factor models for equity and bond funds. *Fund size* is the log of total net assets. *Expenses* are objective-adjusted. *Ownership (low)* is computed based on the lowest value of the dollar ownership in each range. *Ownership (average)* is computed based on the average value of dollar ownership (i.e., the midpoint) in each range. *Average Manager Ownership* is computed by dividing *ownership (low)* by the number of fund managers. *Board size* is the number of directors on the fund board. *% Independent Directors* is the percentage of the board members independent from the fund management company. *Board Member Compensation* is the log of (total board compensation / board size). *Family assets* is the log of total assets of the fund management company. *Single manager dummy* is equal to one if the fund is managed by one manager and zero otherwise. All the control variables are measured in 2005, while managerial ownership is measured at the end of 2004. Numbers reported in parentheses are p-values.

Panel A. Basic models

	Objective-adjusted return (OAR)			Alpha
	Model I	Model II	Model III	Model IV
Ownership (low)	2.76 (0.00)	3.29 (0.00)	3.42 (0.00)	3.16 (0.00)
Expenses		0.28 (0.16)	0.32 (0.11)	0.86 (0.00)
Fund Size		0.43 (0.00)	0.44 (0.00)	0.52 (0.00)
Back-end Load		-0.11 (0.47)	-0.13 (0.40)	-0.27 (0.09)
Front-end Load		-0.04 (0.42)	-0.04 (0.38)	-0.06 (0.26)
Portfolio Turnover		-0.16 (0.03)	-0.16 (0.03)	-0.13 (0.09)
Intercept	-0.13 (0.27)	-2.35 (0.00)	-3.10 (0.00)	1.18 (0.20)
Objective dummies	No	No	Yes	Yes
N	1265	1243	1243	1176
Adjusted R^2	0.01	0.04	0.04	0.16

	OAR Full sample	OAR Funds with single manager	OAR Funds with multiple managers	OAR Full sample	OAR Funds with Portfolio turnover > 20%
	Panel B. Alternative models				
	Model I	Model II	Model III	Model IV	Model V
Ownership (low)		4.32 (0.00)	2.60 (0.04)		4.22 (0.00)
Ownership (average)	1.40 (0.00)				
Average Manager Ownership				4.29 (0.00)	
Expenses	0.31 (0.12)	-0.30 (0.40)	0.55 (0.03)	0.31 (0.12)	0.51 (0.02)
Fund Size	0.44 (0.00)	0.32 (0.00)	0.50 (0.00)	0.44 (0.00)	0.48 (0.00)
Back-end Load	-0.13 (0.38)	-0.03 (0.91)	-0.17 (0.38)	-0.13 (0.38)	-0.19 (0.26)
Front-end Load	-0.05 (0.33)	0.04 (0.54)	-0.10 (0.15)	-0.04 (0.37)	-0.05 (0.32)
Portfolio Turnover	-0.16 (0.03)	0.05 (0.63)	-0.32 (0.00)	-0.17 (0.03)	-0.23 (0.00)
Intercept	-3.10 (0.00)	-3.03 (0.02)	-3.08 (0.02)	-3.07 (0.00)	-3.14 (0.00)
Objective dummies	Yes	Yes	Yes	Yes	Yes
N	1243	600	643	1243	983
Adjusted R^2	0.04	0.03	0.05	0.04	0.05

Panel C. Basic models for funds with average manager tenure of > 1 year at the end of 2005

	OAR	OAR	OAR	Alpha
	Model I	Model II	Model III	Model IV
Ownership (low)	2.75 (0.00)	3.25 (0.00)	3.38 (0.00)	3.08 (0.00)
Expenses		0.28 (0.17)	0.33 (0.12)	0.83 (0.00)
Fund Size		0.45 (0.00)	0.46 (0.00)	0.51 (0.00)
Back-end Load		-0.12 (0.45)	-0.14 (0.37)	-0.28 (0.09)
Front-end Load		-0.02 (0.71)	-0.02 (0.67)	-0.05 (0.32)
Portfolio Turnover		-0.23 (0.01)	-0.23 (0.01)	-0.18 (0.03)
Intercept	-0.18 (0.15)	-2.47 (0.00)	-3.35 (0.00)	1.23 (0.21)
Objective dummies	No	No	Yes	Yes
N	1102	1082	1082	1023
Adjusted R^2	0.01	0.05	0.05	0.13

in managerial ownership, the fund performance is improved by 2.76 percent. Nevertheless, fund manager ownership is moderate and 1 percent increase is the difference between the lowest and highest ownership. This result strongly persists after we include other control variables in Models II and III. A negative relation seems to exist between fund size and performance. Consistent with previous literature (e.g. Carhart (1997), Wermers (2000)), we find a significant and negative impact of portfolio turnover on fund performance. Every 100 percent increase in portfolio turnover decreases fund performance by 0.16 percent.

Until now all analysis are based on the objective adjusted returns, since this measure is relatively easy to compute with a short time-series data. One criticism is that there is still risk taking behavior within the same objective that our measure does not capture. To address this concern, we also separately compute the four-factor alphas for equity and bond funds as the dependent variable. One problem in computing four-factor alphas is that they represent the excess return during the entire period. For example, if we use 36 months data to compute four-factor alphas, the intercept from the regression is the monthly excess return of the security. Our solution is to include a year 2005 dummy in the regression, and our estimate of the abnormal return for year 2005 is the sum of the intercept and the coefficient on the dummy. Thus our estimate accurately reflects the excess return of year 2005. In Model IV, we substitute four-factor alphas for the objective-adjusted returns in Model III and find our result is consistent. Note that the Adjusted R^2 is significantly higher in Model IV than in other models. (16% vs. 1% to 4% in other related models) Depending on our model specification, the coefficient on manager ownership varies from 2.76 to 3.42.

Panels B and C serve as robustness checks to above basic models. In Model I of Panel B, we replace the manager ownership computed from the minimum of dollar ranges by that from the midpoint of the dollar ranges. Manager ownership continues to be significantly positively related to fund performance. The coefficient decreases from 3.42 in Model III of Panel A into 1.40. This is consistent with the previous finding that average ownership is 0.04% and 0.08% with the two measures.

When we were computing the manager ownership, we simply aggregated all managers' holdings in their funds. It is possible that those who are single managers and invest in their funds have their interests more aligned up with investors than those who are jointly managing and investing in the funds. Therefore, we separately estimate the above regressions for funds managed by single and multiple managers in Models II and III in Panel B. Our previous results continue to hold, and the coefficient on multiple manager ownership is 2.60, less than half of the coefficient on the single manager ownership. This result could just be demonstrating the difference in the percentage of managers' ownership. In Model IV, we compute and use the average manager ownership in each fund as the dependent variable, and find similar results.

If manager ownership helps align the interests of portfolio managers with investors, and have them make better investment decisions, this effect should be less for passively-managed mutual funds such as index funds, where managers have less control of the portfolio selection. We use funds with turnover ratio lower than 20% to proxy for index funds and exclude them from our analysis. Model V reports the regression model after excluding these funds, and previous results persist.

Up to this point, we have been testing the hypothesis that manager ownership affects future fund performance. One caveat to this hypothesis is the assumption of the same managers during the two consecutive years. To fix this issue we need to limit our sample to the funds with the same managers in year 2004 and 2005. However, Morningstar does not provide the names of all portfolio managers. We do not believe this issue will bias our analysis, since it will actually bias us toward finding a relationship between manager ownership and fund performance. Nevertheless, we can use one test that at least partially addresses this issue. Morningstar reports the average tenure of all portfolio managers. We remove those funds with average manager tenure less than 1 year from our sample to rerun the regressions. Models I to IV in Panel C report the results from the subsample, and our previous findings remain robust.

In sum, we find the fund future performance improves when managers have a larger stake of ownership in their funds. This result is robust to difference measures of performance and manager ownership.

3.4.3. Determinants of portfolio managerial ownership

Table 3.4 studies the determinants of portfolio managerial ownership as of year end 2004, computed from the low end of the dollar ranges. All dependent variables are measured in 2004 unless specified in the table. Model I reports the result from a basic ordinary least squares regression. We find managers from large families are less likely to have ownership stakes in their funds. This is understandable since managers in large families have a higher probability of managing multiple funds, and make the ownership in one individual fund less likely.

Table 3.4
Determinants of fund manager ownership at year-end 2004

This table reports OLS and interval regression results using managerial ownership in % at the end of 2004 (based on the lowest value of the ownership range) as the dependent variable. All explanatory variables are measured in 2004 unless indicated otherwise. *Fund size* is measured as the log of total assets. The objective-adjusted return *(OAR)* is computed as the annual return of the fund less the return of the median fund in the matched investment objective. *Alpha* is the abnormal fund return estimated using separate four-factor models for equity and bond funds, over the period 2002-2004. *Volatility* is the annualized standard deviation of the monthly returns in 2003 and 2004. *Expenses* are objective-adjusted. *Average tenure* is the average tenure of all the fund managers managing a particular fund. *Board size* is the number of directors on the fund board. *% Independent Directors* is the percentage of the board members independent from the fund management company. *Board Member Compensation* is the log of (total board compensation / board size). *Family assets* is the log of total assets of the fund management company. *Single manager dummy* is equal to one if the fund is managed by one manager and zero otherwise. All variables are measured at year-end 2004 unless stated otherwise. Model V estimates an interval regression where both lowest and highest ranges are used. Models III - V are limited to the sample with average manager tenure longer than one year at the end of 2005. P-values are reported in parentheses. All coefficients are multiplied by 100.

	Ordinary Least Squares Regression				Interval Regression
	Model I	Model II	Model III	Model IV	Model V
Fund Size	-0.94 (0.00)	-1.00 (0.00)	-1.74 (0.00)	-1.74 (0.00)	-1.72 (0.00)
OAR 2004	0.16 (0.01)		0.20 (0.02)		0.22 (0.02)
OAR 2003	0.10 (0.00)		0.12 (0.01)		0.16 (0.00)
Alpha 2002-2004		0.32 (0.00)		0.34 (0.00)	
Volatility 2003-2004	-0.44 (0.25)	0.27 (0.46)	-0.56 (0.21)	0.39 (0.37)	-0.60 (0.25)
Expenses	-0.19 (0.80)	-0.28 (0.70)	-1.09 (0.21)	-1.06 (0.20)	-1.09 (0.28)
Back-end Load	0.38 (0.30)	0.58 (0.15)	0.45 (0.29)	0.72 (0.12)	0.35 (0.47)
Front-end Load	-0.26 (0.24)	-0.26 (0.27)	-0.43 (0.08)	-0.46 (0.08)	-0.68 (0.01)
Average tenure			0.61 (0.00)	0.63 (0.00)	0.80 (0.00)
Board Size	-0.12 (0.40)	-0.05 (0.73)	-0.04 (0.80)	0.05 (0.77)	-0.04 (0.84)
% Independent Directors	-2.21 (0.45)	-2.19 (0.48)	4.12 (0.26)	3.93 (0.30)	4.38 (0.30)
Board Member Compensation	0.48 (0.01)	0.54 (0.00)	0.42 (0.04)	0.45 (0.04)	0.58 (0.01)
Family Assets	-0.63 (0.02)	-0.64 (0.02)	-0.46 (0.10)	-0.52 (0.07)	-0.65 (0.04)
Single Manager Dummy	-0.60 (0.42)	-0.78 (0.31)	-0.99 (0.26)	-1.41 (0.12)	-1.33 (0.18)
Equity dummy	5.64 (0.00)	6.54 (0.00)	7.99 (0.00)	8.46 (0.00)	10.12 (0.00)
Sector dummy	5.22 (0.01)	4.64 (0.01)	6.22 (0.01)	5.07 (0.02)	7.96 (0.00)
Intl Equity dummy	3.93 (0.02)	3.32 (0.05)	4.74 (0.02)	3.67 (0.07)	5.89 (0.01)
Balanced dummy	2.31 (0.07)		2.79 (0.07)		3.75 (0.06)
Bond dummy	0.18 (0.86)	1.97 (0.08)	-0.43 (0.71)	1.59 (0.21)	-1.05 (0.46)
Intercept	12.82 (0.00)	9.43 (0.00)	7.57 (0.04)	3.90 (0.32)	8.74 (0.04)
N	1328	1272	983	943	983
R^2	0.10	0.09	0.17	0.15	N/a

Managers of bigger funds also have smaller ownership, and this is because it takes a lot more for managers to have the same level of ownership as in smaller funds.

Fund past performance of both 2003 and 2004 have a significantly positive impact on managers' probability of ownership. The coefficient estimate implies that when the performance of year 2004 increases by one standard deviation, the probability of managers' ownership goes up by 0.79 basis points. This number may not appear to be large, but given the average managerial ownership of 0.04%, this increase is substantial. This finding is consistent with our performance-chasing hypothesis for portfolio managers, or their belief in performance persistence going forward.

Performance volatility does not seem to have a significant impact on managers' ownership. Neither do we find significant coefficients for objective-adjusted expenses nor back-end loads. Managerial ownership is negatively related to front-end load only in selected models. These results suggest that performance is the most important fund-level attribute1 that portfolio managers value in the decisions of investing personally in their funds.

We do not observe any significant relation between board size, percentage of independent board members, and managerial ownership. The only significant board characteristic is board member compensation, which is positively related to managerial ownership. This finding seems to be consistent with our hypothesis that board member compensation is a proxy for the management skills. However, this result is likely to be caused by the higher correlation between fund size (fund family size) and board member compensation. We also do not find number of managers related to managerial ownership in the funds.

Balanced funds, and all equity fund dummies, include domestic equity, sector funds, and international funds have positive significant coefficients, while bond funds have insignificant coefficients. This is consistent with our hypothesis that managers are more likely to invest in growth-oriented funds, which fit into their personal portfolios better.

Model II replaces objective-adjusted return measures by four-factor alphas. Since we do not have the appropriate four factors for balanced funds, they are left out in the regression. All previous results continue to hold, and the coefficient on alpha is 0.32. A one standard deviation increase in the fund alpha will improve the manager ownership by 1.1 basis points.

Models III and IV replicate models I and II, excluding the funds with manager tenure less than 1 year old at the end of 2005. This procedure guarantees the same management for the sample funds during the consecutive two years, and results are consistent with previous models. We also find the managers with longer tenure have higher ownership. This is not surprising as they have a longer time period to accumulate investment in the funds.

When we were running above regressions, we were assuming all observations are independent of each other. However, this is not necessarily true, especially for funds from the same families. In unreported models, we redo our analysis with fixed effect where we cluster the fund families. This method takes into account the interdependence among observations and adjusts the standard error for the coefficients in the regression, and thus adjusts the t-statistics. We also find our results are robust to this method.

So far all our analyses are based on the assumption of managers' ownership in the low end or midpoint of the dollar ranges. There is a methodology that does not rely on such an assumption. Model V has the same model as model III and presents the results of an interval regression where dependent variable is dollar ranges. For the largest range above 1 million dollars, the model leaves the range as open. Our previous results persist, and the coefficients on performance is slighter larger than in model III.

Overall, results suggest that portfolio managers are more likely to invest in their own funds if the past performance has been good, and when they have been managing the fund for a longer period. Managerial ownership is higher in smaller funds than bigger funds, in equity funds other than bond funds, and in funds from smaller families.

3.4.4. Decomposing managerial ownership to explain future fund performance

In this section, we investigate how performance is affected by managerial ownership, i.e., we decompose ownership into the part that can be predicted by other variables, and the residual part. Table 3.5 reports four models that respectively correspond to models I to IV in Table 3.4. For example, we use model I in Table 3.4 to predict manager ownership and find the residual unpredicted part, and study their impact on the fund future performance in 2005. In most models, we find that both the predicted ownership and the residual part are positively related to fund future performance. In model IV, a one standard deviation in predicted ownership increases future performance by 36 basis points, while a one standard deviation in residual ownership increases future performance by 22 basis points. Both of the effects are substantial, especially given that previous literature did not have much success in predicting future fund returns.

Table 3.5
Explaining 2005 performance with decomposed managerial ownership

This table reports OLS regression results where fund performance (measured using objective-adjusted returns and four-factor alphas) is the dependent variable. The objected adjusted return *(OAR)* is computed as the annual return of the fund less the return of the median fund in the matched investment objective. *Alpha* is the abnormal fund return estimated using separate four-factor models for equity and bond funds. *Fund size* is the log of total net assets. *Expenses* are objective-adjusted. The predicted and residual ownership levels are computed using equivalent models in Table 4. All the control variables are measured in 2005. Numbers reported in parentheses are p-values.

	OAR Full sample	Alpha Full sample	OAR Tenure > 1 yr	Alpha Tenure > 1 yr
	Model I	Model II	Model III	Model IV
Predicted Ownership	32.17 (0.00)	9.72 (0.04)	19.89 (0.00)	5.17 (0.14)
Residual Ownership	1.82 (0.05)	2.85 (0.00)	1.84 (0.08)	2.96 (0.01)
Expenses	0.12 (0.62)	0.86 (0.00)	0.41 (0.13)	1.01 (0.00)
Fund Size	0.71 (0.00)	0.60 (0.00)	0.68 (0.00)	0.57 (0.00)
Back-end Load	-0.07 (0.63)	-0.26 (0.11)	-0.08 (0.63)	-0.27 (0.12)
Front-end Load	0.04 (0.41)	-0.03 (0.51)	0.03 (0.60)	-0.05 (0.38)
Portfolio Turnover	-0.03 (0.71)	-0.10 (0.21)	-0.06 (0.61)	-0.18 (0.10)
Intercept	-5.40 (0.00)	0.63 (0.52)	-5.04 (0.00)	0.92 (0.39)
Objective dummies	Yes	Yes	Yes	Yes
N	1184	1134	925	885
Adjusted R^2	0.08	0.16	0.07	0.12

Above findings suggest that manager ownership does convey useful information to the shareholders. Even though we cannot distinguish whether the ownership per se provides incentives for manager to outperform, or managers simply have superior information about fund future performance to have ownership. From the perspective of investors, both explanations are equivalently useful since the ownership information allow them to better predict future returns.

3.4.5. An additional test for fund future performance

Earlier in section 4.2., we separately estimated models for funds with single managers versus funds that are team managed to examine the difference in their incentives. There is another possibility how the management structure can affect fund performance, where some managers manage more than one fund in the complex. When the same manager manages multiple funds in the complex, it is less likely for them to have investment in one fund, since fund performance and other characteristics all affect their selection. With our dataset, one test we can do is to rerun the regression with funds that are only managed by single managers, and include manager fixed effects. Table 3.6 reports the findings. Within our sample, there are 544 funds that are managed by 344 individuals, and 344 manager dummies are included in the models. Again managerial ownership is significantly positively related to future fund performance, and the coefficients are larger than in previous models in Table 3.3. Therefore, we conclude that the ownership of single managers, especially those who manage multiple funds, have more positive impact on fund future performance.

Table 3.6
Estimating 2005 performance with manager fixed effects

This table reports OLS regressions results where fund performance (measured using objective-adjusted returns and four-factor alphas) is the dependent variable. The objected adjusted return *(OAR)* is computed as the annual return of the fund less the return of the median fund in the matched investment objective. *Alpha* is the abnormal fund return estimated using separate four-factor models for equity and bond funds. *Ownership (low)* is computed based on the lowest value of the dollar ownership in each range. *Fund size* is the log of total net assets. *Expenses* are objective-adjusted. All the control variables are measured in 2005. Numbers reported in parentheses are p-values.

	OAR		Alpha	
	Model I	Model II	Model III	Model IV
Ownership (low)	4.01 (0.07)	4.40 (0.05)	4.05 (0.05)	3.89 (0.08)
Expenses	-0.99 (0.18)	-1.02 (0.17)	-0.09 (0.89)	-0.14 (0.83)
Fund Size	0.19 (0.17)	0.16 (0.37)	0.33 (0.01)	0.35 (0.03)
Back-end Load	3.24 (0.06)	1.82 (0.53)	0.60 (0.69)	2.35 (0.36)
Front-end Load	-0.20 (0.09)	-0.20 (0.11)	-0.16 (0.13)	-0.14 (0.19)
Portfolio Turnover	0.22 (0.29)	0.21 (0.31)	-0.10 (0.58)	-0.09 (0.62)
Board Size		-0.02 (0.94)		-0.25 (0.38)
% Independent Directors		-15.45 (0.46)		11.90 (0.51)
Board Member Compensation		0.05 (0.67)		-0.01 (0.91)
Family Assets		0.39 (0.57)		-0.50 (0.40)
Intercept	-0.93 (0.80)	4.02 (0.67)	1.01 (0.27)	-1.02 (0.90)
Objective dummies	Yes	Yes	Yes	Yes
N	544	544	523	523
Adjusted R^2	0.70	0.69	0.75	0.75

3.5. Conclusion

Managerial ownership is usually regarded as an effective approach in protecting the interests of a firm's shareholders. It can effectively reduce the agency costs imbedded in corporations. The SEC believes that owning shares in funds also aligns the interests of portfolio managers with those of shareholders. Starting from the spring of 2005, all funds are required to disclose their managers' ownership. A number of debates have already been raised about the usefulness of managerial ownership.

Using a unique hand-collected database of managerial ownership, we study the relation between managerial ownership and fund performance in this paper. We document that as many as 43% of fund managers own shares in their funds, and equity managers hold a much higher percentage and dollar amount than bond managers. We study the impact of ownership structure on fund performance, and find that performance is positively related to the percentage of managerial ownership. We then study the determinants of managerial ownership. Our findings suggest higher managerial ownership in smaller funds, funds from smaller families, most importantly, with superior past performance. Managers are also more likely to invest in their own funds if they have been in charge for a longer period, and more likely to invest in equity funds instead of bond funds. At last, we decompose manager ownership into the part that can be predicted by other variables and the residual part, and find that they are both related to fund future performance. In summary, our findings lend support to the recent SEC rule changes of mandatory disclosure of managerial ownership in mutual funds. We believe that managerial ownership provides valuable information to investors and helps them make more informative decisions.

CHAPTER 4

PORTFOLIO MANAGER OWNERSHIP AND

THEIR INVESTMENT BEHAVIOR

4.1. Introduction

The mutual fund industry has grown rapidly in the last two decades. By 2006, the total assets had already reached a historical record of 9 trillion dollars in the U.S. These registered investment companies control 25% of all shares of stocks, 32% of municipal securities, and 37% of commercial papers, and 10% of taxable bonds.[15] With 91 million individual investors' interests at stake, it is not surprising that academics have paid significant attention to mutual funds, especially their performance.

Many researchers have studied the determinants of mutual fund performance, but most fund characteristics, except expenses and turnover ratio, cannot successfully predict performance [see Carhart (1997), Blake et. al. (1993), etc]. A recent study by Khorana et. al. (2006) documents that almost half of all mutual fund managers own shares in their funds, and their ownership is positively related to the funds' future performance. When managerial ownership is decomposed into a component explained by fund characteristics and a residual part, they find that both components are significant in explaining fund performance. This article further examines the portfolio holdings of their funds, and attempts to understand the relation between managerial ownership and managers' investment behavior.

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[15] According to ICI 2006 investment company fact book.

Previous literature on mutual funds has studied a few aspects of investment behavior including disposition effect and tournament behavior. Disposition effect is the tendency that investors have of holding losing investments too long and selling winning investments too soon. The first empirical evidence was presented by Odean (1998) who analyzed the trading information of individual investor accounts. He documents that the presence of a disposition effect leads to lower returns and thus hurts the interests of shareholders. Cici (2005) examines disposition effect using the quarterly holdings from mutual funds. He does not find strong evidence of disposition effect in mutual funds; instead, he finds that mutual fund managers appear to realize losses more readily than gains. However, he does find an economically and statistically significant and negative impact of disposition effect on fund performance. Tournament behavior measures the extent to which fund managers alter portfolio risk in the latter part of the year after assessing their interim performance. Brown et. al. (1996) are the first to investigate this behavior, and show that managers of funds which are interim losers are more likely to increase fund volatility after mid-year, relative to managers of interim winners. These managers are gambling and hoping that increasing risk would generate abnormal returns that will offset their previous underperformance. When managers increase risk, they are acting on their own best interests instead of those of shareholders.

If managerial ownership is useful in aligning the interests of managers with those of shareholders, it should affect the investment behavior of managers, especially those that are not maximizing the wealth of their shareholders. Hence, in this paper, we study how managerial ownership affects the disposition effect and tournament behavior in mutual funds.

This study is interesting for the following reasons. First, it enriches the corporate finance literature on managerial ownership. A large body of papers in corporate finance document a positive or curvilinear relation between managerial ownership and firm value. Other papers examine the effect of managerial ownership on corporate decisions, such as mergers and acquisitions. This paper contributes to the literature by studying the impact of managerial ownership on the investment behavior of fund managers. Second, it contributes to the recent rapidly-growing literature on mutual fund governance. Board characteristics have been found to play an important roles in mutual fund decision-making, such as fee negotiation and merger decisions. Managerial ownership acts as another important component of fund governance. This paper also complements Khorana et. al. (2006). Thirdly, and most importantly, this study is of interest to shareholders. It was not until recently that funds started to disclose information on managerial ownership. If there is a significant relation between managerial ownership and managers' investment behavior, ownership information will be valuable in helping investors with their investment decisions.

Our dataset includes about 760 funds that have information on both portfolio holdings and managerial ownership. We use the methodology of Odean (1998) and Brown et. al. (1996) to construct measures for disposition effect and tournament behavior. The main results of the paper are as follows. First, we find that funds with positive managerial ownership exhibit significantly less disposition effect, i.e. they hold on to winners longer and sell losers faster. This strong negative relation persists in the multivariate regressions after controlling for fund characteristics and their investment objectives. Second, we do not find a reliable relation between managerial ownership and

tournament behavior. The degree to which managers manipulate fund risk cannot be explained by managerial ownership.

The rest of the paper is organized as follows. Section 2 discusses the pertinent literature, hypotheses and data sources. Section 3 and 4 investigate two aspects of investment behavior: disposition effect and tournament behavior respectively. Section 5 concludes the paper.

4.2. Related Literature, Hypotheses, and Data

4.2.1. Managerial Ownership

Corporate finance research has a long history of studying the impact of managerial ownership. Earlier studies provide theoretical and empirical evidence that corporate value is a function of managerial ownership. For example, Jensen and Meckling (1976) argue that firms with higher percentage of insider ownership enjoy higher corporate value. McConnell and Servaes (1990) document a significant curvilinear relation between corporate value and percentage of insider ownership. They find that corporate value slopes upward until insider ownership reaches about 40% to 50%, and then slightly downward. Core and Larcker (2002) study a group of firms that adopted a "target ownership plan", under which managers are required to own a minimum amount of stock. They find that required increases in the level of managerial equity ownership result in improved firm performance.

The framework of how managerial ownership affects firm value also applies to mutual funds. However, due to data limitations, there is no study in this area other than a recent paper by Khorana et. al. (2006). Using a unique dataset on the personal stakes of

portfolio managers, they investigate the determinants of managerial ownership, and examine the relation between managerial ownership and fund performance. They find that manager ownership is positively related to risk-adjusted future fund performance.

Later studies examined how managerial ownership affects other corporate decisions. Palia and Lichtenberg (1999) document a positive relation between managerial ownership changes and changes in firm productivity. A higher sensitivity exists for firms that experience greater than median change in managerial ownership. Ghosh and Ruland (1998) investigate how acquiring and target firm managers' preference for control rights motivates the payment for mergers. Their analysis shows a strong, positive relation between managerial ownership of target firms and the likelihood of stock payment for acquisitions. Tufano (1996) examines the corporate risk management activities in the North American gold mining industry. He finds that firms whose managers hold more stock manage gold price risk more, suggesting that managerial risk aversion may affect corporate risk management policy. All the above studies provide evidence that managerial ownership is significantly related to investment decisions that are made by corporations.

On the other hand, portfolio managers, whose main responsibility is security selection and allocation, do not face as many corporate decisions as managers in corporations. Managerial ownership, however, can affect the investment decisions made by portfolio managers. Personal investment in the funds helps reduce the moral hazard problem by aligning the interests of portfolio managers with those of shareholders. One would expect managers with higher ownership to be less involved in investment behaviors that are detrimental to the interests of shareholders. Harmful investment

behaviors studied in the context of the mutual fund industry include two types: disposition effect and tournament behavior. We discuss these two effects in detail in the following sections.

4.2.2. Disposition Effect and Hypotheses

Disposition effect relates to the tendency of investors holding losing investments too long and selling winning investments too soon. It was first studied by Shefrin and Statman (1985), who extended the prospect theory from the seminal work of Kahneman and Tversky (1979) to the field of investment. Prospect theory states that people have a different value function in the domain of gains and losses. This value function, similar to a utility function, is concave in the domain of gains and convex in the domain of losses.

Disposition effect was first tested using a sample of individual investors. Odean (1998) studies the trading behavior of individuals with trading information from 10,000 accounts at a large discount brokerage house during 1987 through 1993. He finds that overall, investors realize gains more readily than losses. This effect is robust after controlling for portfolio rebalancing and changes in share prices. Winning investments that investors choose to sell, continue to outperform the losers that they decide to keep. Disposition effect thus leads to lower returns, especially in taxable accounts.

Recent research papers have been studying disposition effect in mutual funds. Jin and Scherbina (2006) examine the disposition effect exhibited by newly-appointed managers. They find that when new managers take over mutual fund portfolios, they tend to sell loser stocks at a faster rate than winner stocks, and stocks in other momentum deciles. They also find that inherited losers significantly underperform other momentum

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losers for three months following managerial changes.   Thus, managers are estimated to save an average of between $1.3 and $1.9 million over the six months after their appointment by avoiding the future underperformance of momentum losers.

Cici (2005) investigates the impact of disposition effect on portfolio characteristics and performance of U.S. equity mutual funds. Surprisingly, he finds that mutual funds appear to realize losses more readily than gains, though 36% of the sample funds show a propensity to realize gains more readily than losses. He also finds evidence that funds with higher disposition measures are positively loaded on the book-to-market factor and negatively loaded on the momentum factor. Meanwhile, he documents a significantly negative correlation between disposition effect and fund performance.

In sum, disposition effect is harmful for both individual investors and institutional investors because it significantly hinders portfolio performance. To protect the interests of shareholders and improve fund performance, portfolio managers should try to avoid the disposition effect. If managerial ownership is useful in aligning the interests of fund managers with those of investors, managers with significant ownership will be less likely to be involved in investment behaviors that hurt shareholders' interests. Therefore, we hypothesize that funds with higher managerial ownership show less disposition effect.

4.2.3. Tournament Behavior and Hypotheses

Tournament behavior is the altering of investment characteristics of a fund's portfolio at mid-year, conditional on its year-to-date performance. When the incentive structure of the mutual fund industry is viewed as a tournament, interim losers will increase their risk level in an attempt to achieve higher payoff (attracting more asset

inflows) at the end of the competition. This conjectured tournament behavior is studied by Brown et. al. (1996). They examine the portfolio risk characteristics of more than 330 growth-oriented mutual funds with monthly return data, and find evidence that relative mid-year losers indeed increase portfolio risk to a greater degree than do interim winners. This result is stronger for newer, less established funds, and for consistent losers and winners.

Tournament behavior is not in the best interests of mutual fund shareholders. Although investors seek excess return on their funds to maximize their wealth level, they prefer the excess portion to come from asset allocation skills of portfolio managers, rather than from increased portfolio risk. When managers alter the risk characteristics of the portfolios after mid-year, they effectively change managerial objectives from a long-term to a short-term perspective. If portfolio managers have personal stakes in their funds, we hypothesize that they will be more cautious in changing portfolio risk, and thus exhibit less tournament behavior.

4.2.4. Data

In order to study the characteristics of fund holdings, we first generate the combined database by merging our dataset of managerial ownership as of year-end 2004, the CRSP survivorship bias Free Mutual Fund database, CDA/Spectrum holdings data, and the CRSP stock price data. We obtain fund-level information such as size, performance, and investment objectives from CRSP mutual fund database. Fund manager information and their personal holdings are hand collected from the Securities and Exchange Commission's website. Lipper provides us with the data on fund board

characteristics.[16] We obtain all mutual funds' holdings from Thomson Financial CDA/Spectrum Mutual Funds database, which collects information from the prospectuses and N30D forms funds filed with the SEC. Sequently, we match the tickers of stocks held with CRSP to find its price, return, and industry classification code.

There are two dates reported in the CDA database, report date (RDATE) and file date (FDATE). Report date is the date when the portfolio holdings are recorded. File date is the date when investment companies file with the SEC. It is more appropriate to use RDATE for our study, although CDA has some errors in this data. Since different funds can file at any time in a quarter, we aggregate all report dates into quarter end for the purpose of quarterly study of investment behavior. However, when we match CDA with CRSP to obtain information on the stocks, we use the exact file dates.

We apply a few filters to our holdings data to ensure that errors are not due to misreporting or errors in the data collection process. Holding of a particular stock is set to "missing" if any of the following situations occur:

1. total number of shares held by a fund is larger than the total shares outstanding in a particular date.

2. total holding of a stock is larger than the total net assets of the fund reported by CDA.

3. total net assets of the fund is more than 100% different than that reported by CRSP mutual funds database.

The CDA database also has the issue of missing some quarterly data that is missing. This is due to the fact that before 2004, funds were only required to disclose their portfolio holdings semiannually, although most funds chose to report their quarterly

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[16] We would like to thank Donald Cassidy for providing us with the data.

holdings voluntarily. If one fund misses reporting portfolio holdings in one quarter, we replace them with data from the previous quarter. If the data of the previous quarter is also missing we then set both quarters to "missing".

Khorana et. al. (2006) examine a total of 1,406 funds that had managerial ownership information as of year-end 2004, of which 913 are equity funds. When we match those funds with CDA/Spectrum, we are able to identify 779 of them with portfolio holdings in year 2005. To study the characteristics of fund portfolio holdings, we have to limit our sample to equity funds in which we can identify their stock holdings. Since we have to use the holding data during 2002-2004 to compute cost basis, our final sample includes 755 funds.

We also match our dataset with the 2005 Morningstar Open-end Fund CD to obtain the manager tenure information. However, this data is only available for a subgroup of funds.

4.3. Disposition Effect

We use a modified methodology of Odean (1998) and Cici (2005) to capture the disposition effect. First we have to determine the cost basis for each stock in our sample funds. Odean (1998) includes individual trades during the period of 1987-1993, while Cici (2005) covers all U.S. equity funds during 1980 to 2004. We believe that a six-year period is a suitable time span for individual investors, but a twenty-four-year period is too long for mutual funds. Univariate tests show that the average tenure of mutual fund managers is four years in our sample. When considering the reference point of stock prices, new managers should be more concerned about the recent purchase prices they

paid, instead of the prices paid by previous managers. Perhaps the long sample period in Cici (2005) partially explains why he does not find the expected disposition effect in mutual funds. Therefore we use the mutual fund holdings in year 2002-2004 to compute the cost basis for the stocks held in year 2005.

Since mutual fund holdings are reported quarterly, we can only compute the cost basis for every quarter. We compute a value-weighted average purchase price for each stock. The first time a stock shows up in a portfolio, all shares are included. In the subsequent quarters, only the newly purchased shares are included. Our calculation methodology is illustrated below:

Assume that fund A had 200 shares of BBT stock in the first quarter of 2002 when the ending stock price is $50. Subsequently, fund A purchased 100 shares at $80 in the second quarter of 2003, and 200 shares at $100 in the third quarter of 2004. No other purchases were made in any other quarters in the three-year period 2002-2004. Thus the value-weighted cost basis of BBT stock in fund A is:

Cost Basis =

$$\$50 \times \frac{200}{200+100+200} + \$80 \times \frac{100}{200+100+200} + \$100 \times \frac{200}{200+100+200} = \$76$$

We then compare the selling price of each stock that was sold in each quarter of 2005 to this cost basis to decide whether the sale is a gain or loss. All sales are assumed to occur at the end of the quarter. Each stock that is held by the fund at the end of the quarter is assumed to be either an unrealized paper gain or loss (or neither). We compute the following disposition measure as the difference in the proportion of realized gains and losses.

Disposition Measure (Disp_t^i)

= Proportion of Gains Realized (PGR$_t^i$) − Proportion of Losses Realized (PLR$_t^i$)

where

$$PGR_t^i = \frac{RG_t^i}{RG_t^i + UNRG_t^i}, \; PLR_t^i = \frac{RL_t^i}{RL_t^i + UNRL_t^i}$$

RG_t^i and $UNRG_t^i$ respectively refer to the number of realized and unrealized capital gains in a quarter, while RL_t^i and $UNRL_t^i$ refer to the number of realized and unrealized capital losses in a quarter. Disp$_t^i$ is the difference between PGR and PLR. This measure is computed for all stocks in a fund for every quarter, and averaged across all the four quarters in year 2005. A positive Disp suggests that the portfolio manager is more prone to disposition effect and realizes more capital gains than losses.

4.3.1. Univariate Analysis

Table 4.1 reports statistics on the distribution of disposition effect of all sample funds, and for the subsample of funds with or without managerial ownership. Across the four quarters in 2005, our sample funds sell an average of 44% of winner stocks, and 40% of loser stocks. Overall, the mean disposition measure is 2%, and 61% of sample funds have positive disposition measures, suggesting that a majority of funds realize gains more readily than losses. Median values show the same patterns. PGR and PLR measures are significantly higher in Table 4.1 than those in Odean (1998). The difference is likely due to the difference between individual accounts and institutional accounts. Mutual funds usually hold hundreds of stocks and other securities for diversification purpose with much higher portfolio turnover rates than individual accounts.

Table 4.1
Disposition measures of sample funds

This table uses *PGR, PLR* and *Disp* to measure the disposition effect.

$$PGR_t^i = \frac{RG_t^i}{RG_t^i + UNRG_t^i}, \ PLR_t^i = \frac{RL_t^i}{RL_t^i + UNRL_t^i}, \text{ and } Disp_t^i = PGR_t^i - PLR_t^i$$

Where RG_t^i is the number of stocks that fund i realized capital gains in quarter t, $UNRG_t^i$ is the number of stocks that fund i had unrealized capital gains, RL_t^i is the number of stocks that fund i realized capital losses in quarter t, and $UNRL_t^i$ is the number of stocks that fund i had unrealized capital losses. *PGR* and *PLR* respectively refer to the percentage of gains realized and losses realized. Cost basis is calculated based on the value-weighted historical average purchase price during 2002-2004. *Disp* is the difference between *PGR* and *PLR*. This measure is computed for all stocks in a fund every quarter, and averaged across all the four quarters in year 2005. *% positive Disp* refers to the percentage of funds with positive disposition measure.

	PGR			PLR			Disp		
Ownership	No	Yes	All	No	Yes	All	No	Yes	All
Minimum	0.05	0.02	0.02	0.04	0.03	0.03	-0.55	-0.52	-0.55
Mean	0.45	0.42	0.44	0.39	0.40	0.40	0.04	0.01	0.02
Median	0.44	0.41	0.43	0.36	0.38	0.37	0.04	0.01	0.03
Std Dev	0.20	0.20	0.20	0.21	0.21	0.21	0.11	0.12	0.12
Max	1.00	1.00	1.00	1.00	1.00	1.00	0.45	0.45	0.45
N	346	409	755	303	360	663	303	355	658
% positive Disp	NA	NA	NA	NA	NA	NA	0.69	0.54	0.61

Table 4.2
Subsample analysis of disposition measures

PGR and *PLR* respectively refer to the percentage of gains realized and losses realized. *Disp* is the difference between *PGR* and *PLR*. This measure is computed for all stocks in a fund every quarter, and averaged across all the four quarters in year 2005. Panel A includes all sample funds, while Panel B is limited to those with managerial tenure longer than 2 years. Panel C reports the quarterly results of all sample funds. Panels D and E include subsample tests for the funds that are team managed and solo managed.

Panel A. All sample funds

	N			Mean			Median		
Ownership	PGR	PLR	Disp	PGR	PLR	Disp	PGR	PLR	Disp
No	346	303	303	0.45	0.39	0.04	0.44	0.36	0.04
Yes	409	360	355	0.42	0.40	0.01	0.41	0.38	0.01
p-value				0.05	0.66	0.00	0.07	0.48	0.00

Panel B. Funds with manager tenure longer than 3 years

	N			Mean			Median		
Ownership	PGR	PLR	Disp	PGR	PLR	Disp	PGR	PLR	Disp
No	152	132	132	0.43	0.40	0.02	0.42	0.39	0.03
Yes	293	253	251	0.41	0.40	0.00	0.40	0.39	0.00
p-value				0.28	0.81	0.05	0.34	0.76	0.01

Panel C. Quarterly results for all sample funds

Quarter	Ownership	N			Mean			Median		
		PGR	PLR	Disp	PGR	PLR	Disp	PGR	PLR	Disp
1	No	270	262	246	0.34	0.37	-0.05	0.25	0.32	-0.04
	Yes	327	316	301	0.34	0.41	-0.08	0.27	0.37	-0.08
	p-value				0.97	0.02	0.01	0.72	0.01	0.00
2	No	308	262	262	0.53	0.40	0.09	0.51	0.36	0.08
	Yes	357	306	305	0.49	0.41	0.06	0.48	0.37	0.05
	p-value				0.12	0.83	0.04	0.16	0.44	0.04
3	No	289	228	228	0.44	0.38	0.07	0.41	0.31	0.07
	Yes	351	277	276	0.41	0.39	0.03	0.40	0.33	0.04
	p-value				0.12	0.43	0.02	0.14	0.38	0.02
4	No	266	219	218	0.47	0.42	0.06	0.44	0.37	0.05
	Yes	296	236	236	0.42	0.41	0.03	0.39	0.34	0.02
	p-value				0.02	0.65	0.04	0.02	0.79	0.02

Panel D. Funds that are team managed

Ownership	N			Mean			Median		
	PGR	PLR	Disp	PGR	PLR	Disp	PGR	PLR	Disp
No	189	163	163	0.46	0.40	0.04	0.45	0.36	0.04
Yes	226	190	187	0.42	0.40	0.01	0.41	0.38	0.00
p-value				0.08	0.95	0.02	0.09	0.84	0.01

Panel E. Funds that are managed by single managers

Ownership	N			Mean			Median		
	PGR	PLR	Disp	PGR	PLR	Disp	PGR	PLR	Disp
No	157	140	140	0.44	0.38	0.04	0.44	0.37	0.05
Yes	183	170	168	0.42	0.40	0.01	0.42	0.36	0.02
p-value				0.34	0.45	0.03	0.46	0.40	0.01

Table 4.1 also shows that funds with positive managerial ownership exhibit a lower disposition effect than those without. Both the mean and the median disposition measures are 1 percent for funds with managerial ownership, compared to 4 percent for those without managerial ownership. This difference is mostly driven by their readiness to realize the gains from winner stocks. Funds with managerial ownership, on average, realize 42% of the capital gains, lower than the 45% gains realized by those without managerial ownership. The sample size for funds with managerial ownership is larger than those without (409 vs. 346). This is consistent with the evidence documented by Khorana et. al. (2006) that over half of the equity fund managers invest in their own funds.

Table 4.2 provides detailed analysis for all sample funds as well as the two subgroups of funds. A t-test is conducted for differences in means and a rank sum test for difference in medians. Panel A of Table 4.2 again reports the PGR, PLR, and Disp measures for the two groups. Both t-tests and median tests reveal that the funds with managerial ownership show significantly less disposition effect, primarily because they are less willing to sell winners than their counterparts. Panels B to E serve as robustness checks for this finding. Since we previously documented that managers have an average tenure of 4 years in the sample, it is necessary to check whether the results hold for the funds where managers have been in charge during the whole estimation period. Panel B restricts the sample to funds with managerial tenure longer than three years. Our previous findings still hold, though the result of PGR comparison is weaker. However, we lose a large portion of observations when we filter the data with this restriction, mainly because the younger-tenured managers do not have enough time to build any

personal stakes in the funds. Hence the rest of the analysis use the full sample of 755 funds.

Panel C of Table 4.2 reports the quarterly results. Odean (1998) finds that during January to November, PGR is significantly higher than PLR. But in December, PLR is significantly higher than PGR, a result motivated by year-end tax-loss selling. Since our data frequency is quarterly, we redo the analysis for each quarter in year 2005 to examine the time-series pattern of disposition measures. We find that our previous results of less disposition effect in funds with managerial ownership persist in quarter 2 through quarter 4. Nevertheless, funds with managerial ownership show more disposition effect in quarter 1, primarily due to the higher PLR. One possible reason is that those managers try to take advantage of the January effect. For example, suppose that they have some loser stocks in their portfolio, instead of selling at the year-end 2004 for tax purpose, they wait until the beginning of 2005 to sell in anticipation of smaller capital losses.

Panels D and E show the subsample results of funds that are team managed and managed by single managers. As argued by Khorana et. al. (2006), it is possible that the incentives of managerial ownership held by single managers are much stronger than by multiple managers. Chen et. al. (2004) find that team-managed funds significantly underperform solo-managed funds by 48 basis points a year, though the effect is weaker than the size effect. Khorana et. al. (2006) also find that the positive impact of ownership on performance is almost twice as large for solo-managed funds as for team-managed funds. When we separate our sample funds into solo-managed and team-managed groups, we find that our previous results on disposition effect hold for both. For the

group of funds that are team-managed, managers with positive ownership realize capital gains less readily than those without.

By now, we have shown that funds with managerial ownership do exhibit less disposition effect than those without. How is this effect different for funds with various levels of managerial ownership? Table 4.3 presents results for funds with zero managerial ownership, from zero ownership to 75th percentile of ownership, from 75th percentile to 90th percentile, from 90th percentile to 100th percentile of ownership. We do find a monotonically declining negative relation between managerial ownership and disposition effect. As managers' ownership becomes higher, the disposition measure decreases significantly, as does the percentage of funds with a positive disposition measure. This effect is most pronounced in the highest percentile group where the disposition effect is actually negative. As a contrast, the mean disposition measure is 0.04 in the group without managerial ownership, vs. -0.02% in the group with 90th to 100th percentile of managerial ownership. Meanwhile, 69% of funds without managerial ownership show a positive disposition measure, while only 41% of those in the highest percentile of managerial ownership have a positive disposition measure. This Table, along with the previous findings, strongly suggests a significantly negative relation between managerial ownership and the disposition effect, which we will examine next in a multivariate analysis.

As with the last robustness check, we redo the analysis with different fund objectives to detect whether previous findings are driven by fund styles. We sort all sample funds by their investment objectives: aggressive, growth income, growth, international equity, sector and others. Results are reported in Table 4.4. We find that

Table 4.3
Disposition measures by managerial ownership

PGR and *PLR* respectively refer to the percentage of gains realized and losses realized. *Disp* is the difference between *PGR* and *PLR* computed for all stocks in a fund every quarter, and averaged across all the four quarters in year 2005. *% positive Disp* refers to the percentage of funds with positive disposition measure. In the column under ownership, zero refers to the funds with zero managerial ownership, $<=75^{th}$, $<=90^{th}$, $<=100^{th}$ respectively refer to the percentile ranges of managerial ownership. P-value is computed for the ANOVA test of variance.

Ownership	N			Mean			Median			% positive disp
	PGR	PLR	Disp	PGR	PLR	Disp	PGR	PLR	Disp	
zero	346	303	303	0.45	0.39	0.04	0.44	0.36	0.04	0.69
$<=75^{th}$	216	196	193	0.43	0.41	0.02	0.43	0.38	0.03	0.60
$<=90^{th}$	117	94	94	0.42	0.39	0.01	0.41	0.38	0.01	0.52
$<=100^{th}$	76	70	68	0.40	0.41	-0.02	0.37	0.37	-0.03	0.41
p-value				0.13	0.80	0.00	NA	NA	NA	0.00

Table 4.4
Disposition measures by fund objectives

PGR and *PLR* respectively refer to the percentage of gains realized and losses realized. *Disp* is difference between *PGR* and *PLR* computed for all stocks in a fund every quarter, and averaged across all the four quarters in year 2005.

		N			Mean			Median		
	Ownership	PGR	PLR	Disp	PGR	PLR	Disp	PGR	PLR	Disp
Aggressive	No	82	81	81	0.45	0.41	0.05	0.44	0.39	0.04
	Yes	97	94	93	0.39	0.38	-0.01	0.37	0.39	0.00
	p-value				0.03	0.34	0.01	0.05	0.49	0.00
Growth Income	No	53	53	53	0.42	0.40	0.02	0.37	0.35	0.03
	Yes	51	49	49	0.39	0.35	0.03	0.35	0.33	0.05
	p-value				0.42	0.19	0.63	0.47	0.17	0.61
Growth	No	76	76	76	0.41	0.38	0.04	0.40	0.34	0.04
	Yes	107	107	107	0.42	0.43	0.01	0.41	0.39	0.00
	p-value				0.73	0.16	0.07	0.76	0.14	0.04
Intl Equity	No	52	12	12	0.58	0.42	0.07	0.60	0.37	0.06
	Yes	56	14	14	0.52	0.52	0.02	0.54	0.50	0.00
	p-value				0.15	0.33	0.46	0.27	0.25	0.46
Sector	No	48	46	46	0.44	0.37	0.05	0.45	0.37	0.06
	Yes	70	66	65	0.43	0.41	0.03	0.44	0.37	0.02
	p-value				0.48	0.98	0.04	0.68	0.65	0.03
Others	No	35	35	35	0.41	0.40	0.03	0.43	0.37	0.05
	Yes	28	28	27	0.38	0.40	-0.02	0.33	0.36	-0.04
	p-value				0.89	0.37	0.38	0.85	0.46	0.18

our previous result is not driven by any specific category. In fact, the two groups (with/without managerial ownership) show significant differences in their disposition effect in most categories such as aggressive, growth, and sector funds. We include the objective dummies in our multivariate analysis to control for fund styles.

4.3.2. Multivariate Analysis

We now investigate the relation between managerial ownership and the disposition measures by studying the determinants of the disposition effect in a multivariate framework. Besides managerial ownership, the following control variables are employed to explain disposition effect: fund size, board size, percentage of board member independence, a dummy variable for solo-managed funds, fund objectives (aggressive, growth and income, growth, international, and sector funds are included, and others are left out in the regressions).

We hypothesize a negative impact of managerial ownership on the disposition measure. Managerial ownership has an important attribute of aligning the interests of portfolio managers with those of shareholders. It is well documented by previous literature that the disposition effect is harmful to shareholders because it hurts fund performance. Hence, we predict that funds with higher managerial ownership will exhibit less of a disposition effect. We have two alternative variables for managerial ownership: ownership percentage and ownership dummy. Ownership percentage is computed based on the lowest value of the dollar ownership in each range (mutual funds only report each manager's holdings in the following ranges: $0, $1-$10,000, $10,001-$50,000, $50,001-$100,000, $100,001-$500,000, $500,001-$1,000,000, or above

$1,000,000). Ownership dummy is a dummy variable equal to one if portfolio managers have positive ownership in the fund, and zero otherwise.

We predict a negative relation between fund size and disposition measure. Larger funds are usually older and more mature, and have survived fierce market competition. Fund managers may be prone to the disposition effect for the following reasons: they are not more sophisticated than individual investors and do not make rational decisions that optimize shareholders' interests, they are contrarians who believe mean reversion in stock prices, or they are more interested in short-term performance evaluation by realizing capital gains and holding onto the losers. No matter the reason why managers are being subjected to the disposition effect is, investors will eventually recognize their behavior and penalize them with zero or negative net asset flows. Therefore, we hypothesize a negative relation between fund size and the disposition measure. Managers of bigger funds would be more cautious about their investment behavior and show less of a disposition effect.

We also include board governance variables such as board size and percentage of independent directors. Previous research has suggested that larger boards are less effective due to the inefficiency in coordinating large teams. Unlike inside board members who have a conflict of interest between their fiduciary duties and shareholders, outside board members can better represent the interests of shareholders. A higher percentage of board independence can help the management make better decisions to protect the interests of shareholders. Tufano and Sevick (1997) and Del Guercio et. al. (2003) both find that funds with smaller boards and higher percentage of independence

charge lower fees. We also conjecture that funds with smaller and more independent boards will exhibit less disposition effect.

Using dummy variables, we control for whether the fund is managed by single or multiple managers. This is designed to capture the possible difference in incentives between solo-managed and team-managed funds. It is possible that single managers are less involved in the disposition effect because they are the only party responsible for the subsequent inferior performance. However, it is equally likely that there is no difference in the disposition effect no matter how many managers are managing the fund. Finally, we include the investment objective categories. Funds with different investment objectives have different investment strategies, and could exhibit different levels of the disposition effect. Controlling for fund objectives will ensure that the disposition effect is not solely driven by some special objectives.

Table 4.5 contains the results of the analysis. Models I and II are the simple regressions where only managerial ownership is used as an independent variable. Models III to VI include additional control variables. First, we find that the disposition measure is significantly negatively related to managerial ownership. This effect is also economically significant. Increasing managerial ownership from the 25th (zero ownership) to the 75th percentile decreases the disposition measure by 2%, i.e. managers will sell 2% more losers than winners. The coefficient of managerial ownership dummy is also significant. Ceteris paribus, a fund where managers have positive personal holdings will have a disposition measure that is 3% lower.

Size seems to be negatively related to disposition effect, but this result is not robust across all models. Hence, there is only weak evidence to suggest that bigger funds

Table 4.5
Determinants of disposition measure

Dependent variable of the regression is the disposition measure, which is difference between percentage of gains realized and losses realized. This measure is computed every quarter, and averaged across all the four quarters in year 2005. *Ownership percentage* is computed based on the lowest value of the dollar ownership in each range (mutual funds only report each manager's holdings in following ranges: $0, $1-$10,000, $10,001-$50,000, $50,001-$100,000, $100,001-$500,000, $500,001-$1,000,000, or above $1,000,000). *Ownership dummy* is equal to one if portfolio managers have positive ownership in the fund, and zero otherwise. *Fund size* is the log of fund assets in year 2005. *Single manager* is a dummy variable that equals one if the fund is managed by a single manager. *International fund* and *sector fund* are dummy variables that capture the fund objectives. Domestic fund dummy is left out in the regressions. P-values are reported in parentheses.

	Model I	Model II	Model III	Model IV	Model V	Model VI
Intercept	0.03 (0.00)	0.04 (0.00)	0.05 (0.01)	0.05 (0.01)	0.03 (0.32)	0.02 (0.40)
Ownership percentage	-0.11 (0.00)		-0.10 (0.00)		-0.10 (0.00)	
Ownership dummy		-0.03 (0.00)		-0.03 (0.01)		-0.03 (0.00)
Fund size			-0.01 (0.03)	-0.00 (0.15)	-0.01 (0.05)	-0.00 (0.23)
Board size			0.00 (0.06)	0.00 (0.03)	0.00 (0.13)	0.00 (0.09)
Board independence pct			-0.08 (0.06)	-0.09 (0.03)	-0.08 (0.05)	-0.09 (0.03)
Single manager			0.01 (0.56)	0.01 (0.51)	0.00 (0.70)	0.00 (0.66)
Aggressive					0.02 (0.27)	0.03 (0.23)
Growth Income					0.03 (0.17)	0.03 (0.17)
Growth					0.03 (0.17)	0.03 (0.13)
International fund					0.04 (0.17)	0.04 (0.15)
Sector fund					0.04 (0.10)	0.04 (0.07)
N	658	658	635	635	635	635
Adjusted R^2	0.02	0.01	0.02	0.02	0.02	0.02

exhibit less disposition effect. Board characteristics are reliably related to disposition effect. Board size is positively related, while percentage of board independence is negatively related to the disposition measure. This is consistent with our hypotheses that board characteristics are useful in regulating managers' investment behavior.

Models V and VI include fund investment objectives. Other than the sector dummy being marginally significant, we do not find significance in any objectives. This result suggests that our previous finding is not driven by any particular objectives.

In sum, both our univariate and multivariate analyses suggest that managerial ownership affects disposition effect. Funds with higher managerial ownership are less prone to the disposition effect. Since the disposition effect is harmful to shareholders, this finding further confirms the positive attribute of managerial ownership aligning the interests of managers with those of shareholders.

4.4. Tournament Behavior

Brown et. al. (1996) show a strong presence of tournament behavior by studying monthly returns of over 300 growth-oriented mutual funds. We use the same measures as theirs to estimate the tournament behavior. RNT is the return measure, and it is the cumulative total return through the first 6 months of the year. RAR is the risk-adjustment ratio, and it is computed as:

$$RAR = \frac{\sigma_{7-12}}{\sigma_{1-6}},$$

where σ_{7-12} is the standard deviation of fund returns from July to December, while σ_{1-6} is the standard deviation of fund returns from January to June. The central hypothesis of tournament behavior states that interim loser funds tend to increase

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portfolio risk in the latter part of the year than interim winner funds. When managers of loser funds exhibit tournament behavior, they are betting on higher rates of return from high volatility. If their gamble succeeds, the improved returns will offset their previous underperformance; meanwhile, if they lose, they will still belong to the loser category that they have already fallen into during the first part of the year. This is exactly the manifestation of agency problems in mutual funds. Since we hypothesize that managerial ownership helps to align the interests of portfolio managers with those of shareholders, we conjecture that higher managerial ownership will decrease the level of tournament behavior. Fund managers, especially those with personal stakes in the loser funds, will be less likely to increase the interim risk level. Nevertheless, to the extent that managerial ownership can be altered at anytime, it is possible that managers of loser funds have already sold off their own personal holdings before they increase portfolio risk. Consequently, we will not observe any relation between their previous ownership and future tournament behavior.

Table 4.6 reports the results of tournament behavior by the breakdown of managerial ownership. We first sort all sample funds into two groups: one with zero managerial ownership, and the other with positive ownership. We then sort them into the loser and winner group depending on whether their cumulative six-month return in 2005 is below or above the median. For each subgroup, we report the number of observations, mean RAR ratio, and the percentage of above-median RAR. Panel A of Table 4.6 shows the result of all sample funds. For the group of funds without managerial ownership, mean RAR is 0.928 for loser funds and 0.918 for winner funds; for the group with positive managerial holdings, mean RAR is 0.951 for loser funds and 0.954 for winner

Table 4.6
Classification of tournament behavior by managerial ownership

We use RTN and RAR to study the tournament behavior: (i) the cumulative total return through the first 6 months of the year (RTN); (ii) the risk adjustment ratio (RAR). Tournament behavior is reported for a 2 × 2 classification scheme involving the following two variables: (i) whether managers have any ownership in the funds, and (ii) whether RTN is below ("loser") or above ("winner") the median. We construct the classification with monthly returns of 763 equity funds in year 2005 that had available managerial ownership data as of year-end 2004. Mean of RAR, and the percentage of funds with above-median RAR are reported, and a two-way analysis of variance is conducted to compare the variance, with p-values included in the tables.

Panel A. Managerial incentives classified by managerial ownership

	No Ownership		With Ownership		
	Loser	Winner	Loser	Winner	p-value
N	181	166	193	223	
RAR	0.928	0.918	0.951	0.954	0.48
% of above-median RAR	0.541	0.434	0.549	0.471	0.08

Panel B. Funds that are team managed

	No Ownership		With Ownership		
	Loser	Winner	Loser	Winner	p-value
N	96	94	98	134	
RAR	0.961	0.911	0.979	0.985	0.22
% of above-median RAR	0.552	0.414	0.561	0.522	0.16

Panel C. Funds that are managed by single managers

	No Ownership		With Ownership		
	Loser	Winner	Loser	Winner	p-value
N	85	72	95	89	
RAR	0.890	0.928	0.923	0.907	0.74
% of above-median RAR	0.529	0.458	0.537	0.393	0.18

funds. These numbers do not seem to be significantly different from each other. We run the two-way ANOVA test (analysis of variance) to test the difference in the four groups, and find the p-value to be 0.48. We also report the percentages of funds with above-median RAR for each subgroup, and find that the percentages are much higher for loser funds, no matter whether the funds have managerial ownership or not. The ANOVA test has a p-value of 0.08 for the four subgroups, but further analysis shows that the difference stems from the classification of loser/winner funds, instead of zero/positive ownership funds. Hence, the evidence suggests that there is no significant impact of managerial ownership on tournament behavior.

Panels B and C contain subsample results. Panel B is limited to all the funds that are team managed while Panel C includes all funds managed by single managers. Again, we do not find evidence of significant difference that managerial ownership may make to tournament behavior, measured by RAR and percentage of funds with above-median RAR.

To further examine our findings in multivariate regressions, we replicate all models from Table 4.5 and replace the dependent variable with RAR. Since both the disposition effect and tournament behavior are investment behaviors by portfolio managers that are not in the best interests of shareholders, our hypotheses of how managerial ownership affects them are similar, as well as the impact from other control variables. We also include the RTN (first 6-month cumulative return) to control for the assessment period performance. Table 4.7 reports the results of the linear regressions. First of all, we do not find any significant relationship between managerial ownership and tournament behavior. The ownership dummy variable is only significant in one of the

Table 4.7
Determinants of tournament behavior measure

Dependent variable of the regression is the RAR measure, the risk adjustment ratio. *Ownership percentage* is computed based on the lowest value of the dollar ownership in each range (mutual funds only report each manager's holdings in following ranges: $0, $1-$10,000, $10,001-$50,000, $50,001-$100,000, $100,001-$500,000, $500,001-$1,000,000, or above $1,000,000). *Ownership dummy* is equal to one if the portfolio managers have positive ownership in the fund, and zero otherwise. *Fund size* is the log of fund assets in year 2005. *Single manager* is a dummy variable that equals one if the fund is managed by a single manager. *RTN of first 6 months* refers to the cumulative total return through the first 6 months of the year. *International fund* and *sector fund* are dummy variables that capture the fund objectives. Domestic fund dummy is left out in the regressions. P-values are reported in parentheses.

	Model I	Model II	Model III	Model IV	Model V	Model VI
Intercept	0.94 (0.00)	0.92 (0.00)	0.92 (0.00)	0.91 (0.00)	0.93 (0.00)	0.92 (0.00)
Ownership percentage	0.01 (0.82)		0.00 (0.96)		0.03 (0.58)	
Ownership dummy		0.03 (0.12)		0.03 (0.19)		0.03 (0.06)
Fund size			0.00 (0.53)	0.00 (0.67)	0.01 (0.31)	0.00 (0.53)
Board size			-0.00 (0.70)	-0.00 (0.75)	-0.00 (0.48)	-0.00 (0.53)
Board independence pct			0.17 (0.05)	0.17 (0.06)	0.13 (0.13)	0.12 (0.13)
Single manager			-0.06 (0.01)	-0.05 (0.01)	-0.04 (0.06)	-0.03 (0.07)
RTN of first 6 months			-0.00 (0.85)	-0.00 (0.82)	0.00 (0.90)	0.00 (0.91)
Aggressive					-0.13 (0.01)	-0.13 (0.00)
Growth Income					0.00 (0.97)	0.00 (0.98)
Growth					-0.04 (0.36)	-0.05 (0.32)
International fund					0.16 (0.00)	0.15 (0.00)
Sector fund					-0.03 (0.55)	-0.04 (0.47)
N	763	763	744	744	744	744
Adjusted R^2	-0.00	0.00	0.01	0.01	0.12	0.13

models. Second, none of the following control variables, such as fund size, board size, percentage of board independence, and the first 6-month return is significantly related to tournament behavior. The only control variable that is significant in all models is single manager dummy, which suggests that solo-managed funds are less likely to show tournament behavior. This is consistent with our hypothesis that they are the only party responsible for the corresponding inferior performance. Third, we find a significantly negative coefficient on aggressive funds, and positive coefficient on international funds. Aggressive funds are less likely to exhibit tournament behavior, but international funds are more likely to show the behavior. One possible explanation is that international funds have higher variance in their returns, which makes the RAR ratio less stable than in some other investment categories.

Taken together, we do not find a robust significant relation between managerial ownership and tournament behavior. Although managerial ownership is an important factor of fund governance, it does not seem to predict the degree of managers' manipulation of fund volatility in the latter part of the year.

4.5. Conclusion

This paper extends Khorana et. al. (2006), who document that managerial ownership is positively related to fund future performance. They find that not only the predicted ownership, but also the residual ownership is related to future risk-adjusted performance. This paper complements their study by examining the relation between managerial ownership and investment behavior.

We examine two aspects of investment behavior: disposition effect and tournament behavior. Previous literature finds that neither of the effects is in the best interests of shareholders. Since managerial ownership is supposed to align the interests of portfolio managers with those of shareholders, we predict that it is negatively related to both disposition effect and tournament behavior.

We first find that fund managers who have positive managerial ownership in the funds exhibit significantly less disposition effect. They appear to be more rational, holding on to winner stocks longer and selling loser stocks faster. This result is robust when we examine the whole sample, funds with manager tenure over 3 years, subgroups with different investment objectives, funds that are team managed, or funds that are managed by single managers. When we report the disposition measures by different percentiles of managerial ownership, we observe a monotonically declining negative relation between them. We then examine the determinants of disposition effect in a multivariate framework. We find that disposition effect is less pronounced in funds with higher managerial ownership, bigger funds, funds with smaller boards, and higher percentage of board independence.

We also investigate the impact of managerial ownership on tournament behavior, but we do not find a reliable relation. The tournament behavior in funds seems to be driven by other fund characteristics instead of the level of managerial ownership.

In conclusion, managerial ownership does seem to affect the investment behavior of mutual fund managers, especially the disposition effect. This paper provides further evidence that managerial ownership does convey important information to fund

shareholders, and it helps to better align the interests of managers with those of shareholders.

CHAPTER 5

CONCLUSION

Recent scandals in the mutual fund industry prompted many debates over the governance of mutual funds. This study examines two key components in mutual fund governance: board characteristics and managerial ownership.

The second chapter of this study examines how board structure affects manager dismissal decisions in mutual funds. First, we study the relationship between manager turnover and the underlying board structure. We find some evidence suggesting that the likelihood of managerial replacement is higher when fund boards are more independent and receive lower levels of compensation. This result is robust to alternative approaches used in the study. Consistent with previous literature, we also find that manager turnover is more likely when funds underperform the objective average. Second, we investigate the manager turnover decision conditional on the funds experiencing a merger. Since acquiring fund boards are primarily responsible for the new combined assets, we examine their effectiveness in the context of the managerial retention/replacement decision. We find that funds with more independent boards are more likely to employ target managers with a track record of superior performance. Overall, these results support the hypothesis that funds with more independent boards make manager retention/replacement decisions in the interests of their shareholders.

The third chapter studies the relationship between managerial ownership and mutual fund performance. Using a unique dataset of fund managerial ownership, we first document that almost half of the mutual fund managers own shares in their funds, though

the absolute amount of investment is modest. Fund future performance is positively related to the level of manager ownership. Manager ownership is higher in equity funds than bond funds, in funds with better past performance, smaller sizes, and where managers have been in charge for a longer time period. Mutual fund board characteristics do not seem to affect manager ownership. When we decompose manager ownership into predicted and residual parts, we find that both components are significant in explaining fund future performance. These results are robust to different measures of performance and manager ownership. Our findings lend support to the notion that managerial ownership has desirable incentive attributes for mutual fund investors.

The fourth chapter investigates how managerial ownership affects the investment behavior of portfolio managers. First, we examine the disposition effect exhibited by different fund managers, and find that those with positive ownership show significantly less disposition effect. Specifically, they sell losers faster and hold on to winner stocks for a longer period. After controlling for various fund characteristics and their investment objectives, we find that the level of managerial ownership is negatively related to the disposition effect. We also find that disposition effect is less pronounced in bigger funds, funds with smaller boards, and funds with higher percentage of board independence. Second, we test the relation between managerial ownership and the tournament behavior. We study how the degree of managers' manipulation of fund volatilities in the latter part of a year is related to their personal stakes in the funds. However, we do not find evidence suggesting the existence of such a relationship.

Our study has important policy implications for fund regulators such as the SEC, who initiated changes to the manner in which mutual fund boards are structured and

required mutual funds to disclose the ownership information of portfolio managers. Our results support the recent changes made by the SEC requiring a more independent board for mutual funds and the disclosure of portfolio managers' ownership. This study also enriches the literature on mutual fund governance, as well as that on corporate governance.

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