

Managerial Skin in the Game and Mutual Fund  
Performance

by

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## **1. Introduction**

Economists have long recognized the potential for conflicts of interest between a firm's managers and its investors. Adam Smith (1776) wrote, "The directors of such [joint-stock] companies, however, being the managers rather of other people's money than of their own, it cannot well be expected, that they should watch over it with the same anxious vigilance with which the partners in a private copartnery frequently watch over their own." The principal-agent problem Smith described applies generally to firms in which ownership rights are separated from control rights. Mutual funds demonstrate a separation of ownership and control such that portfolio managers do not bear the full wealth effects of their investment decisions, and thus managers may have reduced incentives to generate investment returns for their shareholders.

In a 1983 essay, Fama and Jensen develop a theoretical framework for explaining the long-term persistence of organizations such as mutual funds in which ownership and control are separated. These organizations are characterized by a separation of decision and risk bearing functions. According to the authors, separation of the two functions continues in these organizations in part because of the efficiency benefits that result from specialized management, but also because these organizations tend to adopt management structures that separate ratification and monitoring of decisions ("decision control") from initiation and implementation of decisions ("decision management"); this allows the former class of managers to act as a check on the latter.

The management structure described by Fama and Jensen is common to many industries, including the mutual fund industry. At mutual funds, portfolio managers are employees of independent fund advisory companies contracted by the fund's board of directors. Day-to-day investment decisions are initiated by the portfolio manager (the decision management function) and then ratified and monitored by the fund adviser, who can dismiss or reward the portfolio manager based on investment performance, thereby fulfilling the decision control function and acting as a check on the fund manager. The board of directors fulfills an additional decision control function in deciding whether to renew the fund adviser's contract and can choose not to renew the contracts of fund advisers that have performed poorly. Fama and Jensen argue that multiple-member boards should make collusion between portfolio managers and the top-level decision control agents—the board members—more difficult.

In an attempt to mitigate potential principal-agent conflicts, the U.S. Securities and Exchange Commission (SEC) requires frequent, comprehensive disclosure of funds' investment activities for each reporting period (typically quarterly), including listings of the funds' holdings as of a particular date, information on the fund's board of directors, and information on portfolio managers. As of 2004, the SEC has also required that fund management companies appoint chairmen that are independent of the fund adviser and maintain boards that are at least 75% independent. These SEC regulations complement the unique mutual fund management structure described above.

In March 2005, the SEC mandated that funds disclose portfolio managers' ownership stakes in their own funds within the Statement of Additional Information (SAI) section of the fund's annual report. In theory, portfolio managers with more skin in the game should have their own interests more closely aligned with those of their investors. It is worth noting, however, that it is also in the portfolio manager's interest to maintain as limited an ownership stake as possible for reasons of diversification, since his future income stream depends heavily on his ability to retain his job which, in turn, is linked to the performance of the fund he manages. These may be offsetting trends that leave ambiguous the optimal level of managerial ownership in a mutual fund.

There is evidence that some regulators and industry insiders were initially lukewarm to the idea of requiring funds to report the details of manager ownership. Some, such as David Cliffe of the Financial Services Authority, a non-government regulatory agency in the U.K., questioned whether there was any usefulness in making the data publicly available. In a 2005 interview with the *Financial Times*, Cliffe stated, "From a cost-benefit analysis, we just don't see the meaningful value for investors in requiring funds to disclose such information." As the head of one U.S. advisory firm put it, "Whether or not a manager owns shares in his own fund doesn't matter one bit to us." The Investment Company Institute, a trade association of U.S. mutual funds, criticized the new ruling out of privacy concerns. The large U.S. mutual fund companies Fidelity and Vanguard were also skeptical of the ruling (Financial Times 2005).

Not all observers opposed the requirements. Patrick Dorsey, director of stock analysis at the independent investment research company Morningstar, fully supported the new mandate, stating, “They are both responsible for allocating resources and ultimate performance. CEOs must declare their own stakes, why shouldn’t fund managers?” (Financial Times, 2005) In addition, the fund research company Morningstar.com assigns a stewardship grade to each fund manager, and awards an “A” rating for the “Incentive” component of a fund’s stewardship grade for funds whose managers have invested over a million dollars.

This thesis attempts to test the hypothesis that there is a positive relationship between fund performance and the level of portfolio manager ownership, a test that was not empirically feasible until ownership data became available in 2005. Identifying the nature of this relationship is important for several reasons. A positive relationship between fund performance and managerial ownership would be consistent with the incentive alignment hypothesis. First, if funds with higher levels of portfolio manager investment do indeed outperform their peers, then the managerial ownership measure carries predictive power. As of this writing, studies of U.S. funds have shown a generally positive relationship between ownership and fund performance, though results are not uniform. Furthermore, studies of the determinants of fund performance are quite timely in light of the growing importance of mutual funds in the domestic equity markets. The Investment Company Institute’s 2006 Factbook reports that U.S. mutual funds had a record \$8.9 trillion in assets under management by year-end 2005 (cited in Khorana et al., 2007). Finally, I argue that the nature of the ownership-performance relationship carries significant policy



implications, including but not limited to the efficacy of continuing to require disclosure of ownership data.

Using an ordinary least squares (OLS) regression, this paper finds a positive and significant relationship between the level of managerial ownership and mutual fund performance, when controlling for management fees and expenses, fund size, and a host of corporate governance factors. However, the relationship is only positive and significant for ownership stakes greater than \$500,000, suggesting that low levels of ownership have little effect on fund performance. This suggests that ownership information does indeed carry predictive power.

## **2. Institutional Background**

In this section I review the academic literature on various issues related to mutual fund performance, corporate governance, and the ownership-performance relationship. I begin with studies of performance persistence and continue to studies of fund manager characteristics. I then review the literature on corporate governance for both firms and mutual funds. I conclude the literature review with studies of managerial ownership and performance at firms and finally at mutual funds. These theories suggest that mutual fund ownership and governance structures may differ from the accepted optimal arrangements due to the idiosyncratic characteristics of this industry (e.g., the separation of daily and long-term management).

### **2.1. Fund Performance**

#### *2.1.1. Findings on Portfolio Manager Skill*

The efficient market hypothesis implies that managers should not be able to consistently achieve excess returns, except by luck (Fama, 1970). Thus, in theory, managerial skill should not explain differential fund performance. As early as 1933, Alfred Cowles found evidence that stock forecasters do not generate abnormal returns. Sharpe (1966) finds that, on average, mutual fund managers do not outperform a portfolio of stocks based on the Dow Jones Industrial Average, once expenses are subtracted. Sharpe also found evidence that the performance differences observed between funds could be attributed largely to differences in expense ratios, rather than differential managerial ability. Based on a sample of 115 mutual fund managers over the period 1945-1964, Jensen (1967) finds that, on average, fund

managers do not outperform the market and do not even generate returns sufficient to recoup brokerage expenses. In a study of fund returns over the period 1971-1991, Malkiel (1995) finds that mutual funds underperform benchmark portfolios, both net and gross of management fees. In addition, Malkiel finds evidence that survivorship bias is significantly stronger than previously estimated. Survivorship bias presents an empirical challenge in evaluating mutual fund returns: measures of fund performance based on existing listings of funds fail to account for funds that have gone out of business or merged with other funds, and likely underperformed peers. Carhart, Carpenter, Lynch, and Musto (1997) find an annual bias of .07% for one-year samples and 1% for sample periods greater than 15 years.

On the other hand, not all studies have shown that portfolio managers lack skill. Wermers (2000) finds that the returns of stocks held by mutual funds exceed market returns by 1.3 percent per year but their net returns underperform by 1 percent. Thus, the study finds a 2.3 percent difference between gross and net returns. However, once the difference is decomposed into expenses and underperformance of non-stock holdings, Wermers finds that .7 percent of the difference is due to underperformance of non-stock holdings and 1.6 percent is due to expenses and transaction costs. Thus, assets held by fund managers do outperform the market. In a study of mutual fund returns over the period 1975-1984, Grinblatt and Titman (1989) find that some funds do indeed generate significantly positive risk-adjusted gross returns. In a later study, Grinblatt and Titman (1992) find that differences in performance between funds persist over time, consistent with the ability of fund managers to earn abnormal returns.

### *2.1.2. Findings on Persistence*

The efficient market hypothesis also predicts that funds should not display long-term performance persistence. Carhart (1997) finds that virtually all performance persistence can be explained by common factors in stock returns and investment expenses. Likewise, Bollen and Busse (2004) find that, although on a quarterly basis the average abnormal return of the top-ranking decile of funds is .39%, those returns do not persist over periods longer than one quarter.

Jegadeesh and Titman (1993) find that funds that pursue a momentum strategy—buying past winners and selling past losers—produce significant positive returns over 3-12 month periods. In a later study (Jegadeesh and Titman, 1999), the authors find evidence confirming their original findings of superior performance over 3-12 month holding periods for funds pursuing a momentum strategy. Similarly, Hendricks, Patel, and Zeckhauser (1990) find evidence of persistent performance over a one-year time horizon. The authors find that funds holding recent poor performers significantly underperform benchmarks while funds holding top performers do not tend to do significantly better than benchmark index holdings. Carhart (1997) attributes Hendricks et al.'s finding to the momentum effect described by Jegadeesh and Titman.

Not all studies of the mutual fund industry have found a lack of performance persistence. In a study of open-end, domestic equity mutual funds between 1985 and 2002, Wermers and Ding (2005) find that experienced large-fund managers and portfolio managers with better past performance tend to outperform their respective

size, book-to-market, and momentum benchmarks, contradicting the hypothesis that managerial ability has no effect on fund returns. Likewise, Gaspar, Massa, and Matos (2006) find that, within the same fund family, funds with higher fees or higher past performance tend to outperform at the expense of funds with lower fees or past performance. Part of the difference in performance is due to better IPO allocation at the former. Porter and Trifts (1998) find evidence of performance persistence, though only in the case of inferior investment performance.

Some studies have shown evidence of performance persistence in the hedge fund industry. For example, Edwards and Caglayan (2001) find that 25% of hedge fund managers earn positive excess returns and that both positive and negative excess returns are persistent. However, a study of Australian hedge funds finds evidence of winning persistence only in the short-term and only weak evidence of losing persistence (Do, Faff, Veeraraghavan, 2010).

### *2.1.3. Studies of Portfolio Manager Characteristics*

Several studies suggest that managerial skill may indeed influence fund performance. Analyzing the set of growth and growth and income funds in 1994, Chevalier and Ellison (1999) studied the relationship between fund performance and portfolio manager age, the average SAT score of the manager's undergraduate alma mater, and whether the portfolio manager obtained an MBA. After controlling for differences in managerial behavior and selection biases, the authors find that managers who attend undergraduate institutions with higher average SAT scores generate significantly higher risk-adjusted excess returns than their peers. Chevalier

and Ellison's work was later expanded on by Gottesman and Morey (2006) who find a positive and significant relationship between fund performance and the mean GMAT score of the manager's MBA program. In addition, managers who obtained their MBAs from programs ranked among the top 30 in the nation by Business Week outperform fund managers from institutions not ranked in the top 30. The authors find no significant relationship between fund performance and the attainment of either the CFA distinction or a non-MBA graduate degree.

Golec (1996) finds that portfolio managers who are younger, hold MBA degrees, and have had a longer tenure at their funds tend to outperform their peers. In addition, the study finds evidence of better performance by funds with lower fees and more diversified portfolios.

Experience also appears to play a role in mutual fund performance. In a study of open-end, domestic equity mutual funds for the 1985-2002 period, Ding and Wermers (2005) find that more experienced large-fund portfolio managers outperform size, book-to-market, and momentum benchmarks. Once again, evidence from the hedge fund industry appears contradictory, as Boyson finds that less-experienced hedge fund managers tend to outperform more experienced managers.

There is even some evidence that portfolio managers benefit from knowledge spillover in cities. Christoffersen and Sarkissian (2009) find that managers of U.S. equity mutual funds located in financial centers tend to outperform peers in terms of both gross and risk-adjusted returns. Consistent with the findings of Ding and Wermers, the authors find that the key driver of this relationship is manager experience. Hong, Kubrik and Stein (2005) propose an alternative, complementary

explanation for managerial knowledge spillovers: local informational channels that can lead to higher degrees of investment synchronicity among managers in particular cities.

#### *2.1.4. Alternative Explanation for Lack of Long-Term Performance Persistence*

An alternative explanation for the lack of performance persistence in mutual funds was posited by Berk and Green (2004). These authors argue that, because investors “chase performance”, i.e., allocate capital to funds with the best past performance, managers will increase the size of their fund and thereby drive down returns up to the point where returns are competitive. Thus, the lack of persistence in mutual fund performance does not indicate that managers lack investing skill or that markets are efficient; it simply indicates that capital is supplied competitively, driving down returns.

Several studies of fund flows suggest that investors do indeed supply capital competitively. Consistent with Berk and Green’s hypothesis, Ding and Wermers (2009) find that underperforming managers do indeed suffer significantly higher investment outflows. Likewise, Phalippou (2010) finds that venture capital funds that are expected to be backed by investors with better reputations for asset selection tend to attract greater fund inflows but do not exhibit performance persistence. In addition, Boyson (2010) finds that more senior hedge fund managers who do not engage in herding behavior tend to underperform and attract fewer inflows. Bergstresser and Poterba (2002) find that after-tax returns are more predictive of mutual fund inflows

than pre-tax returns. Furthermore, funds with substantial unrealized capital gains tend to attract smaller inflows than funds without.

Berk and Green's hypothesis also helps explain the phenomenon observed by Gaspar, Massa, and Matos (2006): fund families channel performance to funds with better past performance to attract capital inflows.

## **2.2. Corporate Governance and Firm Performance**

### *2.2.1. Generalized Studies of Corporate Governance*

Several studies have shown the importance of good corporate governance for firm performance. A study of 1500 large firms during the 1990s, (Gompers, Ishii, and Metrick, 2003) considered 24 corporate governance metrics, creating a "Corporate Governance Index" where a low score in the index signified stronger shareholder rights and a high score indicated weaker rights. The authors' results show that an investor who bought firms with low scores, the democracy portfolio, and sold firms with high scores, the dictatorship portfolio, would have generated abnormal returns of 8.5% per year during the 1990s. Low-score firms had higher firm value, higher profits, higher sales growth, lower capital expenditures, and made fewer corporate acquisitions.

Starting with the same Institutional Investors Research Center (IRCC) list of 24 corporate governance provisions, Bebchuk, Cohen, and Ferrell (2004) develop an "entrenchment index," consisting of 6 provisions. Four provisions—staggered boards, limits to shareholder bylaw amendments, supermajority requirements for mergers, and supermajority requirements for charter amendments—limit the power of a



majority of shareholders to influence corporate policy while the other two—poison pills and golden parachutes—are put in place to deter hostile takeovers. The authors found that higher scores on the entrenchment index (indicating deeper managerial entrenchment) are associated with lower firm value measured by average Tobin's  $q$ , which is used as a proxy for firm valuation, as well as large negative abnormal returns during the 1990-2003 period. In addition, the study indicates that the negative relationship between the 24 IRCC corporate governance provisions and firm value can be attributed entirely to the 6 provisions chosen to make up the entrenchment index. In other words, their study yields no evidence to suggest that the other 18 provisions have any significant relation to firm value. Numerous subsequent studies have supported the Bebchuk, Cohen and Ferrell (2004) findings.

### *2.2.2. Board Characteristics*

A study by Weisbach (1987) finds that CEOs of firms that produced below average stock returns and earnings were more likely to be removed at firms with outsider-dominated boards than at firms with insider-dominated boards. The study also finds increases in stock returns on the days of unexpected CEO resignations, suggesting that boards have the potential to increase firm value by forcing out bad managers.

Bebchuk and Cohen (2005) find that staggered boards, boards in which directors come up for election during different time periods are associated with reduced firm value. Staggered elections increase the difficulty of effecting a change in board make-up, which may be of particular value to outsiders such as would-be

acquirers. The association with a reduced firm value is stronger for staggered boards established in the corporate charter than for staggered boards established by the company's by-laws which, unlike the corporate charter, can be amended by shareholders.

In a study of U.S. industrial firms over the period 1989-1995, Fich and Shivdasani (2006) find that firms where majorities of outside directors serve on three or more boards—so-called “busy boards”—tend to have lower market-to-book value ratios and operating profitability. These firms are also less likely to replace underperforming CEOs.

The corporate finance literature shows an inverse relationship between board size and firm value (Yermack, 1996).

These results suggest that an optimal board structure may contain more independent directors, not be staggered, and not concentrate too much responsibility in too few hands. While Yermack (1996) suggests that the optimal board size may be relatively small, later research has found that the optimal size varies across industries and non-monotonically with firm age.

### *2.2.3. Management Incentives*

In a study of the 460 largest U.K. listed companies, Florou and Conyon (2002) found a statistically significant inverse relationship between the probability of management turnover and firm performance. However, evidence suggests that only very poor performance increases the probability of top management turnover.

A study of individual executives by Murphy (1985) finds that executive compensation is strongly positively related to corporate performance as measured by shareholder return and growth in firm sales. Hanlon, Rajgopal, and Shevlin (2003) found that one dollar of Black-Scholes value in an executive stock option is associated with \$3.71 of future operating income for the firm.

### **2.3. Corporate Governance and Fund Performance**

#### *2.3.1. Studies of Board Characteristics*

The evidence on the effect on performance of board structure and composition is mixed. Wermers and Ding (2005) find that more independent fund boards yield better future performance and are also more likely to replace underperforming managers. This relationship between board independence and the likelihood of manager termination has been further confirmed in other studies (e.g., Wermers and Ding, 2009). Khorana, Tufano, and Wedge (2006) find that fund mergers are more likely to occur when funds underperform and when boards are more independent, particularly in cases where all of a fund's directors are independent. The authors found no stable relationship between merger likelihood and either board size or the presence of independent chairs. Post-merger performance does not tend to be superior but instead tends to revert to the fund category mean. Likewise, empirical research has shown that smaller, more independent mutual fund boards of directors have lower expense ratios [Tufano and Sevick (1997) and Del Guercio et al. (2003)]. Del Guercio et al. (2003) find that closed-end funds with relatively low expense ratios tend to have smaller, more independent boards, relatively low director compensation, and charter

provisions specifying action when discounts increase beyond a certain level. Kong and Tang (2008) found that unitary boards, referring to a board structure wherein one board oversees all funds in the entire fund family, tend to pass along economies of scale benefits to investors, have lower fees, and better stewardship. They are also less likely to be involved in insider trading scandals. Larger, more independent boards, by comparison, tend to charge higher fees and rank lower on stewardship metrics.

Not all studies show a positive relationship between fund performance and board independence. Following a series of scandals, the SEC required mutual funds to have an independent chairman and a board that is at least 75% independent. Ferris and Yan (2007), however, find no relationship between either the probability of a fund scandal or fund performance, on the one hand, and either chair or board independence on the other, obviously bringing into question the efficacy of the new SEC regulations. While the Ferris and Yan dataset was from 2002, prior to the proposal and implementation of the SEC rule, their results suggest that even among those firms that were supposedly the most enlightened as they had adopted these measures pre-emptively and voluntarily, these measures were, at best, of limited benefit.

Rowe and Davidson (2000) found no statistically significant change in abnormal returns following a managerial change at closed-end funds. Interestingly, the authors found that abnormal returns are negatively related to the percentage of inside director stock ownership and unrelated to board independence.

Meschke (2005) suggests that funds overseen by an independent chair charge fees that are 12 basis points lower than their peers. The relationship between mutual

fund fees and the fraction of independent directors was not consistent over time. The study suggests that independent boards are able to negotiate lower fees; however, these lower fees push more talented portfolio managers toward funds with less independent directors and higher fees. In addition, Meschke finds that funds with higher levels of director ownership and lower unexplained compensation have lower fees and generate higher returns. From this study, two key conclusions can be drawn:

- 1) greater board independence does not necessarily produce better performance and
- 2) high director ownership and low unexplained compensation appear to align director's incentives with those of their shareholders.

Khorana et al. (2007) did not find evidence of a robust relationship between non-ownership related governance mechanisms and future performance. These authors suggest that these results may be due to the fact that board directors are not directly involved in day-to-day management of fund portfolios; that is the portfolio managers' prerogative.

Using a sample of U.S. mutual funds over the period 1994 to 2000, Almazan, Brown, Carlson, and Chapman (2004) find no difference in performance between funds with high investment constraints and funds with low ones.

These results suggest that the general stylized relationships between firm performance and governance structure do not translate directly into the mutual fund industry. This may reflect a unique attribute of the mutual fund industry: the separation of daily and long-term management between portfolio managers and fund advisers. I therefore turn next to an analysis of portfolio manager incentives to better

understand how and why their incentives may differ from those of other involved parties.

### *2.3.2. Portfolio Manager Incentives*

Khorana (1996) finds an inverse relationship between the probability of managerial replacement and fund performance, whether measured by the growth rate in a fund's asset base or its portfolio returns. The study also found that departing fund managers tended to have higher expenses than their non-replaced counterparts. Using data for the period 1992-1994, Chevalier and Ellison (1999) find that younger managers are more likely to be terminated for poor performance than are older ones. Most likely as a result, young managers tend to hold less unsystematic risk and manage more conventional portfolios.

Elton, Gruber, and Blake (2003) found that funds with incentive fees tended to earn positive abnormal returns, due to both superior stock-picking and lower expense ratios. Much of the performance gap can be attributed to the greater risk taken by incentive-fee funds. Measuring the alignment of manager and shareholder interests via pay-performance sensitivity, Broussard, Buchenroth, and Pilotte (2004) found that increased alignment tends primarily to reduce over-investment of free cash flow. Massa and Patgiri (2009) find that fund managers with highly incentive-based contracts tend to take on more risk and have lower probability of survival. Nevertheless, these funds achieve persistent superior performance, largely through active portfolio rebalancing.

In a study of 396 portfolio managers, Farnsworth and Taylor (2006) find that manager compensation practices are more likely to be “subjective and discretionary” than “objective and formula-based”. Furthermore, firm profitability is more likely to influence portfolio manager compensation than is investment performance, indicating that firm success tends to outweigh client success in the determination of manager compensation.

## **2.4. Ownership and Firm Performance**

### *2.4.1. Overview*

The potential conflict of interest between corporate managers and dispersed shareholders when managers do not have an ownership interest in the firm was described by Berle and Means (1932). Cheffins and Bank (2009) find that separation of ownership and control is indeed a common feature of U.S. companies, though other studies have found evidence of more concentrated ownership. The relationship between managerial equity ownership and performance was formalized by Jensen and Meckling (1976).

While there is a wealth of literature on the relationship between equity ownership and firm performance, no clear relationship has been established. While most studies have found a positive relationship indicating managerial alignment at at least some ownership levels, most have also found that the relationship is nonmonotonic, though the shape of this relationship is still a matter of debate.

### *2.4.2. Evidence Supporting a U-Shaped Relationship between Ownership and Firm Performance*

An oft-cited study by Morck et al. (1987), which utilized a sample of 371 Fortune 500 firms, found a significant non-monotonic relationship between managerial equity ownership and firm valuation as measured by average Tobin's  $Q$ , the ratio of a company's market value to replacement value. Specifically, average Tobin's  $Q$  first increases, then declines, and finally rises slightly as ownership by the board of directors rises; thus, the observed relationship between managerial ownership and firm performance is U-shaped.

Like Morck et al., Griffith (1999) finds a U-shaped relationship between CEO equity ownership and firm value. Specifically, he finds a positive relationship between CEO ownership and average Tobin's  $Q$  for ownership levels between 0 and 15%, a negative relationship for ownership levels between 15 and 50%, and a positive relationship for ownership levels above 50%. Using a sample of 283 firms, Ellili (2006) found that managerial ownership and firm performance are positively related as ownership increases from 0 to 5.72%. At ownership levels between 5.72% and 55.47%, evidence suggests that increasing managerial ownership heightens entrenchment. At ownership levels above 55.47%, however, the relationship between managerial ownership and performance is again one of alignment. In their study of the U.K. financial services industry, Mudambi and Nicosia (1998) also find evidence confirming a U-shaped relationship between managerial ownership and firm performance. Chen, Hexter, and Hu (1993) find that average Tobin's  $Q$  increases for managerial ownership levels between 0 and 7% and falls for ownership levels between 7 and 12%. For ownership levels above 12%, the relationship is unclear, as Tobin's  $Q$  rises in some samples and falls in others.



Studies of foreign firms have also found a U-shaped relationship between ownership and performance. A study of post-IPO Thai firms finds a positive and statistically significant relationship between managerial ownership and post-IPO performance for high and low levels of managerial ownership. The authors find a negative relationship, however, between managerial ownership and performance for intermediate ownership levels (Kim, Kitsabunnarat, and Nofsinger, 2004). A study of New Zealand firms by Bhabra (2007) finds a positive relationship between insider ownership and firm performance (as measured by average Tobin's  $q$ , market-to-book value, and ROE) for insider ownership levels less than 14% and greater than 40%. A negative relationship is observed at ownership levels between 14 and 40%.

McConnell and Servaes (1990) find a positive relationship between Tobin's  $Q$  and insider equity ownership up to ownership levels of 40% to 50% and then a slight negative relationship at higher ownership levels. The hump-shaped relationship between managerial ownership and performance observed by McConnell and Servaes (1990) was also confirmed in a more recent study by Coles, Meschke, and Lemmon (2008). Similarly, Florackis, Kostakis, and Ozkan (2009) find a positive and significant relationship between managerial ownership and firm performance at ownership levels below 15% and no significant relationship at intermediate and high levels of managerial equity ownership. Benson and Davidson (2009) also find evidence of incentive alignment at low levels of managerial ownership and risk aversion at higher levels. A study of non-listed Chinese firms (Hu and Zhou, 2008) finds that firms where managers had higher levels of ownership tended to outperform

peers. Like a number of others before them, the authors observed nonlinearity in the ownership-performance relationship, with performance diminishing at firms where managerial ownership exceeded 50%. Like McConnell and Servaes, Chen and Steiner (2000) also find evidence of an initial alignment effect at low ownership levels and an entrenchment effect at higher ownership levels.

It has been suggested that the nonlinear relationship between managerial ownership and firm value may indicate that managers at intermediate levels of ownership become entrenched and act in their own self interest rather than the interests of their shareholders. Short and Keasey (1999) find that, in the U.K., where defending against hostile takeovers is more difficult than in the U.S., managers become entrenched at higher levels of ownership. It is also possible that the nonlinear relationship could suggest manager risk aversion beyond a certain ownership level. However, Florou and Conyon (2005) find no evidence that managerial stock ownership leads to entrenchment.

Using a sample of randomly-selected manufacturing firms, Palia and Lichtenberg (2009) find that changes in managerial ownership are positively related to changes in firm productivity and that increases in firm productivity are associated with increases in stock price. Fahlenbrach and Stulz (2009) also find that large increases in managerial ownership tend to increase Tobin's  $q$ . However, their findings indicate that increases in officer ownership are positively correlated with firm value, while increases in ownership by directors are unrelated to changes in firm value. The study showed no negative effects for large decreases in managerial ownership. Using a sample of 153 manufacturing firms over the period 1979-1980, Mehran (1995) finds

evidence of a positive and significant relationship between the percentage of firm equity held by managers and firm performance. Kim, Lee, and Francis (1988) find a positive and significant relationship between insider ownership and common stock abnormal returns. The authors suggest that this relationship may arise from the market's failure to accord an adequate price to managerial equity ownership. Likewise, Core and Larcker (2000) found that firms that adopt "target ownership plans," rules requiring managers to own a minimum amount of stock, experience higher excess accounting and stock returns following plan adoption. This evidence suggests that these plans have a positive impact on firm performance. Morck, Nakamura, and Shivdasani (2000) find a positive and monotonic relationship between managerial ownership and Tobin's Q for Japanese firms. A study of Chinese state-owned enterprises privatized during the 1992-2000 period finds a positive and significant relationship between CEO ownership and firm performance across all ownership levels. Though the relationship becomes less significant at higher levels of CEO ownership, performance continues to rise as managerial performance in the aggregate increases (Li, Moshirian, Nguyen, and Tan, 2007).

The general consensus thus favors the presence of a U-shaped relationship with researchers disagreeing about the ranges where the relationship assumes a particular sign. Demsetz and Villalonga (2001) prepared a graph that shows visually the commonalities of these studies, and highlights that the differences may stem from variation in sample composition and econometric technique. This graph is included as Appendix A of this thesis. The relationship between performance and managerial or director ownership is considered to be relatively robust, with most studies showing

that there are positive gains from incentive alignment at low levels of ownership, and that there may be negative effects from entrenchment at high levels of ownership. These findings have been obtained in studies from numerous time periods, industrial samples, and countries, and are robust to implementation of varying econometric techniques. Subsequent research has focused primarily on inter-temporal variation in ownership levels, seeking to identify causal factors.

#### *2.4.2. Other Observed Relationships*

While most studies do find consistent evidence in favor of a u-shaped relationship between performance and insider ownership, there is a small body of evidence supporting the idea that there is no stable relationship. These studies are considered reliable, and remain widely cited, even though their conclusions are inconsistent with the generally accepted stylized relationship.

In a study of 134 NYSE-listed companies, Hermalin and Weisbach (1991) find a positive relationship between CEO stock ownership and firm ownership for ownership ranges between 0 and 1%, a negative relationship between 1 and 5%, a positive relationship between 5 and 20%, and a negative relationship beyond 20%.

Some studies have even found a negative relationship between managerial equity ownership and performance. In a study of commercial banks, Hirschey (1999) finds a significant inverse relationship between managerial stock ownership and both accounting profits and market values.

In addition, studies have found no link between ownership and performance. After controlling for observed firm characteristics and firm fixed effects,

Himmelberg, Hubbard, and Palia (1999) found no conclusive link between changes in managerial ownership and firm performance in their study of 600 U.S. firms between 1982 and 1992. Using a unique methodology, Demsetz and Villalonga (2001) found no relationship between managerial ownership and firm performance. Using a sample of all U.K. non-financial listed companies, Faccio and Lasfer (1999) found a weak relationship between firm value and the level of managerial ownership. Demsetz (1983) argues that there should be no relationship between managerial ownership and firm performance: “How could it be otherwise? In a world in which self-interest plays a significant role in economic behavior, it is foolish to believe that owners of valuable resources systematically relinquish control to managers who are not guided to serve their interests.”

#### *2.4.3. Interpretations of Empirical Studies*

Some have suggested that there may be an optimal level of managerial ownership. Tong (2008) finds that deviations from an estimated optimal level of CEO ownership, as determined in the initial contracting phase, reduce firm value regardless of whether the deviation results in an above-optimal or below-optimal ownership level.

Several studies have asked whether the differences in results can be attributed to variability in data sources. While Anderson and Lee (1997) find that discrepancies in sources of ownership data can significantly affect the results of empirical studies, Kole (1995) presents evidence suggesting that contradictory empirical evidence cannot be explained by differences in ownership data.

In addition, the direction of correlation is unclear. In a study of listed Danish firms, Rose (2005) finds evidence rejecting the hypothesis that higher managerial ownership is associated with higher values of average Tobin's  $Q$ , finding instead that managers increase their equity ownership in response to increases in firm performance. Similarly, Fahlenbrach and Stulz (2009) found that managers tend to decrease their ownership stakes when their firms perform well and increase their stakes during times of poor performance.

Interestingly, LaFond and Roychowdhury (2007) observed a negative relationship between the level of managerial ownership and financial reporting conservatism. As economic theory predicts that the agency problems that arise when ownership and control are separated will be worsened when managers have a relatively low level of ownership, this study suggests that shareholders try to combat this by demanding more conservative accounting practices from firms where managers have relatively low levels of ownership.

A concept that is closely related to managerial ownership and firm performance is the ratio of control rights to cash flow rights. In a study of 1,433 firms from 18 emerging market countries, Lins (2003) found that firms in which management's control rights exceeded its cash flow rights tend to have lower firm values. Furthermore, this relationship was more pronounced in countries where shareholder protections are relatively weaker. In a study of 3,468 firms from 22 countries during the 1996-2008 period, Lin, Ma, Malatesta, and Xuan (2011) find that firms where control rights most dramatically exceed cash-flow rights tend to face significantly higher borrowing costs.

Utilizing a sample of over 19,000 firms across 61 countries, Gugler, Mueller, and Yurtoglu (2004) find that the origin of a country's legal system, rather than the level of managerial ownership and instance of corporate governance institutions, tends to be the most important predictor of return on investment, with firms from countries with English common law-origin legal systems earning returns on investment that exceed their cost of capital. Countries with civil law systems average returns below their cost of capital.

These results may be of limited importance in understanding the U.S. mutual fund industry as there is no inter-fund variation in prevailing legal institutions. On the other hand, to the extent that managers may absorb disparate cultural influences due to where they are raised or educated, then there may be unobserved manager-specific variation that could be important to analysis of the U.S. mutual fund industry.

#### *2.4.4. Other Important Owners*

In addition to ownership concentration, the identity of these owners may also be important to firm value. Clifford (2008) finds that when activist hedge funds acquire more than 5% of a firm, the firm tends to earn a higher ROA than firms targeted by passive hedge funds. In a study of partially-privatized Chinese firms during the period from 1991 to 2001, Wei, Xie, and Zhang (2005) found a significant negative relationship between state and institutional ownership and firm value as measured by average Tobin's  $Q$ . On the other hand, the authors found that foreign ownership and firm value are positively related.

In a study of S&P 500 firms, Anderson and Reeb (2004) find that family-owned firms outperform non-family firms, with additional evidence of better performance at firms where a family member serves as CEO.

#### *2.4.5. Shareholder Effects*

Shareholders with large holdings may be more likely to exercise their associated control rights, and as a result they have the potential to influence managerial action and thereby incentivize managers. In a study of emerging markets firms, Lins (2003) found that large non-management blockholdings are positively related to firm value, particularly in countries where shareholder protections are weaker.

Several studies have found no stable relationship between ownership concentration and firm performance (Wruck, 1989 and Demsetz and Lehn, 1985). Results are not uniform, however. Using a sample of the 435 largest European companies, Thomsen and Pedersen (2000) find a positive relationship between ownership concentration and average Tobin's  $Q$ .

The ability of large shareholders to incentivize managers should also be observed at mutual funds because they have the right to withdraw large numbers of shares at full net asset value (NAV) at a moment's notice and thereby impose the discipline of the market on underperforming managers. Qian (2011) found that funds with greater flow sensitivity have lower arbitrage potential and fewer abnormal flows, implying less opportunistic trading and a lower likelihood of being implicated in scandals.



## **2.5. Ownership and Fund Performance**

### *2.5.1. Portfolio Manager Ownership*

Several studies of U.S. mutual funds have shown a positive and significant relationship between the level of portfolio manager ownership and mutual fund performance. A July 2009 study by Morningstar shows that managers with more than \$1 million invested in their own funds beat 58% of peers, on average, over the previous five years. On the other hand, funds with no manager investment outperform only 46% of their peers.

Using a sample of 1,406 mutual funds, Khorana and Servaes (2007) find a positive relationship between portfolio manager ownership and future risk-adjusted performance. Specifically, the authors find that future performance increases by approximately three basis points for each additional basis point of manager ownership.

In a study of 592 closed-end funds, Khorana, Servaes, and Wedge (2009) found a positive and significant correlation between portfolio manager ownership and fund performance measured using both NAV and price returns. A study of 237 single-manager funds by Evans (2008) also finds a positive relationship between portfolio manager ownership and fund performance.

In a study of Norwegian mutual funds, Kumlin and Puttonen (2009) find no relationship between manager ownership and fund performance. In addition, when controlling for portfolio manager ownership as a percentage of taxable wealth, the

authors find a negative relationship between portfolio manager ownership and fund performance.

The above studies also present findings on the prevalence of manager ownership. More than half of the funds in the Morningstar survey had no manager investment. This was confirmed in a subsequent study by Khorana et al. which showed that only 43% of fund managers had any ownership in their own funds (2007). The story is different for funds managed by a single portfolio manager, however; a 2008 study of funds with a single manager shows that 78% of managers have ownership stakes in their own funds (Evans, 2008). Furthermore, 22% of these managers have ownership stakes over \$1,000,000.

Evans (2008) also finds an inverse relationship between manager ownership and portfolio turnover. This result is fairly intuitive: excessive turnover raises administrative costs and managers invested in their own funds, feeling the effects of those administrative costs, should be less likely to tolerate them.

Fu and Wedge (2011) find an inverse relationship between the level of mutual fund manager ownership and a fund's propensity to exhibit a disposition effect, i.e., the tendency to realize gains more readily than losses. Because this is known to be a losing investment strategy, it may partially explain the better performance observed among portfolio managers who are more heavily invested in their own funds.

#### *2.5.2. Director Ownership: Prevalence and Relationship to Performance*

Chen, Goldstein, and Jiang (2008) find significant ownership by mutual fund directors in the funds they oversee. The authors also find greater director ownership

in actively-managed funds and funds with less institutional ownership. Interestingly, the authors also find significant heterogeneity in ownership across fund families; though it is difficult to draw any firm inferences from this observation, it may be evidence of differential ownership policies from family to family.

A study of equity mutual funds (Cremers et al., 2006) found that funds in which directors, both independent and non-independent, have low ownership stakes tend to significantly underperform peers. The authors suggest that low ownership may lead directors to do a worse job of monitoring their funds, rather than simply choosing not to invest in funds they expect to underperform.

A study of equity mutual fund directors by Cremers, Driessen, Maenhout, and Weinbaum (2009) find a positive and statistically significant relationship between fund performance and the ownership levels of both independent and non-independent directors. The authors also found evidence supporting the notion that the interests of directors with relatively low ownership stakes are not aligned with those of their shareholders. They did not, however, find any evidence suggesting directors have superior private information.

### *2.5.3. Public vs. Private Ownership of Mutual Fund Companies*

Berkowitz and Qiu (2003) found that mutual funds managed by publicly-traded companies tend to take on more risk and charge higher management fees than their privately-held peers. However, mutual funds of publicly-traded management companies do not generate higher risk-adjusted returns than funds managed by their privately-held competitors. Likewise, Ferris and Yan (2008) find that, compared to

their privately-held counterparts, funds managed by publicly-traded fund companies raise more funds, charge higher fees, and significantly underperform. These findings suggest an agency conflict between publicly-traded fund management companies and their funds' shareholders.

## **2.6. Other Factors Linked to Fund Performance**

### *2.6.1. Portfolio Management Characteristics*

In a study of open-end mutual funds during the period from 1997-2004, Karagiannidis (2009) found that single-manager funds outperformed multiple manager funds between 2001 and 2004; the performance difference was larger among growth-oriented funds. No performance difference was observed between single-manager funds and multiple-manager funds classified as pure teams. The key difference is observed between single-manager funds and multiple-manager funds employing multiple advisers.

Chen, Hong, and Kubik (2010) found that mutual funds whose management is outsourced to unaffiliated advisory firms underperform internally managed funds by up to 63.6 basis points per year. According to this study, the management of about 27% of mutual funds is outsourced. The authors hypothesize that it is difficult to extract investment performance from an outsourced relationship and make two predictions about outsourced funds. The first is that outsourced funds are more likely to be closed due to excessive risk-taking and the second is that outsourced funds will in fact take less risk.

Cici, Gibson, and Moussawi (2010) find that mutual funds managed by firms that simultaneously manage hedge funds tend to underperform mutual funds not affiliated with any hedge fund. Mutual funds whose investment style was most similar to their affiliated hedge fund tended to underperform by the widest margin. In addition, mutual funds affiliated with hedge funds tended to extract less benefit from IPO underpricing than their affiliated hedge fund or unaffiliated peers. This study thus suggests that fund companies try to maximize fees by shifting their top stock-picking performance from mutual funds to hedge funds. Chen and Chen (2009) find supporting evidence that hedge fund managers who choose to concurrently manage a mutual fund suffer performance declines. On the other hand, mutual fund managers who choose to manage a hedge fund concurrently tend to outperform full-time mutual fund managers.

#### *2.6.2. Fund Size and Performance*

Chen, Hong, Huang, and Kubik (2004) find a significant negative relationship between fund returns, both gross and net of fees and expenses, and lagged fund size. The effect was most pronounced among funds whose objective was to invest in small and illiquid stocks, which suggests that the decline in performance observed at larger funds may be related to liquidity problems; it is more difficult to move in and out of positions with larger numbers of shares, and the effect is magnified for stocks that are more illiquid to begin with. The authors also found that fund returns do not diminish as the size of the fund family increases. A more recent paper by Yan (2008) confirmed the inverse relationship between fund size and fund performance as well as

the increased magnitude of this effect observed in less liquid portfolios. Yan also found a more pronounced negative relationship among growth and high turnover funds, which the author suggests have higher demands for immediacy. Likewise, Adams, Mansi, and Nishikawa (2009) find an inverse relationship between fund size and mutual fund performance.

Pollet and Wilson (2008) note the tendency of both large- and small-cap funds with growing assets to respond by diversifying their portfolios. The authors found a positive and significant relationship between this diversification and fund performance; the relationship was especially pronounced at small-cap funds. As fund families grow, they tend to introduce new funds that differ in their holdings, thus increasing the fund family's overall level of portfolio diversification. This may explain why fund returns do not diminish as the size of the fund family increases. In fact, one study finds that funds belonging to larger fund families tend to outperform peers (Chen et al., 2004).

### *2.6.3. Factors Affecting Small-Cap Funds*

Banz (1981) finds that smaller firms tend to have higher risk-adjusted returns than both larger and average-sized ones, suggesting that the capital asset pricing model may be misspecified. Lustig and Leinbach (1983) also find abnormal returns among smaller firm stocks. They argue that these abnormal returns would most likely disappear if the opportunity cost of obtaining information about small cap stocks was factored into the purchase price.

A number of others have attempted to explain the superior investment returns generated by small companies. Using small firm mutual fund data, Isberg and Thies find evidence suggesting that the small firm effect may be due to higher transaction costs, including a wider bid-ask spread. Roll (1981), however, suggests that the higher risk-adjusted returns of small firm stocks are stems from bias in beta estimation due to the auto-correlation of portfolio returns that results from infrequent trading. While Reinganum (1982) does find evidence of bias in beta estimation, the bias appears too small to explain the small firm effect.

Arbel and Strebel (1982) suggest that the “neglected firm effect” may offer a better explanation for the superior returns observed among small firms. Specifically, the authors find superior performance among firms whose securities are covered by fewer analysts. Their study was conducted at a time when analyst coverage was more commonplace than it is now.

### **3. Data**

This paper will utilize cross-section data for the approximately 800 mutual funds listed in the May 2009 Value Line No-Load Fund Advisor Mutual Fund Directory. This data set was selected primarily because it presents a large listing of U.S. mutual funds with similar characteristics in one easily-accessible online directory, and thus reduces the heterogeneity of the sample data set.

Data for each fund on the number of directors, number of insiders on board, as well as data on whether the CEO is on the board, the CEO is the Chairman, the CFO is on the board, the founder is the Chairman, or the founder is on the board was hand-collected from Semi-Annual N-CSRS (Certified Shareholder Report) and 485 BPOS (Prospectus) filings. Data on expense ratios, management fees, and average monthly total net assets for the period 2006-2009 are obtained from the CRSP Survivor-Bias-Free US Mutual Fund Database.<sup>1</sup>

Data on annual fund returns and 5-year beta coefficients tracking the period February 28, 2006, to February 28, 2011, are taken from Morningstar.com. Returns and beta coefficients are both category-adjusted to account for differences in investment style and to yield a simple measure of objective-adjusted excess returns and risk. Funds in this data set fall into 25 Morningstar categories.

Data on managerial ownership as of February 28, 2011 is taken from Morningstar.com's FundSpy database. A complete directory of filings for all funds is available at the SEC's EDGAR online database. Managerial ownership for each fund

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<sup>1</sup> I appreciate the generosity of Elif Sisli Ciamarra (Brandeis University) and Abigail Hornstein in making this data available to me for my thesis research.

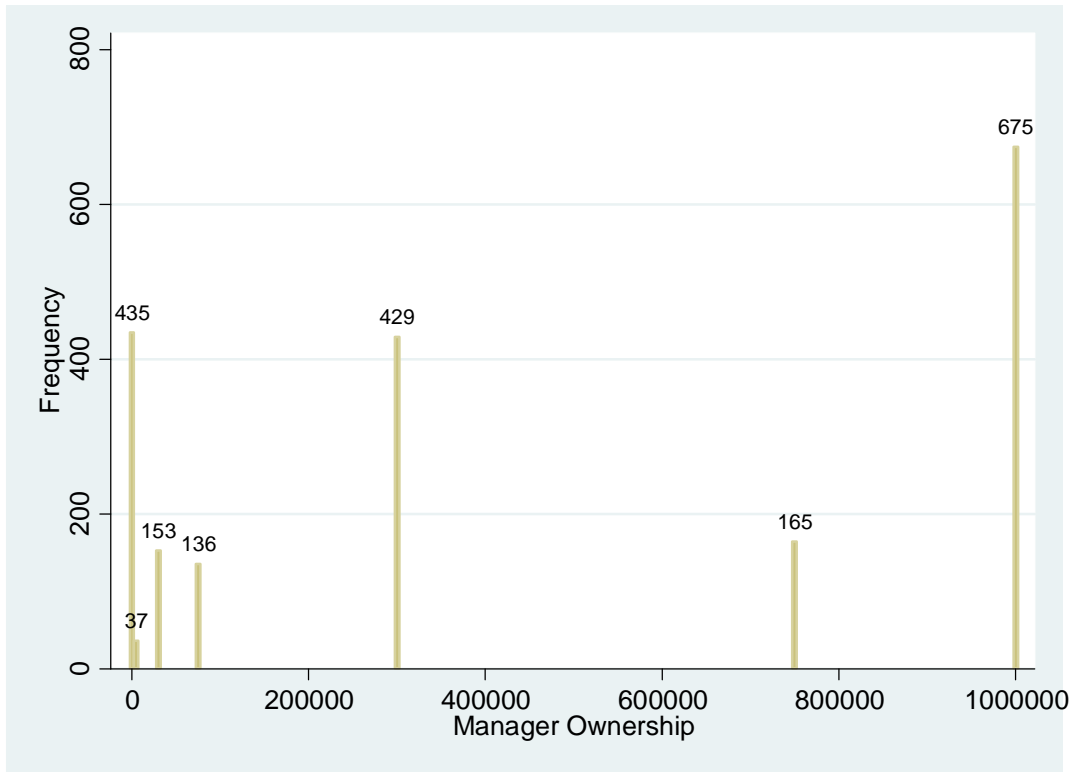


is reported as lying within one of the following bands: \$0; \$1-\$10,000; \$10,001-\$50,000; \$50,001-\$100,000; \$100,001-\$500,000; \$500,001-\$1,000,000; and over \$1,000,000. Obviously, these bands are not evenly spaced and, additionally, there may be a significant difference in ownership within a single band; e.g., a fund manager who owns \$500,001 and a manager who owns \$1,000,000 are both reported within the same band. Furthermore, for managers with over \$1,000,000 invested, it is impossible to determine by how much their investment exceeds \$1,000,000.

The mean ownership stake for the fund managers in this study is \$464,249, while the average fund has approximately \$4.19 billion in assets under management; thus, the average fund manager holds an ownership stake of approximately .01%. This finding is consistent with other studies (Khorana et al., 2007) that have found managerial equity ownership to comprise a very low percentage of the overall fund (their study finds that, on average, managerial ownership comprises between .04 and .08% of the fund's assets). However, the average owner in this data set is significantly more invested in his own fund than the average manager in Khorana et al.'s sample, which found average fund manager ownership of between \$97,000 and \$150,000. Table 2, located at the end of this thesis, presents summary statistics for the fund sample.

The managerial ownership distribution is relatively bifurcated. Of the 2030 observations in the sample, 435 are zero management ownership and 675 are ownership over \$1,000,000. The frequencies of the different ownership stakes (taken as midpoints of the respective ownership ranges) are presented in the figure below:

Figure 1



This figure shows that there are substantial differences in fund performance and governance, and supports the hypothesis that these differences may be related to ownership stakes.

Though Kummlin and Puttonen’s study of Finnish funds (2009) measured portfolio managers’ stake in their own fund(s) as a percentage of their total taxable wealth, it is impossible to do so in this study because information on portfolio managers’ wealth is not publicly disclosed in the United States.

## **4. Methodology**

This paper utilizes a simple ordinary least squares (OLS) regression model similar to the model employed by Khorana et al. (2007). The dependent variable measuring performance is the fund's annual return less the average return of its respective fund category as defined by Morningstar.com. The dependent variable is thus a simple measure of category-adjusted excess returns. This is an imperfect measure of abnormal returns, however, because it leaves open the possibility that funds within a given category may vary widely in the amount of risk they assume. For this reason, the model controls for the fund's excess beta relative to its category, derived by taking the fund's 5-year beta coefficient and subtracting the beta coefficient of the fund category.

Because managerial ownership is disclosed in bands, this paper will assign values to ownership levels by assuming ownership is equal to the midpoint of the reported band (e.g., a manager reported as having invested between \$10,001 and \$50,000 would be assigned an ownership value of \$30,000 and a manager with reported ownership between \$50,001 and \$100,000 would be assigned an ownership value of \$75,000).

Fund manager ownership is as of February 28, 2011, even though fund returns are for the years 2006-2009. This differs from the methodology employed by Khorana et al. (2007), which attempts to explain returns as a function of lagged ownership. This paper's methodology is thus more similar to that of Evans (2008) which regressed returns over the period 2001 to 2004 against 2005 ownership and assumes that ownership remained unchanged over the entire 2001 to 2005 period.

Like Evans, this paper argues that this convention should not significantly alter results for several reasons. First, because the reporting bands are quite broad, it appears unlikely that many managers would change their ownership by enough to move into a different band. Furthermore, because it is possible that managers either increase ownership by enough to move into a higher band or decrease ownership by enough to move into a lower band, this paper makes the simplifying assumption that the mean of the error terms is approximately 0.

On the other hand, if there is important time variation in the managerial ownership measure, it may be inappropriate to use it as an independent variable seeking to explain excess returns in a prior year. If this variable is biased upwards as managers increase their ownership stake over time, then I would be less likely to find a significant impact of ownership. It is difficult to argue the counterfactual that managers would decrease their stake over time, as such action may be interpreted within the fund as a manager's lack of confidence in their own strategy, and would thus likely lead to the manager's termination.

Other independent variables are as follows: board size, percentage of board members who are insiders, number of funds within the fund family, average total net assets under management, management fee, and expense ratio. Also included are dummy variables to indicate whether the CEO is a member of the board, whether the CEO is Chairman, whether the CFO is a member of the board, whether the founder is a member of the board, and whether the founder is Chairman. Thus, this paper controls for risk-taking, portfolio manager ownership stake, and board characteristics. The baseline regression model is estimated as follows:

$$\begin{aligned}
\text{excess\_return}_{p,t} = & \beta_0 + \beta_1 \text{ownership}_{p,t} + \beta_2 \text{catexcbeta}_{p,t} + \beta_3 \text{beta}_{p,t} + \beta_4 \text{exp\_ratio}_{p,t} + \\
& \beta_5 \text{fund\_size}_{p,t} + \beta_6 \text{fund\_age}_{p,t} + \beta_7 \text{board\_size}_{p,t} + \beta_8 \text{insider\_}\%_{p,t} + \beta_9 \text{year}_{p,t} + \\
& \epsilon_{pt}
\end{aligned}$$

All error terms are normal i.i.d. Because the error terms may be clustered across funds within a family, all error terms are clustered at the fund family level.

Because the corporate finance literature has showed entrenchment for managers with medium-levels of ownership, this paper will attempt to determine whether or not a similar phenomenon exists for managers of mutual funds by comparing the category-adjusted returns of different ownership bins.

This paper also employs a multinomial logit regression model that designates managerial ownership bin as the dependent variable and excess return as an independent variable. In this model, the dependent variable assumes the values of 0-6 depending on whether the fund manager's ownership stakes fall into which of the seven ownership levels. The bin representing no ownership stake is used as the base scenario, thus all regression coefficients can be interpreted as the marginal impact of a particular variable relative to the base scenario, no managerial ownership stake. In this model, the empirical specification is:

$$\begin{aligned}
\text{ownership}_{p,t} = & \beta_0 + \beta_1 \text{excess\_return}_{p,t-i} + \beta_2 \text{catexcbeta}_{p,t-i} + \beta_3 \text{beta}_{p,t-i} + \beta_4 \text{exp\_ratio}_{p,t-i} \\
& + \beta_5 \text{fund\_size}_{p,t-i} + \beta_6 \text{fund\_age}_{p,t-i} + \beta_7 \text{board\_size}_{p,t-i} + \beta_8 \text{insider\_}\%_{p,t-i} + \\
& \beta_9 \text{year}_{p,t-i} + \epsilon_{pt} .
\end{aligned}$$

The multinomial logit model is used to address the potential problem of endogeneity in the first model, which was discussed above. Ownership stakes were only available for the year 2011 while all other variables were collected in 2006-2009.

## 5. Results

The results of the regression models are presented at the end of this thesis in Tables 3-8.<sup>2</sup> My key results regarding managerial ownership stake are discussed in Section 5.1, and then all control variables are discussed in Section 5.2. In Section 5.3 I present and discuss the results of my multinomial logit tests for robustness.

### 5.1. *Portfolio Manager Ownership*

The baseline regression model (model 1) shows a positive and significant relationship between the dollar value of portfolio manager ownership and category-adjusted excess returns, though the magnitude of the correlation coefficient is relatively small. Specifically, the baseline model finds that a \$10,000 increase in managerial ownership is associated with a 1.69 basis point increase in excess return. This result is significant at the 1% error level.

The finding of a positive and significant relationship between manager ownership and returns is consistent when variables for corporate governance characteristics are included in the model. Model 4, which includes all corporate governance-related variables, shows that a \$10,000 increase in managerial ownership is associated with a 1.92 basis point increase in category-adjusted excess return. This finding is significant at the 1% error level.

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<sup>2</sup> While the R-Squared values for the regressions in this thesis may appear very low, they are actually within the normal range for finance studies. Appendix C presents R-Squared values from other representative studies of mutual funds.

Models 5 through 8, mirror models 1 through 4, but the error terms are clustered by family id. The standard errors are clustered to control for the possibility of correlation among funds managed by the same family. If this technique is appropriate, it will yield smaller estimated standard errors, and that is what I found in my results. As in the first 4 models, models 5 through 8 find that a \$10,000 increase in managerial ownership is associated with an increase in category-adjusted excess returns ranging between 1.69 and 1.92 basis points. All of these findings are significant at the 1% error level.

Models 9 through 16 divide managerial ownership into bins based on the SEC reporting standards. The results of these regressions, which include dummies for only the non-zero bins, show a significant relationship between managerial ownership and returns for only the top 2 bins—ownership between \$500,000 and \$1 million and ownership greater than \$1 million. For these bins, the relationship is positive and significant at the one percent error level, a result that is confirmed when error terms are clustered by fund family id in models 13 through 16. Model 10 finds ownership bins 3 and 4—ownership between \$50,001 and \$100,000 and ownership between \$100,001 and \$500,000—to be positively and significantly correlated with returns, but this finding is not replicated in any other models.

Models 17 through 20 include a dummy variable for zero manager ownership. All of these models find that zero portfolio manager ownership is negatively correlated with returns and that this relationship is statistically significant at as low as the 1% error level. Thus, this paper's findings suggest that no ownership and

relatively high levels of ownership have the most statistically negative effect on returns.

All in all, this paper's findings on the relationship between managerial ownership and fund performance are consistent with those of Evans (2008) and Khorana et al. (2007), and contrary to those of Kumlin and Puttonen (2009), which found a negative relationship between ownership and portfolio manager performance.

## 5.2. *Other Variables*

Regression models 1-4 find a positive relationship between category-adjusted excess beta and excess returns. This result is significant at the 5% error level, and is consistent with financial theory, which predicts that fund managers who take on more risk than their intra-category competitors should be rewarded with greater returns. However, the positive relationship between beta and excess return disappears when the error terms are clustered by fund family id, as in regression models 5-8. The positive and significant relationship between excess returns and category excess beta is again observed when ownership is measured by SEC disclosure bin (models 9-12). This time, the result holds when error terms are clustered by family id (models 13-16). Finally, models 17-20, which include a dummy variable for zero ownership, show a positive and significant relationship between excess return and excess beta, when error terms are not clustered by family id.

Interestingly, every regression model in this study that includes a variable for board independence finds a positive relationship between excess returns and the percentage of insiders on the board. In other words, this study finds that *less*



independent boards are associated with better performance. The SEC enacted the ruling requiring that boards be at least 75% independent in the hopes that it would mitigate conflicts of interest and improve fund performance. Several studies have found evidence of better performance by funds with more independent boards (e.g., Wermers and Ding, 2005). However, several studies of the mutual fund industry have also shown no relationship between board independence and performance (e.g., Ferris and Yan, 2007). While it would be a stretch to conclude that performance is negatively related to board independence, this study does appear to add credence to the idea that the relationship between performance and board independence remains ambiguous. As other studies have suggested, this may arise from the fact that day-to-day management of the fund is entrusted to the portfolio manager, while boards are only charged with deciding whether or not to renew the fund adviser contracts. On the other hand, this result in no way supports or refutes the SEC's requirement that boards be at least 75% independent; this result simply suggests that there may be negative effects of a board being *too* independent (e.g., 100%).

This paper finds no consistent relationship between performance and fund age, suggesting that longer-established funds do not display a competitive edge.

A number of studies have found an inverse relation between performance and fund size (e.g., Yan, 2008, and Adams et al., 2009). The regression results of all models in this study find that performance and fund size are negatively correlated. However, this relationship is not significant in many of the models. This paper also finds no relationship between performance and fund family size, as measured by number of funds in the fund family. This is consistent with a number of studies that

have shown no decline in performance as the size of the fund family increases (e.g., Chen et al., 2004, and Pollett and Wilson, 2008).

While all regression models in this study find a negative relationship between performance and CEOs serving as board members or chairmen, none of the observed coefficients are significant.

All in all, the findings of this paper are consistent with those of Khorana et al. (2007) who find no relationship between fund performance and non-ownership related governance mechanisms.

### 5.3. *Multinomial Logit Model Robustness Tests*

This set of regressions designates managerial ownership as the dependent variable. In this multinomial logit regression, all coefficients should be interpreted as the probability of a fund having a particular ownership level vs. having an ownership level of zero (the base case). When managerial ownership level is designated as the dependent variable, no relationship is observed between excess returns and ownership bin except for the top two bins. Specifically, higher excess returns are associated with fund manager ownership over \$500,000. This suggests that managerial ownership level is not dependent on excess returns except for very high levels of ownership.

Lower excess beta is associated with ownership in the top bin. This result is significant at the 5% error level and suggests that managers who are more heavily invested in their own fund tolerate less risk.

Less independent boards are inversely related to portfolio manager ownership in the bottom 2 ownership bins and positively related to ownership in the top 4 bins. However, these relationships are not uniformly significant.

Management fees are positively related to ownership over \$1,000,000 and this result is significant at the 1% error level. This suggests that fund managers with very high levels of ownership charge higher management fees. The nature of this relationship has not been established however. It could be that charging a higher management fee makes fund managers feel obligated to increase their ownership stake. On the other hand, managers with very high ownership levels in their own funds may demand higher management fees for their increased skin in the game.

## **6. Conclusion**

The observed relationship between portfolio manager ownership and fund performance is consistent with the hypothesis that more skin in the game increases the alignment of fund managers' interests with those of their shareholders. It also suggests that, leaving aside questions of privacy, the SEC disclosure requirements are valuable to the investment community because they carry predictive power regarding fund performance.

The findings of this paper along with other studies of U.S. funds raise the question of whether regulators should require portfolio managers to maintain a minimum level of investment in their own funds at a time when capital requirements are at the center of post-financial crisis discussions of banking regulation. Since this paper's findings indicate that fund performance is most enhanced at ownership levels above \$500,000, perhaps regulators should consider requiring managerial equity ownership of at least \$500,000. It is not likely that such a requirement would place an undue burden on portfolio managers with significant tenure at their funds. A survey by the CFA institute found that the average portfolio manager earns between \$176,000 and \$310,000 per year (cited in Khorana et al., 2007).

One issue with this paper's methodology is that it fails to determine the direction of causality. It is unclear whether better fund performance causes managers to increase their ownership stake, consistent with Berk and Green's hypothesis that better past performance increases fund inflows, or whether, on the contrary, better performance is a product of the increased alignment, resulting from higher levels of

managerial equity ownership. Resolving this issue, perhaps via identification of an instrumental variable, would be a useful modification.

The findings of this paper could also be improved upon in the future by adding several variables to the regression model. First, the level of managerial ownership could be adjusted to account for manager tenure as well as the number of managers at the fund. In addition, variables could be added for manager characteristics, such as those studied by Chevalier and Ellison (1999), including age, quality of undergraduate institution, and educational attainment. Another important variable may be portfolio turnover. Because substantial fund turnover adds to administrative costs, and one would expect that managers who are more heavily invested in their own funds and thus more affected by those costs should be expected to minimize fund turnover.

The results of studies on this topic are likely to become more robust as the body of data on fund manager ownership grows over time. At present, the disclosure requirement has only been in place for six years and the data remains very difficult to collect by hand. With the passage of time, however, better data sets can be expected to yield more robust results.

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Table 1. Morningstar Styles of Funds in Dataset

<b><u>Category</u></b>	<b><u>Symbol</u></b>
Aggressive Allocation	AL
Conservative Allocation	CA
Consumer Staples	CC
Convertibles	CV
Equity Energy	EE
Foreign Large Blend	FB
World Allocation	IH
Large Blend	LB
Large Growth	LG
Long-Short	LO
Large Value	LV
Moderate Allocation	MA
Mid-Cap Blend	MB
Mid-Cap Growth	MG
Mid-Cap Value	MV

Small Blend	SB
Communications	SC
Health	SH
Natural Resources	SN
Equity Precious Metals	SP
Real Estate	SR
Technology	ST
Utilities	SU
Target Date 2000-2010	TA
World Stock	WS

Table 2. Summary Statistics

<b>Variable</b>	<b>Obs</b>	<b>Mean</b>	<b>Std. Dev.</b>	<b>Min</b>	<b>Max</b>
Excess Return	1,668	1.345	7.917	-33.45	66.62
Manager Ownership	2,030	464249.1	426920.2	0	1,000,001
Excess Beta	1,843	.069	.690	-7.48	6.76
Expense Ratio	1,750	.010	.004	0	.030
Management Fee	1,750	.687	.289	0	2.029
Fund Size	1,751	4190.407	9285.951	5.05	89,887.39
Number of Directors	1,724	8.706	2.630	3	16
Insiders on Board	1,720	1.727	.956	0	5
Fund Family Size	1,645	177.416	210.658	1	628
Fund Age	1,752	19.962	15.509	0	85
Ownership %	1,702	.001	.005	0	.120
Insider %	1,720	.204	.112	0	.625



Table 3. Results of Main OLS Regression Model

	(1)	(2)	(3)	(4)
	Excess Return	Excess Return	Excess Return	Excess Return
Manager Ownership	0.00000169*** (0.000000492)	0.00000178*** (0.000000507)	0.00000186*** (0.000000533)	0.00000192*** (0.000000535)
Expense Ratio	41.64 (73.33)	49.78 (75.82)	39.35 (77.84)	31.24 (80.10)
Management Fee	-0.924 (1.053)	-0.997 (1.116)	-0.882 (1.150)	-0.804 (1.167)
Excess Beta	0.746** (0.319)	0.819** (0.335)	0.816** (0.337)	0.796** (0.337)
Fund Age	-0.00663 (0.0136)	-0.0126 (0.0140)	-0.0116 (0.0144)	-0.0102 (0.0144)
Fund Size	-0.0000312 (0.0000232)	-0.0000314 (0.0000236)	-0.0000288 (0.0000243)	-0.0000335 (0.0000245)
Board Size		0.931 (0.636)	0.782 (0.755)	0.997 (0.766)
Insider %		4.237** (1.800)	4.192** (1.819)	5.997*** (2.153)
Fund Family Size			0.000201 (0.00122)	0.00104 (0.00136)
CEO on Board				-0.707 (0.576)
CEO is Chairman				-0.314 (0.622)
Year Fixed Effects	Yes	Yes	Yes	Yes
Constant	0.829 (0.776)	-2.034 (1.686)	-1.774 (1.769)	-2.166 (1.778)
$R^2$	0.0123	0.0178	0.0188	0.0210
N	1633	1571	1489	1477

Standard errors in parentheses

\*  $p < .10$ , \*\*  $p < .05$ , \*\*\*  $p < .01$

Table 4. Results of Main OLS Regression Model with Error Terms Clustered by Fund Family ID

	(5)	(6)	(7)	(8)
	Excess Return	Excess Return	Excess Return	Excess Return
Manager Ownership	0.00000169*** (0.000000435)	0.00000178*** (0.000000466)	0.00000186*** (0.000000506)	0.00000192*** (0.000000496)
Expense Ratio	41.64 (59.60)	49.78 (61.59)	39.35 (66.52)	31.24 (69.49)
Management Fee	-0.924 (0.952)	-0.997 (0.964)	-0.882 (1.006)	-0.804 (1.084)
Excess Beta	0.746 (0.456)	0.819* (0.487)	0.816 (0.495)	0.796 (0.487)
Fund Age	-0.00663 (0.00877)	-0.0126 (0.00856)	-0.0116 (0.00917)	-0.0102 (0.00872)
Fund Size	-0.0000312** (0.0000126)	-0.0000314** (0.0000153)	-0.0000288* (0.0000153)	-0.0000335** (0.0000135)
Board Size		0.931 (0.571)	0.782 (0.679)	0.997 (0.666)
Insider %		4.237*** (1.416)	4.192*** (1.484)	5.997*** (1.992)
Fund Family Size			0.000201 (0.000614)	0.00104 (0.000814)
CEO On Board				-0.707 (0.582)
CEO is Chairman				-0.314 (0.483)
Year Fixed Effects	Yes	Yes	Yes	Yes
Constant	0.829* (0.434)	-2.034 (1.453)	-1.774 (1.548)	-2.166 (1.532)
$R^2$	0.0123	0.0178	0.0188	0.0210
N	1633	1571	1489	1477

Standard errors in parentheses  
 \*  $p < .10$ , \*\*  $p < .05$ , \*\*\*  $p < .01$

Table 5. Results of OLS Regression with Ownership Measured by Bin

	(9)	(10)	(11)	(12)
	Excess Return	Excess Return	Excess Return	Excess Return
\$1-10,000	-0.805 (0.534)	-0.697 (0.526)	-0.694 (0.547)	-0.493 (0.484)
\$10,001-50,000	-0.662 (0.904)	-0.932 (0.952)	-1.273 (1.017)	-1.264 (1.030)
\$50,001-100,000	1.073* (0.639)	0.964 (0.648)	1.032 (0.664)	1.029 (0.658)
\$100,001-500,000	0.956* (0.488)	0.788 (0.511)	0.683 (0.534)	0.785 (0.521)
\$500,001-1,000,000	2.329*** (0.543)	2.285*** (0.544)	2.356*** (0.603)	2.403*** (0.583)
>\$1,000,000	1.546*** (0.507)	1.560*** (0.526)	1.571*** (0.560)	1.650*** (0.548)
Expense Ratio	32.75 (55.94)	39.21 (57.49)	22.21 (63.40)	14.84 (66.59)
Management Fee	-0.764 (0.940)	-0.790 (0.941)	-0.650 (0.992)	-0.581 (1.068)
Fund Size	-0.0000264* (0.0000141)	-0.0000277 (0.0000168)	-0.0000259 (0.0000167)	-0.0000305** (0.0000150)
Excess Beta	0.747* (0.449)	0.825* (0.476)	0.830* (0.480)	0.814* (0.473)
Fund Age	-0.00914 (0.00798)	-0.0149** (0.00753)	-0.0146* (0.00801)	-0.0133* (0.00764)
Board Size		0.963 (0.593)	0.916 (0.679)	1.126* (0.658)
Insider %		3.703** (1.447)	3.582** (1.528)	5.322** (2.076)
Fund Family Size			0.0000314 (0.000635)	0.000819 (0.000829)
CEO on Board				-0.725 (0.570)
CEO is Chairman				-0.252 (0.484)
Year Fixed Effects	Yes	Yes	Yes	Yes
Constant	0.677 (0.492)	-2.057 (1.355)	-1.825 (1.412)	-2.233 (1.359)
$R^2$	0.0153	0.0207	0.0224	0.0247
N	1653	1591	1509	1497

Standard errors in parentheses

\*  $p < .10$ , \*\*  $p < .05$ , \*\*\*  $p < .01$

*Table 6. Results of OLS Regression with Ownership Measured by Bin and Error Terms Clustered by Family ID*

	(13)	(14)	(15)	(16)
	Excess Return	Excess Return	Excess Return	Excess Return
\$1-10,000	-0.805 (0.534)	-0.697 (0.526)	-0.694 (0.547)	-0.493 (0.484)
\$10,001-50,000	-0.662 (0.904)	-0.932 (0.952)	-1.273 (1.017)	-1.264 (1.030)
\$50,001-100,000	1.073* (0.639)	0.964 (0.648)	1.032 (0.664)	1.029 (0.658)
\$100,001-500,000	0.956* (0.488)	0.788 (0.511)	0.683 (0.534)	0.785 (0.521)
\$500,001-1,000,000	2.329*** (0.543)	2.285*** (0.544)	2.356*** (0.603)	2.403*** (0.583)
>\$1,000,000	1.546*** (0.507)	1.560*** (0.526)	1.571*** (0.560)	1.650*** (0.548)
Expense Ratio	32.75 (55.94)	39.21 (57.49)	22.21 (63.40)	14.84 (66.59)
Management Fee	-0.764 (0.940)	-0.790 (0.941)	-0.650 (0.992)	-0.581 (1.068)
Fund Size	-0.0000264* (0.0000141)	-0.0000277 (0.0000168)	-0.0000259 (0.0000167)	-0.0000305** (0.0000150)
Excess Beta	0.747* (0.449)	0.825* (0.476)	0.830* (0.480)	0.814* (0.473)
Fund Age	-0.00914 (0.00798)	-0.0149** (0.00753)	-0.0146* (0.00801)	-0.0133* (0.00764)
Board Size		0.963 (0.593)	0.916 (0.679)	1.126* (0.658)
Insider %		3.703** (1.447)	3.582** (1.528)	5.322** (2.076)
Fund Family Size			0.0000314 (0.000635)	0.000819 (0.000829)
CEO on Board				-0.725 (0.570)
CEO is Chairman				-0.252 (0.484)
Year Fixed Effects	Yes	Yes	Yes	Yes
Constant	0.677 (0.492)	-2.057 (1.355)	-1.825 (1.412)	-2.233 (1.359)
$R^2$	0.0153	0.0207	0.0224	0.0247
N	1653	1591	1509	1497

Standard errors in parentheses  
 \*  $p < .10$ , \*\*  $p < .05$ , \*\*\*  $p < .01$

Table 7. Results of OLS Regression with Dummy Variable for Zero Portfolio Manager Ownership

	(17)	(18)	(19)	(20)
	Excess Return	Excess Return	Excess Return	Excess Return
No Ownership	-1.126** (0.510)	-1.126*** (0.408)	-1.021* (0.548)	-1.021** (0.436)
Expense Ratio	41.80 (72.94)	41.80 (59.08)	33.38 (79.80)	33.38 (68.53)
Management Fee	-0.333 (1.028)	-0.333 (0.928)	-0.335 (1.153)	-0.335 (1.081)
Excess Beta	0.729** (0.319)	0.729 (0.455)	0.765** (0.337)	0.765 (0.482)
Fund Age	-0.00696 (0.0136)	-0.00696 (0.00840)	-0.0108 (0.0144)	-0.0108 (0.00838)
Fund Size	-0.0000124 (0.0000221)	-0.0000124 (0.0000103)	-0.00000914 (0.0000231)	-0.00000914 (0.00000955)
Board Size			0.974 (0.760)	0.974 (0.673)
Insider %			5.756*** (2.148)	5.756*** (2.072)
Fund Family Size			0.000168 (0.00133)	0.000168 (0.000894)
CEO on Board			-0.696 (0.574)	-0.696 (0.623)
CEO is Chairman			-0.219 (0.618)	-0.219 (0.505)
Year Fixed Effects	Yes	Yes	Yes	Yes
Constant	1.370* (0.779)	1.370*** (0.414)	-1.283 (1.757)	-1.283 (1.536)
$R^2$	0.00816	0.00816	0.0149	0.0149
N	1653	1653	1497	1497

Standard errors in parentheses

\*  $p < .10$ , \*\*  $p < .05$ , \*\*\*  $p < .01$

*Table 8. Multinomial Logit Regression with Managerial Ownership Designated as Dependent Variable*

	(1)					
	own_logit					
	1	2	3	4	5	6
Excess Return	-0.0177 (0.0285)	-0.0224 (0.0159)	0.0186 (0.0155)	0.0161 (0.0111)	0.0382** (0.0135)	0.0276** (0.00994)
Excess Beta	-0.539 (0.370)	0.121 (0.147)	-0.116 (0.171)	-0.451** (0.156)	-0.147 (0.169)	-0.452** (0.141)
Expense Ratio	-60.33 (80.00)	-4.478 (45.34)	83.26 (43.90)	51.20 (32.15)	114.4** (39.08)	19.84 (30.64)
Management Fee	0.310 (1.190)	-1.083 (0.678)	-1.216 (0.664)	-0.422 (0.479)	0.101 (0.600)	1.570*** (0.442)
Fund Size	-0.000239 (0.000160)	-0.000155** (0.0000598)	0.0000892** (0.0000333)	-0.0000232 (0.0000342)	0.000131*** (0.0000307)	0.000189*** (0.0000270)
Fund Age	-0.0421 (0.0259)	-0.00403 (0.00960)	0.0303*** (0.00734)	0.0173** (0.00636)	0.0102 (0.00845)	0.0112 (0.00612)
Board Size	-0.862 (0.649)	1.452*** (0.441)	-0.596 (0.411)	-0.993*** (0.284)	0.0883 (0.407)	-1.106*** (0.261)
Insider %	-7.342* (2.967)	-0.120 (1.300)	2.938* (1.143)	1.106 (0.859)	3.884*** (1.094)	0.694 (0.793)
CEO on Board	2.368*** (0.661)	-0.158 (0.368)	0.432 (0.317)	1.046*** (0.237)	0.645* (0.299)	0.501* (0.209)
CEO is Chairman	-0.649 (0.542)	0.604 (0.356)	-0.268 (0.333)	0.0627 (0.235)	-0.268 (0.304)	-0.420 (0.226)
Year Fixed Effects	Yes	Yes	Yes	Yes	Yes	Yes
Constant	0.607 (1.511)	-3.313** (1.058)	-1.383 (1.005)	0.738 (0.687)	-4.006*** (1.037)	0.594 (0.635)
Pseudo R <sup>2</sup>	0.104					
Chi-squared	539.0					
p-value of Chi-squared	0.000					

Standard errors in parentheses

\*  $p < 0.05$ , \*\*  $p < 0.01$ , \*\*\*  $p < 0.001$

## Appendix A

### Glossary of Commonly-Used Mutual Fund Terms

**Beta-** a measure of the volatility of a fund's returns compared to the overall market. Beta is a key component of the capital asset pricing model (CAPM).

**Category-Adjusted Excess Beta-** the fund's beta minus the average beta of its Morningstar category

**Category-Adjusted Excess Return-** the fund's return minus the average return of its Morningstar category

**Expense Ratio-** a fund's total annual operating expenses (including management fees, distribution (12b-1) fees, and other expenses) as a percentage of average net assets under management.

**Fund Adviser-** companies independent of the mutual fund company that employ portfolio managers

**Insider-** a member of the mutual fund board that is affiliated with the fund adviser

**Load-** the sales charge investors must pay when they purchase or redeem shares in a mutual fund

**Management Fee-** fee paid to the fund's investment adviser

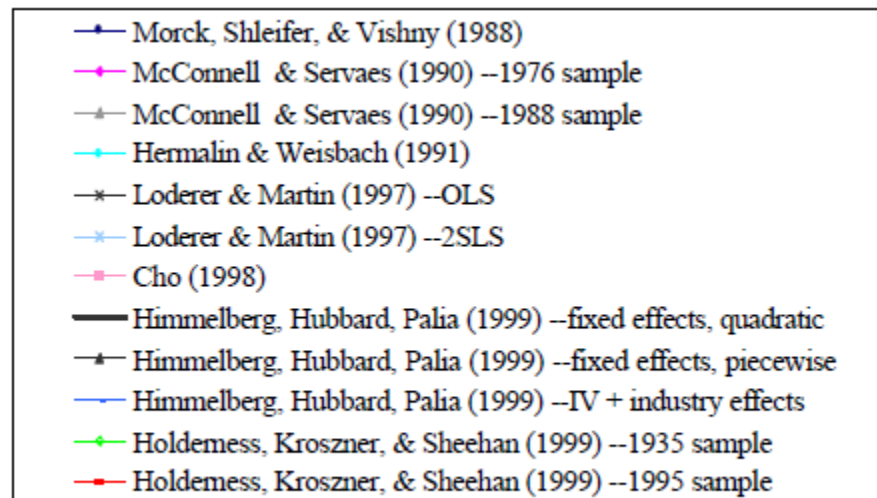
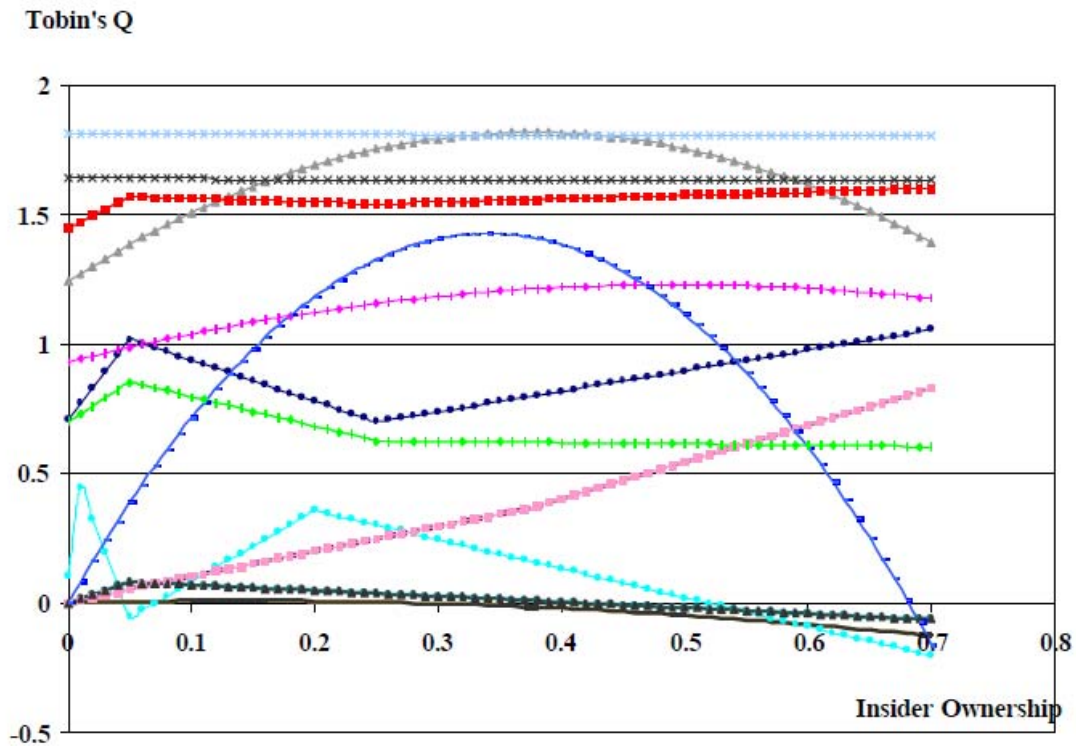
**Net Asset Value (NAV)-** a fund's assets minus its liabilities. Often reported on a per-share basis by dividing NAV by the total number of shares.

**No-Load Fund-** a fund that does not charge a sales load

**Statement of Additional Information-** section of the annual report in which portfolio manager ownership is reported

## Appendix B

### Results and Methodologies of Several Representative Studies on Ownership and Firm Performance



(Credit to Demsetz and Villalonga, 2001)



## Appendix C

### R-Squared Values from Several Representative Mutual Fund Studies

<u>Study</u>	<u>Range of R-Squared Values Reported in Main Table</u>
Chevalier and Ellison, 1999	.02-.03
Khorana et al., 2007	.01-.04
Khorana et al., 2009	.05-.28
Evans, 2008	.037-.048