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Directors' Ownership in the U.S. Mutual Fund Industry

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ABSTRACT

This paper empirically investigates directors' ownership in the mutual fund industry. Our results show that, contrary to anecdotal evidence, a significant portion of directors hold shares in the funds they oversee. Ownership patterns are broadly consistent with an optimal contracting equilibrium. That is, ownership is positively and significantly correlated with most variables that are predicted to indicate greater value from directors' monitoring. For example, directors' ownership is more prevalent in actively managed funds and in funds with lower institutional ownership. We also show considerable heterogeneity in ownership across fund families, suggesting family-wide policies play an important role.

ABOUT HALF OF ALL HOUSEHOLDS in the United States invest in open-end mutual funds. When buying shares in a mutual fund, investors delegate the management of their investment to fund managers (or advisers), hoping to benefit from their skills and experience in large-scale portfolio management. As in all principal-agent settings, conflicts of interest may emerge between the principal (in this case, fund investors) and the agent (in this case, fund managers), with the agent taking actions that may go against the interests of the principal. Examples of investor-manager conflicts in mutual funds are provided by Mahoney (2004) and Tkac (2004). They range from issues of effort allocation to cases of fraudulent behavior such as the market timing and late trading charges that surfaced in 2003.

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Several monitoring mechanisms exist to mitigate agency problems between investors and managers in mutual funds. Among them, the right of fund shareholders to redeem their shares at net asset value is perceived to be an important tool in disciplining managers.[1] Despite its importance, however, this tool is incomplete for two reasons. First, redemption is not an easy choice as shareholders may be locked into their positions due to sales loads, redemption fees, capital gains taxes, or simply because they want to continue to benefit from the fund's style or performance.[2] Second, even if redemption itself is costless, knowing when to redeem requires investors to continuously keep track of managers' actions, which can be very costly, particularly for the majority of mutual fund investors who lack financial expertise. In fact, it is well documented that fund flows are not very sensitive to funds' poor performance. In a recent study, Johnson (2006) concludes that monitoring by existing shareholders is incomplete based on his finding that existing shareholders do not redeem more following bad performance.

Another important role in mitigating the agency problem in mutual funds is played by boards of directors. Mutual fund directors have explicit duties to ensure that fund advisors act in the interests of fund shareholders. Some believe that the reliance on directors as monitors is stronger in mutual funds than in regular corporations (e.g., Phillips (2003)), partly because while corporate directors often have other roles (such as advising management on strategic decisions), the main role of mutual fund directors is to monitor. A few recent papers (e.g., Tufano and Sevick (1997), Del Guercio, Dann, and Partch (2003), and Khorana, Tufano, and Wedge (2005)) study the role of directors in the fund industry, and show their effect on funds' decisions and performance.

Despite the large interest in mutual fund directors, little is known about the incentives provided to them to perform their monitoring role. Economic theory suggests that ownership of shares in the funds they oversee is important for these incentives to develop. This view is also often heard in policy circles.[3] Yet, not much is known about the actual ownership of mutual fund directors.[4] In this study, we attempt to fill this gap. Specifically, we provide evidence on both the prevalence and the magnitude of directors' ownership for a sample of more

[1] Shareholders in regular corporations do not have this right, since they need to sell their shares at a price which is likely to reflect the problem with the management.

[2] The fact that a fund has good performance does not necessarily mean that managers behave in the best interest of shareholders. Skilled managers may take actions against shareholders' interests, using the fact that shareholders will be reluctant to redeem their shares. In such cases, monitoring that does not involve redemption may be required.

[3] For example, a Statement of SEC Staff Opinion writes that "the staff believes that effective fund governance can be enhanced when funds align the interests of their directors with the interests of their shareholders. Fund directors who own shares in the funds that they oversee have a clear economic incentive to protect the interests of fund shareholders." (See "Interpretive Matters Concerning Independent Directors of Investment Companies," Investment Co. Act Rel. No. 24083.)

[4] Part of the reason is the difficulty in obtaining the data. Only since 2002 have mutual funds been required to disclose director ownership. Further, these disclosures are buried in the Statement of Additional Information (SAI), from which the data can only be hand collected. See "Mutual Funds' Best-Kept Secret," By Karen Damato, *Wall Street Journal* C1, January 23, 2004.

than 2,400 funds. We analyze the determinants of whether directors own shares in a fund, and of how many shares they hold in a fund.

On the descriptive level, we find that, contrary to anecdotal evidence, about two-thirds of directors hold shares in the funds they oversee.[5] The all-sample average dollar amount of holding for a single director-fund pair is about $14,000. The average of total holdings for a director (in all sample funds she oversees) is about $267,000.

In our main analysis of the determinants of director ownership, we find systematic patterns consistent with an optimal contracting equilibrium in that directors' ownership is more prominent in funds where their monitoring effort is expected to generate greater value to shareholders. Specifically, we relate directors' ownership to three different categories of fund characteristics that capture the benefits to shareholders from the directors' monitoring effort. The first category contains variables related to a fund's investor clientele. If a fund's investor clientele is more sophisticated, so that shareholders can monitor the managers themselves, then less monitoring by directors is needed. The second category contains variables that reflect the fund's asset style. When the assets held by the fund are more risky and/or are more difficult to obtain information on, managers can abuse their discretion more easily, and thus more monitoring by directors is required. The third category contains variables that reflect whether the fund is actively managed or not. The idea is that managers in actively managed funds have more flexibility in taking actions against the interests of shareholders, and thus may require more monitoring.

In addition to optimal contracting, we consider other forces that may drive directors' ownership patterns. First, directors' ownership may be a result of personal investment decisions. These personal investment choices may reflect performance chasing (i.e., similar to average mutual fund investors, directors invest in funds with superior past performance and do not divest as much from poor performance funds), they may reflect insider information that directors have that predicts future fund returns, or they may simply reflect personal portfolio allocation needs. Relating directors' ownership to fund performance, we do not find significant evidence of performance chasing or insider information. Because personal portfolio allocation needs can go in any direction, it is hard, if not impossible, to refute their presence. However, given that directors are likely to be heterogeneous in their risk preferences and portfolio needs, and that investment in the mutual funds they oversee is just part of their overall portfolio, a priori, portfolio needs are not expected to generate any systematic correlation between ownership and fund characteristics. Second, directors' ownership may be affected by policies at the fund family-level. Indeed, we find that family-wide policies, such as deferred compensation plans, are important in determining ownership.

[5] Anecdotal evidence, as reported in the media, seems to indicate that few fund directors hold shares in their own funds. See "Directors Take, Don't Always Invest—Studies Show Pay Is Rising for the Overseers of Funds, but Some Own No Shares," by Ian McDonald, *Wall Street Journal* D11, April 28, 2004.

Additional analyses on the subsamples of interested and disinterested directors also provide evidence consistent with the view that, in equilibrium, optimal contracting considerations play a significant role in determining directors' ownership.[6] Specifically, we find that more interested directors hold shares, and in higher magnitude than disinterested directors. Further, we find that both groups exhibit similar ownership patterns that are consistent with an optimal contracting equilibrium. This suggests that ownership serves to strengthen monitoring incentives in both groups, even though their roles may be different from each other.

An important remaining question is what market mechanism induces the observed outcome, which is consistent with an optimal contracting equilibrium. One possible mechanism relies on the incentives of fund families. That is, investors care about fund governance and value directors' ownership. As a result, fund families have incentives to induce directors to hold the fund shares in order to maintain and attract more assets to their funds.[7] Of course, fund families are limited in their ability to do so. This is because directors usually sit on many boards and thus cannot hold significant amounts of shares in all funds they oversee. In addition, directors' ownership of mutual fund shares could be costly to them, as it might not fit their portfolio needs, and thus may require the fund family to increase directors' compensation.[8] Thus, fund families may want to induce directors to own more shares in funds where governance is expected to generate more value to shareholders. Another possible mechanism is that the chairman (or other senior member) of the board of directors internalizes the goal of increasing shareholders' value, and thus, being aware of the importance of collective effort in monitoring the managers, induces other directors to commit to monitoring by owning shares when the monitoring effort is of high value. The exact channel behind the observed equilibrium outcome is not observable to us.[9]

In summary, our paper sheds new light on the incentives that directors in the mutual fund industry have to perform their monitoring role. We study the determinants of these incentives, and show that they are consistent with an optimal contracting equilibrium. We also show that the fund family has an

[6] Mutual funds classify a director as a "disinterested" director in accordance with Section 2(a)(19) of the Investment Company Act of 1940. The industry convention is to refer to "disinterested" and "independent" interchangeably. The formal definition of an "independent" director for a mutual fund is different from that for a regular corporation because mutual funds are corporations with no employees (thus all mutual fund directors would be independent under the regular definition based on employment affliation).

[7] Indeed, Zhao (2006) shows that other things equal, funds with higher director ownership received more net fund flows during the first month after the requirement for disclosing directors' ownership information became effective in 2002. Given the exogeneity of the regulatory requirement, her findings clearly suggest the causality from directors' ownership to fund flows. This is also similar to the hedge fund industry where fund managers' personal investment in the funds is often viewed as a critical signal and weighed heavily by potential fund investors.

[8] Indeed, in our data, directors' ownership is positively correlated with compensation.

[9] This feature of our paper is not different from other papers taking an optimal contracting approach.

important effect in determining these incentives. The evidence we provide is consistent with Almazan et al. (2004), who apply the optimal contracting view to interpret their results on the determinants of investment constraints in mutual funds.It is also consistent with the large literature on governance in regular corporations that has applied the optimal contracting view in studying various governance mechanisms (for example, Demsetz and Lehn (1985), Himmelberg, Hubbard, and Palia (1999), and Bushman et al. (2004)).[10]

Our paper is also related to, but distinct from, Yermack (2004) and Bryan and Klein (2004), who study directors' ownership in regular corporations. First, their studies focus on option grants, which do not exist in the mutual fund industry. Second, Yermack's (2004) data set contains only new directors, while Bryan and Klein (2004) do not have ownership data at the individual director level. More importantly, as we argue above, directors' monitoring has a very different nature and different implications in the mutual fund industry. Further, the nature of the industry enables us to get better clarity on the determinants of ownership by choosing a wider range of variables that characterize the benefits from monitoring. In parallel work, Cremers et al. (2006) and Meschke (2006) also study directors' ownership in mutual funds.While our paper focuses on the determinants of ownership, they focus on the effect of ownership (and other board characteristics) on fund fees and returns. We touch on these issues in the penultimate section of our paper. The relation between ownership and future fund performance is overall weak. This is consistent with the optimal contracting hypothesis, according to which ownership is determined optimally in equilibrium, and thus, after controlling for fund characteristics may not affect fund performance (see Himmelberg et al. (1999)).

The remainder of the paper is organized as follows: In Section I, we discuss the institutional background for directors' ownership in the mutual fund industry. Section II develops the hypotheses for the determinants of directors' ownership and describes the variables used in the empirical investigation. Section III describes the data and sample choices. Section IV outlines the empirical framework and describes the main empirical results for the ownership determinants, including the results of various sensitivity checks. In Section V,

[10] See Hermalin and Weisbach (2003) for a detailed discussion of the optimal contracting approach in studying governance for regular corporations. Clearly, one needs to be careful in applying arguments made in the corporate setting to the mutual fund setting. Typically, in the context of a regular corporation, the optimal contracting approach is taken to say that governance mechanisms are chosen optimally to maximize shareholder value, which is summarized by the firm's share price. But, the share price of a mutual fund is largely exogenous and depends on the value of the underlying assets. The key in applying the optimal contracting approach in the mutual fund setting is the fact that the share price only determines the value shareholders get if they withdraw their investment from the fund immediately. If shareholders stay in the fund, the value they expect to get depends on the actions of mutual fund managers (which, according to Kacperczyk, Sialm, and Zheng (2006) vary from fund to fund, and are strongly persistent at the fund level), and on the costs shareholders will have to incur to monitor these actions. Since governance mechanisms, such as directors' ownership, affect both managers' actions and shareholders' monitoring costs, they are expected to affect shareholder value in case shareholders have a positive investment horizon in the fund.

we analyze the performance consequences of directors' ownership. Section VI concludes.

I. Institutional Background

The structure under which investment advisers manage mutual fund investors' money is prone to principal-agent problems. Tkac (2004) provides an excellent review of the conflicts of interest that might arise between mutual fund investors and managers. One type of behavior stems from the fact that managerial compensation depends on the assets under management. As a result, managers may wish to take actions that alter the flow pattern and are counter to shareholders' investment objectives. For example, in order to attract flow, fund managers may take excessive risk hoping to achieve the top performance. Another type of behavior originates from the fact that investment management companies often sponsor and provide fund management services to multiple funds (which are often collectively referred to as a fund complex or a fund family). As a result, they could take actions that benefit some funds/clienteles at the expense of others. The recent scandal whereby advisory firms allowed high-frequency trading in some funds in return for parking assets in other funds is one example of such behavior (see also Gaspar, Massa, and Matos (2006) for evidence of strategic cross-subsidization).

The Investment Company Act of 1940 (and its amendments) regulates the activities of mutual funds. To protect investors against managers' abusive behaviors, the 1940 Act assigns a central role to the board of directors. It requires that each fund be organized as a corporation (or trust) with its own board of directors (or trustees) and prescribes detailed duties for fund directors.[11] Among their duties, directors are required to approve the investment advisory and underwriting contracts, and to oversee transactions involving potential conflicts of interest between investors and their investment adviser. In addition, directors must oversee and monitor the fund's compliance with federal securities laws and its service providers on many different issues, such as the pricing of fund shares. The initial board of directors is usually selected by the sponsor company. It is common for different funds in a fund family to share the same board.[12]

Fund directors are not required by law to own shares in the funds they oversee. Still, some fund families have guidelines for director ownership. A recent document by the Investment Company Institute (ICI) indicates that 14% of fund complexes require fund directors to own shares in funds they oversee during our sample period, and 37% explicitly encourage director ownership.[13] Further,

[11] See, Phillips (2003) and http://www.ici.org/funds/inv/bro_mf_directors.html.

[12] Note that directors of mutual funds are different from directors of mutual fund management companies. For example, Blackrock Money Management sponsored Blackrock Small Cap Value Fund. The fund has its own directors who assume the duty to protect the interest of shareholders (investors) of the fund. Blackrock Money Management, on the other hand, has it own directors to act on the behalf of shareholders of the management company.

[13] See: http://www.ici.org/issues/dir/rpt_fund_gov_practices.pdf.

about 43% of the funds in our sample offer directors the opportunity to buy fund shares via a deferred compensation plan. The tax benefit in such a plan can encourage directors' ownership. Directors may also receive compensation in the form of fund shares as long as a fixed dollar value is assigned to their services prior to the time that the compensation is payable.[14]

Federal securities laws require that funds disclose directors' compensation structure and value in regulatory filings such as the proxy statements. In the amendment to the exemptive rules effective January 15, 2001 (Release Nos. 33-7932; 34-43786), the SEC further requires that funds disclose each director's beneficiary ownership in each fund s/he oversees, and each director's aggregate ownership of all funds that s/he oversees within a fund family in the SAI and any proxy statement relating to the election of directors filed on or after January 31, 2002. However, mutual funds only need to disclose directors' ownership information using dollar ranges rather than the exact dollar amounts as required of regular corporations. The allowed ranges are: None; $1–$10,000; $10,001–$50,000; $50,001–$100,000; or over $100,000. The SEC believes that range disclosures "provide investors with significant information to use in evaluating whether directors' interests are aligned with their own, while protecting directors' legitimate privacy interests."[15]

II. Main Hypotheses and Variable Description

A. Main Hypotheses

Directors' ownership in mutual funds may be determined by various factors. We broadly classify them into three categories. First, as part of optimal contracting, directors' holdings may be concentrated in those funds where their monitoring effort is particularly important. Second, directors' holdings may be a result of personal investment choice. Third, as a result of family-wide policies, directors' ownership may be more prominent in some families than others. We now discuss these factors in more detail.

A.1. Optimal Contracting

Economic theory suggests that directors' ownership of shares in funds they oversee provides directors better incentives to monitor management's actions. This implies a benefit to shareholders from directors' ownership. Following previous papers in the optimal contracting literature (e.g., Demsetz and Lehn (1985) and Himmelberg et al. (1999)), we hypothesize that the benefit increases

[14] This is because federal regulations explicitly prohibit mutual funds from selling fund shares to directors at terms other than those offered to other investors. See, for example, Section 22(g) of the 1940 Act, and House Hearings, supra note 4, at 99 (memorandum of agreement in principle between the Commission and representatives of open-end and closed-end investment companies dated May 13, 1940).

[15] See, "Role of Independent Directors of Investment Companies," SEC Release Nos. 33-7932; 34-43786; 1C-24816; File No. 57-23-99.

in the extent to which managers have discretion over the fund's actions. This is because when managers have more discretion, the moral hazard problem becomes more substantial, and thus the benefit from providing incentives to directors to monitor managers increases.

Directors' ownership, however, also has costs. Broadly speaking, there are two types of costs. The first type is due to managerial discretion itself. Simply put, it is costly to hold shares in a fund that is subject to moral hazard problems. The second type comes from wealth constraints and portfolio needs. That is, holding shares in the funds they oversee may not fit directors' optimal portfolio choices. This problem is aggravated in the mutual fund industry since most directors sit on many fund boards, and thus cannot be expected to hold significant shares in all of them. Generally speaking, this type of cost is unrelated to the discretion fund managers have.

Following the vast literature on agency problems, we say that as managerial discretion increases, there is an increase in the *net* benefit from directors' ownership. That is, the effect of managerial discretion on the benefit from directors' ownership is greater than its effect on the first type of cost described above. The rationale behind this assumption is that when there is a moral hazard problem, it is more efficient to increase the ownership of one party (in our case, director), who is equipped with a monitoring technology, than to keep ownership at the hands of those who cannot monitor. (Of course, directors will have to be compensated appropriately for the cost they bear.) The net benefit of directors' ownership due to managerial discretion is then traded off against the second type of cost mentioned above. Since this cost is generally unrelated to the amount of managerial discretion, the prediction from an optimal contracting equilibrium is a positive relation between managerial discretion and directors' ownership. As we write in the introduction, such an equilibrium allocation can be implemented via the desire of fund management to attract more flows or via the desire of leading members of the board to increase shareholder value.

To test the optimal contracting approach, we relate the observed ownership levels to fund characteristics that proxy for the amount of managerial discretion. We also supplement the analysis with some directors' characteristics. All variables are described in the next subsection. In general, we use three categories of variables to proxy for managerial discretion. The first category contains variables that describe the clientele of the fund. The idea is that when funds' investors are more sophisticated they impose monitoring pressure on the managers, which reduces managerial discretion and the need for directors' ownership.[16] Variables in the second category describe the style of assets held by the fund. As in Demsetz and Lehn (1985), we assume that managerial discretion increases in the uncertainty of the environment they operate in. Variables in the third category capture the extent to which the fund is actively managed.

[16] This is based on the notion that different control mechanisms may substitute for each other, which has been formalized in theoretical papers (e.g., Arnott and Stiglitz (1991), Gibbons and Murphy (1992), Hermalin and Weisbach (2003)) and used to motivate empirical analyses (e.g., Almazan et al. (2004), and Bushman et al. (2004)).

We expect managerial discretion to be higher, and thus directors' ownership to be higher, when the fund is more actively managed.

A.2. Personal Investment Choice

Directors' ownership may arise as a result of directors' personal investment decisions. We can think of three hypotheses along these lines. First, directors may behave similarly to the average mutual fund investor in that they invest in funds with superior prior performance but do not divest from poorly performing funds as much (see, for example, Brown, Harlow, and Starks (1996), Chevalier and Ellison (1997), Sirri and Tufano (1998), and Zheng (1999)). If so, they may accumulate shares as a result of the fund's prior performance. We refer to this explanation as the performance chasing hypothesis. Second, directors may have better information regarding the ability of the fund manager or the ongoing returns of the fund's underlying assets. Thus, they may choose to own shares in anticipation of a favorable future return. We refer to this explanation as the insider information hypothesis. Finally, directors' holdings may arise simply because certain characteristics of the funds fit well with directors' portfolio allocation needs. We refer to this explanation as the portfolio optimization hypothesis.

A.3. Family-Wide Policies

As we note above, a recent document by the ICI says that 14% of fund complexes require fund directors to own shares in funds they oversee, and 37% explicitly encourage it, during our sample period. This suggests that some ownership may be driven purely by certain family-level policies that require/encourage ownership. To understand the importance of these family-level considerations, we explore the variation in ownership between fund complexes and assess its contribution to the overall variation in ownership.

B. Variable Description

B.1. Fund Characteristics

Investor clientele. The demand for directors' monitoring is expected to be weaker when alternative monitoring mechanisms are strong. In particular, this is expected to be the case when the fund's investors monitor the managers themselves. We consider two variables that characterize the investor clientele of the fund, which affects the monitoring exerted by investors. The first one is the percentage of institutional investors. Institutional investors are expected to exercise more monitoring both because they have the means to monitor—since they are sophisticated and knowledgeable about the financial markets—and because they have the incentives to monitor—since they hold large stakes, and hence are less affected by the free-rider problem. Thus, when a high percentage of fund assets is held by institutional investors, less monitoring is needed from

directors. As a result, the optimal contracting hypothesis predicts that *%Institution* (measured as the ratio of assets in institutional shares to total fund assets) will be negatively related to directors' ownership.

The second variable is the sensitivity of investment flow to fund performance. When flows are more sensitive to performance, the market provides a stronger incentive to managers to perform well, and the need for director monitoring decreases. One way to test this is to rely on findings from the prior literature that large and old funds have less sensitive flows (Chevalier and Ellison (1997), Sirri and Tufano (1998)), and retail funds have less sensitive flows after bad performance than fiduciary pension funds (Del Guercio and Tkac (2002)). As a result, these funds may need more monitoring by directors to substitute for the weakened market incentive. This argument would predict a positive relation between directors' ownership and fund size/age, and a negative relation between ownership and *%Institution*.

Another way to test this conjecture is to construct a direct measure for flow sensitivity (*FlowSensitivity*). We estimate the following statistic for fund i using 10 years of annual data ending 2003:[17]

$$FlowSensitivity_i = \frac{1}{T} \sum_{Quintile_{t-1} \neq 3} \frac{Flow_{it} - Flow\left(\text{Quintile 3 funds in the category}\right)_t}{\left(Quintile_{i,t-1} - 3\right)}, \quad (1)$$

where t is the subscript for year and T is the total number of annual observations of the fund (up to 10 years). The variable $Flow_t$ in the numerator is the standard flow measure used in the literature, defined as $\frac{Assets_t - Assets_{t-1}(1+Ret_{t-1})}{Assets_{t-1}}$, in percentage points. The numerator adjusts for the contemporaneous flows to the median-performance (quintile 3) funds in the same Morningstar category.[18] The variable $Quintile_{t-1}$ is the quintile, from 1 (worst performance) to 5 (best performance), in which the fund's performance falls within its category. The term $Quintile_{t-1} - 3$ can be interpreted as the excess performance quintile relative to the median. Thus, the ratio in (1) is the average incremental flow (as a percentage of fund assets) per excess quintile of fund performance. The summation is done over observations where the performance quintile is different from 3.[19]

[17] We also tried estimation at the monthly, quarterly, and semi-annual frequency. Given the calendar year effect (annual reporting, tax planning, etc.), the flow sensitivity estimates are most meaningful and consistent at the annual frequency for within-fund analysis. Due to the limited number of observations for each fund, we use this ratio instead of estimating the flow sensitivity by regressions.

[18] During our sampling period, Morningstar has 59 different categories, including 20 domestic equity categories, 11 international equity categories, 12 taxable bond categories, and 16 municipal bond categories.

[19] Only a handful of funds have performance in all years falling into quintile 3. Thus, their flow-performance sensitivities are not estimable and are instead imputed with the median flow sensitivity values of their respective categories. Our results are not sensitive to the exclusion of these funds.

Expression (1) measures a fund's flow response to overall performance and is our proxy for the strength of monitoring by investors. We expect that the lower the sensitivity, the more need for directors' monitoring. We also construct an alternative flow measure that focuses on flows after poor performance. This measure would capture the strength of monitoring from the current shareholders of the fund who can penalize bad performance by redeeming their shares.

Asset style. A fund's asset style affects the need for monitoring managers' behavior, and thus affects directors' ownership. Although directors are not supposed to micro-manage a fund's daily operations, they are required by law to oversee the management of the fund's portfolio of securities, and to monitor both the liquidity of the portfolio and the ongoing composition of the fund's investments. These tasks are particularly important in funds that specialize in securities about which information is difficult to obtain, and in funds that specialize in risky assets. Moreover, in those funds, managerial abuse is more difficult to detect, making ownership by directors particularly important to provide proper monitoring incentives (Demsetz and Lehn (1985)).

Based on the above arguments, and due to the greater uncertainty in equity investment relative to bond investment, the optimal contracting hypothesis predicts higher ownership in equity funds than in fixed income or balanced funds. This hypothesis is strengthened by the fact that equity funds have experienced a much higher failure rate (defined as the ratio of the number of funds deceased to the number of funds created during the period).[20] Finally, the potential for managerial abuse is much greater in equity funds, where it is easier for managers to deviate from their stated styles. By similar argument, the optimal contracting hypothesis predicts higher ownership in funds that specialize in growth stocks, small stocks/low grade bonds, and international stocks. For example, small stocks are more likely to serve as underlying assets for mutual funds' "window dressing" (Lakonishok et al. (1991), Carhart et al. (2002)). Relatedly, recent scandals of market timing activities involving international and small-cap stocks provide evidence that the potential for managerial abuse is higher in these types of funds.

To test these predictions, we adopt Morningstar's classification of a fund's investment style. Specifically, a fund is first identified as either an equity (*Equity*), fixed income, or balanced fund. A fixed income fund is then classified into nine subcategories along duration (short, medium, and long) and grade (high, medium, low). An equity fund is classified along market capitalization (large, medium, and small) and book-to-market (value, blend, growth). A balanced fund will have two classification variables, one for the equity securities it invests in and the other for the fixed income securities it invests in. We create dummy variables for whether the fund invests primarily in growth stocks (*Growth*), and whether the fund invests primarily in small stocks (if it is an equity fund) or low grade bonds (if it is a fixed income fund) (*SmallLowGrade*). We use the proportion of the fund's portfolio value invested in non-American

[20] According to Bogle (2005), the failure rate for all equity funds was 36% in the 1990s, and has surpassed 50% in the first 4 years of the 2000s.

securities (*%International*) to proxy for a fund's exposure to foreign securities. Positive relations between ownership and *Equity, Growth*, *SmallLowGrade*, and *%International* are consistent with the optimal contracting hypothesis. We also use the proportion of top 10 securities of a fund to its total portfolio value (*%Top10*) to control for the investment concentration. The theory is ambivalent about this variable. To the extent that it is relatively easy to monitor funds with high values of *%Top10* (because it may be easier to obtain information about the stocks that the fund invests in), one would expect a negative relation between *%Top10* and director ownership. On the other hand, if high *%Top10* implies more concentrated risk and hence high value of monitoring, then a positive relation may be expected.

Finally, directors may own shares in a fund because the fund's assets style fits their personal portfolio choices. Without knowing a director's personal risk preferences or portfolio needs, any observed ownership decision could reflect the individual director's revealed preference for an investment style. However, given the randomness and diversity in directors' risk preferences and portfolio needs, in the equilibrium in which all directors' marginal investment needs are satisfied, the portfolio choice hypothesis does not predict any systematic correlation between ownership and funds' asset style.

Active Management. The optimal contracting approach predicts that directors' ownership will be more prominent in actively managed funds relative to passively managed funds. Index funds constitute the extreme form of passive management. The task and performance (tracking error) of managing index funds are clearly defined, and leave less room for managerial abuse. Hence, less monitoring is needed. The same logic applies to other types of passively managed funds.

To test this prediction, we adopt three proxies for the extent of a fund's active management. The first is a dummy variable for whether the fund is an index fund (*IndexFund*). For nonindex funds, we obtain the R^2 (*Rsqr*) from regressing the fund's past 3 years' monthly returns on their benchmark indices provided by Morningstar. The lower the R^2, the more the fund deviates from the passive benchmark portfolio.[21] The third proxy is the fund's annual turnover rate (*Turnover*). High turnover is one of the salient features of active management.

Again, we realize that directors may choose between actively managed funds and passively managed funds based on their portfolio needs. However, given the randomness and diversity in directors' risk preferences and portfolio needs,

[21] Based on prior literature, there is some ambiguity with respect to the expected effect of *Rsqr*. On the one hand, Demsetz and Lehn (1985) use firm-specific risk as a proxy for managerial discretion. On the other hand, Himmelberg et al. (1999) use more direct proxies for managerial discretion and thus consider only the effect that firm-specific risk has on the cost of ownership. This cost is beyond the relation between firm-specific risk and managerial discretion, and is due to the fact that a higher firm-specific risk implies that investors have to be subject to more idiosyncratic risk. In our context, we are more confident in using this variable to proxy for managerial discretion. First, our study is about mutual funds, whose business is to choose portfolios. Thus, $1 - Rsqr$ is a direct measure for the discretion managers have. Second, mutual funds tend to have much larger *Rsqr* than regular firms. Thus, the costs from idiosyncratic risk held by directors are much less significant.

a priori, the portfolio needs hypothesis does not predict any systematic relation between ownership and fund management style.

Fund performance. To test the performance chasing and the insider information hypotheses, we use two measures for fund performance: The *Alpha* estimate from using the market model (*Alpha1*),[22] and the fund's performance rank within the fine categories classified by Morningstar from 0 (the worst) to 100 (the best). These models are estimated using the fund's return series prior to, during, and after their sample SAI year. As discussed earlier, a positive relation between prior return performance and directors' ownership is consistent with the performance chasing hypothesis, and a positive relation between future return performance and directors' ownership is consistent with the insider information hypothesis.

Fund managers. As discussed earlier, the optimal contracting hypothesis predicts lower directors' ownership when other control mechanisms are relatively more effective in reducing the agency problem. One such mechanism is related to managerial incentives. We use two measures to capture the strength of managerial incentives, namely, manager tenure (*MgrTenure*), measured as the number of years since the current management took over the fund's portfolio management, and the size of the management team (*MgrTeam*).

The optimal contracting hypothesis predicts a positive relation between *MgrTenure* and directors' ownership. The idea is that managers of longer tenure face fewer career concerns from their labor market (Holmstrom (1999), Chevalier and Ellison (1999)). Therefore, the demand for directors' monitoring is relatively high when managers have longer tenure. A positive relation between manager tenure and directors' ownership can also be consistent with the personal portfolio hypothesis if directors behave like average investors who prefer fund managers with proven track records.

The relation between directors' ownership and *MgrTeam* is less clear-cut. On the one hand, if the classic team free-riding problem dampens individual managers' incentives (Holmstrom (1982)), the contracting hypothesis predicts that more director ownership is needed in team-managed funds. On the other hand, team management may also create peer pressure as well as peer-monitoring (Arnott and Stiglitz (1991)), in which case the contracting hypothesis predicts a negative relation between ownership and team size.

Other fund characteristics. We include several other fund characteristics in our analysis: Size, age, and distribution channel. To capture size, we use *FundAsset,* measured as the total dollar value (in millions) of assets under the fund's management. As mentioned earlier, size can be a proxy for the sensitivity of investment flow to fund performance. As such, it is expected to be positively correlated with directors' ownership. In addition, several other factors may affect the relation between fund size and directors' ownership under the optimal contracting approach. To the extent that the governance of larger funds benefits

[22] As a sensitivity check, we also use the Carhart (1997) four-factor model (the Fama-French three factors plus the momentum factor). We find that directors' ownership is more responsive to past performance as measured by the one-factor model than the four-factor model. This evidence is consistent with Chevalier and Ellison's (1997) finding about individual investors' return chasing pattern.

more investors, leading to a greater total benefit from directors' monitoring, the optimal contracting hypothesis predicts a positive effect of fund size on directors' ownership. On the other hand, to the extent that larger funds are more likely to be subject to monitoring by the financial press, which may substitute for directors' monitoring, one may expect a negative relation between fund size and directors' ownership. Similar arguments also apply to fund age in that it is highly correlated with fund size. The correlation in our sample is 0.23.

Nonretirement retail fund shares are distributed to investors through two main channels: the direct channel and the brokerage (advisory) channel. Funds relying on the brokerage channel charge a (front or back-end) load to compensate brokerage firms for their marketing efforts. We use a dummy variable *LoadFund* to indicate whether a fund is a load fund. Ex ante, it is unclear how load charges affect directors' ownership. Several effects exist under the optimal contracting approach. First, a positive relation may arise due to the need to monitor fund managers who deal with the brokerage firms. This is because the distribution of load funds introduces an extra layer of potential conflicts of interest: Fund managers and brokers may collude and reach an agreement that benefits both of them at the expense of investors.[23] Second, a positive relation may also arise since load charges dissuade share redemption and reduce flow-to-performance sensitivity, partly shielding managers from market competition. This effect has been pointed out by Almazan et al. (2004) and supported empirically by Huang, Wei, and Yan (2005). However, a negative relation may arise if the interests of financial advisers are well aligned with those of investors, such that financial advisers can use their financial expertise to monitor the funds on their clients' behalf. Finally, outside the scope of the optimal contracting approach, lower directors' ownership in load funds may be a result of directors' personal investment allocation, given that in principal they have to pay the same load charges as other investors when investing in load funds (the SEC prohibits preferential treatment for directors' transactions with the funds).[24]

B.2. Director Characteristics

The following information about directors' characteristics comes from the Statement of Additional Information (SAIs): Director's age (*DirAge*), number of years the director has served on the board of a fund (*DirTenure*), number of funds s/he oversees (#*Overseen*), whether s/he is an interested or disinterested director (*Interested*) as defined in accordance with Section 2(a)(19) of the Investment Company Act of 1940, and whether s/he is the chairperson of the board (*Chair*). The optimal contracting approach generates predictions on the relations between directors' characteristics and ownership. In most cases,

[23] One example of such payment agreement is the "soft-dollar" practice among broker-directed funds, which came under scruitiny in the Mutual Fund Reform Act of 2004. Though soft dollars were created by paying full price for stock trade execution and receiving research in return, there is evidence that soft dollars to some extent have become a hidden compensation for distribution of fund shares (Khorana and Servaes (2004), Mahoney (2004)).

[24] In practice, some funds may waive directors' front load fees on the grounds that sales to directors involve less sales effort.

however, these are not easily distinguishable from the predictions from the personal investment choice.

The contracting hypothesis predicts that older directors, or directors with longer tenure, own more shares. This is because as they have less implicit incentives from their career concerns, more ownership can provide them with the incentives to monitor fund managers (Gibbons and Murphy (1992) and Yermack (2004)). To the extent that older or longer-tenured directors may also have larger wealth, and hence will invest relatively more in any fund, the portfolio optimization hypothesis also predicts a positive relation between ownership and both age and tenure. Lastly, some fund families encourage directors to defer their compensation in the form of fund shares, thus longer-tenured directors may build up their ownership over time as a result of the deferred compensation.

Similarly, agency theory predicts that interested directors and the chairperson of the board will own more shares. Interested directors should own more shares because their incentives are less aligned with fund investors than disinterested directors. The chairperson of a board plays a more important role in monitoring than other directors, and thus under the optimal contracting hypothesis, is expected to own more shares to ensure that his/her incentives are aligned with fund investors.

The effect of the number of funds directors oversee on their ownership is less clear. On the one hand, wealth constraints and a simple mechanical relation imply that ownership in a given fund is lower for directors overseeing more funds. On the other hand, to the extent that overseeing a large number of funds entails more work, it may be necessary for directors to own more shares in the funds they oversee in order to provide sufficient incentives.

III. Sample Data Description

We obtain data from several sources. Information about directors' characteristics, ownership, and board composition is hand-collected from mutual funds' Statement of Additional Information (SAI). We retrieve the SAIs of all funds in the top 50 mutual fund families, as well as funds in 87 smaller families,[25] from the SECs Edgar web site. Whenever available, we collect each fund's SAI for both 2002 and 2003.

Information about fund characteristics is mostly retrieved from Morningstar Principia Mutual Funds Advanced annual CD-ROM disks from 2001 to 2004. We also supplement Morningstar with the Center for Research in Security Prices (CRSP) mutual fund database for historical total net asset value information and fee waiver information.We rely primarily on the Morningstar database because it offers more uniform fund category classification, clearer definition of share types within the same fund, and finer information about portfolio composition.[26]

[25] The subsample of smaller families originates from our older sample, which was collected by calling all mutual fund families that have listed 1-800 numbers with Morningstar to request their most recent SAIs.

[26] For example, Morningstar has information about funds' international securities holding, the percentage of top 10 securities, and minimum purchase requirement while CRSP does not have such

Information from Morningstar and CRSP is at the fund-share class level. A mutual fund can issue multiple share classes out of the same portfolio to cater to different clienteles. Each share class has a different combination of minimum initial purchase, front- and back-end load, redemption restriction, and expenses. Since all share classes issued out of the same portfolio belong to the same fund and are managed by the same management team and board of directors, we aggregate information to the fund level. Specifically, we calculate total assets under management as the sum of assets across all share classes. Fund inception date is that of the oldest share class in the fund, and management tenure is that associated with the oldest share class in the fund. The proportion of institutional ownership is calculated as the assets in the institutional share classes over total assets of the fund.[27] Load charge is the average total load (front- and back-load) charges of retail classes (institutional classes do not have loads). Expense ratio is calculated as the average expense across different share classes. Results are qualitatively unchanged if we use only the expense ratios for retail share classes.

Our final sample consists of 2,435 unique funds from 137 fund families, covering 39,467 director-fund-year pairings, and 2,445 director-year observations. About 95% of the funds have data from both 2002 and 2003. We find that 9,751 director-fund-year pairings have positive ownership, representing 24.7% of all observations. Among the director-fund pairings with positive ownership, 34.9% own below $10,000, 25.0% own between $10,001 and $50,000, 10.7% own between $50,001 and $100,000, and 29.4% own above $100,000. The percentages of director-fund pairings with positive ownership are virtually identical in 2002 and 2003. At the director level and for funds in our sample, 17.7% of the directors do not hold any shares in any of the funds they oversee, 4.5% have total ownership in the fund family up to $10,000, 11.3% have total ownership between $10,001 and $50,000, 7.6% between $50,001 and $100,000, and 58.8% above $100,000. At the fund level, 59.7% of the funds have positive total director ownership. At the family-level, slightly over 5% of the fund families have no director ownership at all. The mean (median) family-level total ownership is 2.5 million (1.1 million) dollars. In a typical fund family, 57.1% of all directors hold more than $100,000 worth of fund shares within the family. Our sample funds managed $3.7 trillion total assets in 2003, about 76% of all assets under management by all mutual funds tracked by Morningstar, and half of all U.S. mutual funds.[28]

information. Also see Elton, Gruber, and Blake (2001) for a comparison between the two databases. Morningstar only records information on funds in business in each year. To avoid survivorship bias, we use Morningstar disks from earlier years for information on deceased funds.

[27] Morningstar classifies fund shares with class suffix "Inst," "Instl," "Z," "Y," "X," "I," "M," and "N" as insitutional shares; other suffixes (mostly "A," "B," and "C") represent retail shares. Institutional shares usually require a higher minimum initial purchase (typically above $50,000). When unspecified, we follow the standard practice in the literature and classify a share as an institutional share if the minimum initial purchase is $50,000 or above.

[28] According to the 2005 Investment Company Fact Book, published by the ICI (available at www.ici.org), the assets managed by U.S.-based mutual funds totalled $7.4 trillion in 2003.

Table I lists the definitions and summary statistics of the main variables used in this paper at the fund, director, as well as the fund family-levels. As discussed earlier, the SEC only requires mutual funds to disclose ownership in ranges in which the director's ownership falls, rather than the actual amount. In our main analysis conducted at the fund-director level, the estimation technique fully accommodates the interval and top coding. For analyses aggregated at the fund, director, or family level, we sum over the individual directors, where the ownership of each director-fund pairing is calculated at the midpoint of the reported interval, and an individual ownership reported above $100,000 is interpolated to be $150,000 (assuming the upper bound of the range to be $200,000, which is likely to be conservative).[29] Table I shows that the sample average ownership is about $14,000 per director-fund (and a typical director sits on 20 fund boards), and an average (median) director invests $267,000 ($90,000) in all sample funds s/he oversees.[30]

About 22% of the sample observations are from interested directors, and 11% come from chairpersons of the funds. The average (median) age and tenure of directors in our sample is 61.7 (62) and 8.7 (7) years, respectively. The average (median) annual compensation a disinterested director receives from a single fund he oversees is $7,027 ($2,540), and that from all funds he oversees in a fund family is $79,857 ($65,240). Interested directors in general do not receive compensation from the fund for being a director.

The average (median) fund is 12.6 (10) years old, and has about $1,234 ($289) million assets under management. Our sample funds are older than the mutual fund universe tracked by Morningstar (with a median age of 6 years) and larger (the median Morningstar fund share has $31 million under management, and a typical fund has two to four fund share classes). About 61% of the sample funds are equity funds, 25% are classified as growth funds, and 11% are funds specializing in small stocks or low grade bonds. The same proportions in the Morningstar universe are 68%, 23%, and 12%, respectively. About 4% of our sample funds are index funds, compared to 4.4% in the Morningstar fund universe. Our sample funds have an average of about 13% assets invested in international stocks and 31% invested in the top 10 holdings. The average (median) management team has 1.83 (1) members, with about 5.64 (5) years of tenure. The median Morningstar fund has a management team of one member with a tenure of 4.1 years.

[29] This simplifying method is suggested by Wooldridge (2002). The consistency of this method relies on the assumption that the threshold chosen for interval coding is exogenous to directors' ownership. That is, directors do not game the interval coding by investing close to the lower or upper bound of an interval in order to appear to be holding a large or small amount; or, the extent of individual gaming behavior, if it exists, is not systematically correlated with the covariates under analysis. An alternative and conservative method is to use the lower bound of intervals. This method generates qualitatively similar results with lowered significance. The lowered significance is because this coding method cannot distinguish ownership in the lowest interval from true zero ownership.

[30] This underestimates the actual total ownership a typical director has in all the funds she oversees because our sample only includes funds tracked by Morningstar.

Table I
Variable Definitions and Summary Statistics

Panel A: Definitions of Main Variables

Variable Name	Unit	Definition
Director and board information:		
Ownership	\$1,000	Amount of mutual fund shares in thousands of dollars owned by directors. In most analysis, ownership is measured at the fund-director pair level, and is reported as an interval. Ownership at the fund level is the total ownership by all directors of a fund. Ownership at the director level is director total ownership aggregated over all funds s/he oversees. Ownership (total) at the fund family level is the total ownership by all directors in all funds in the family. Ownership (average per fund) at the family level is the fund-level ownership averaged over all funds within a family. All aggregate ownership figures are calculated by setting an individual director's ownership in a fund as the midpoint of the reported interval, or as \$150,000 for the top interval of >\$100,000.
Chair	Dummy	= 1 if the director is the chairperson of the board
Interested	Dummy	= 1 if the director is an interested person
DirAge	Year	Age of the director
DirTenure	Year	Tenure of the director in the mutual fund
#Overseen	#	Number of funds overseen by the director (may have out-of-sample funds)
#Dir	#	Number of directors on a fund's board
%Own	0–1	Proportion of directors owning shares in the fund
%Disinterested	0–1	Percentage of disinterested directors on a fund's board
OwnInterested	\$1,000	Total ownership by interested directors in a fund
OwnDisinterested	\$1,000	Total ownership by disinterested directors in a fund
CompFund	\$	Directors' compensation in dollars from the fund
Fund information:		
(i) Investor clientele		
%Institution	0–1	Proportion of fund assets in institutional share classes
FlowSensivity	%	Effect of fund return being one quintile higher on the fund flows as a percentage of total fund assets.
(ii) Fund asset style		
Equity	Dummy	= 1 if primarily invested in equities
Growth	Dummy	= 1 if primarily invested in growth stocks
SmallLowgrade	Dummy	= 1 if primarily invested in small stocks (equity) or low grade bonds (fixed income)
%Top10	0–1	Proportion of the top 10 securities to the total portfolio value
%International	0–1	Proportion of the portfolio value invested in non-American securities
(iii) Active management		
IndexFund	Dummy	= 1 if an index fund
Rsqr	0–1	R^2 from regressing a (nonindex, non-money-market) fund's monthly returns on the benchmark index
Turnover	100%	Annual turnover rate

(*continued*)

Table I—*Continued*

Panel A: Definitions of Main Variables

Variable Name	Unit	Definition
(iv) Performance		
FutAlpha1	%	Alpha from the market model for the next year
PastAlpha1	%	Annualized alpha from the market model during the years (up to 3 years) before the SAI year
Alpha1	%	Alpha from the market model for the current year
PastRank	0–100	Rank of return during the past year within the MorningStar category
Rank	0–100	Rank of current-year return within the MorningStar category
FutRank	0–100	Rank of return during the next year within the MorningStar category
(v) Management		
MgrTenure	year	Average management tenure
MgrTeam	#	Number of managers in the team
(vi) General		
FundAsset	$1 million	Total assets under fund management in millions of dollars
FundAge	Year	Number of years since fund inception date
LoadFund	Dummy	= 1 if the fund charges loads for retail shares
Load	%	Total load charges (front + back end) of retail shares of the fund
Expense	%	Sum of expense ratio and 12b-1 fee of the fund
Family information:		
DefCompPlan	Dummy	= 1 if the fund offers directors a deferred compensation plan
CompFam	$	Compensation in dollars from the fund family
FamAsset	$ million	Total assets under management of the fund family
%Dir100K	%	Percentage of directors in a fund family that have total ownership above $100,000

Panel B: Summary Statistics

	Mean	Std Dev	5%	25%	50%	75%	95%
Directors and board information:							
Ownership (Fund-director level)	14	39	0	0	0	0	150
Ownership (Fund level)	126	215	0	0	15	155	515
Ownership (Director level)	267	516	0	0	90	300	1,050
Chair	0.11	0.31	0.00	0.00	0.00	0.00	1.00
Interested	0.22	0.41	0.00	0.00	0.00	0.00	1.00
#Dir	8.69	2.97	5	7	8	11	13
DirAge	61.72	10.17	44	56	62	69	77
Interested	56.13	10.76	40	48	56	64	74
Disinterested	63.48	9.31	47	58	64	70	77
DirTenure	8.70	6.61	1	4	7	12	21
Interested	8.95	7.04	1	4	7	12	21
Disinterested	8.62	6.47	1	4	7	12	22
#Overseen	40.37	50.48	1	5	20	61	123
Interested	37.89	55.06	1	3	11	57	138
Disinterested	41.16	48.92	1	6	23	64	115

(*continued*)

Table I—*Continued*

Panel B: Summary Statistics

	Mean	Std Dev	5%	25%	50%	75%	95%
CompFund	3,079	7,259	0	94	1,061	2,641	13,091
Interested	538	2,746	0	0	0	0	2,045
Disinterested	7,027	12,066	0	942	2,540	7,276	29,250
%Own	0.23	0.29	0.00	0.00	0.13	0.33	0.88
Interested	0.24	0.38	0.00	0.00	0.00	0.50	1.00
Disinterested	0.22	0.30	0.00	0.00	0.00	0.33	1.00
%Disinterested	0.79	0.11	0.63	0.71	0.77	0.86	1.00
OwnInterested	52.2	101.6	0.00	0.00	0.00	75	300
OwnDisinterested	73.5	148.1	0.00	0.00	0.00	800	340.5
Fund information:							
(i) Investor clientele							
%Institution	0.12	0.26	0.00	0.00	0.00	0.04	0.86
FlowSensitivity	0.17	1.77	−0.24	0.01	0.05	0.12	0.71
(ii) Fund asset style							
Equity	0.61	0.49	0.00	0.00	1.00	1.00	1.00
Growth	0.25	0.43	0.00	0.00	0.00	1.00	1.00
SmallLowGrade	0.11	0.32	0.00	0.00	0.00	0.00	1.00
%International	0.13	0.28	0.00	0.00	0.01	0.07	0.93
%Top10	0.31	0.18	0.12	0.19	0.26	0.37	0.68
(iii) Active management							
IndexFund	0.04	0.20	0.00	0.00	0.00	0.00	0.00
Rsqr	0.83	0.22	0.36	0.81	0.91	0.96	0.98
Turnover	1.11	2.09	0.07	0.27	0.63	1.20	3.28
(iv) Performance							
PastRank	47.48	25.29	6	28	50	64	92
Rank	46.81	26.16	5	25	50	64	92
FutRank	47.24	25.97	6	26	50	65	92
PastAlpha1	0.90	9.70	−14.61	−3.36	0.90	3.26	15.59
Alpha1	2.80	8.77	−10.56	−1.99	3.60	6.58	15.51
FutAlpha1	2.87	7.64	−8.78	−0.72	3.23	6.31	14.48
(v) Management							
MgrTenure	5.64	3.91	1.00	3.00	5.00	7.30	12.90
MgrTeam	1.83	1.13	1.00	1.00	1.00	2.00	4.00
(vi) General							
FundAsset	1,234	3,935	14	88	289	903	5,085
FundAge	12.64	10.44	3	6	10	16	32
Load	2.20	1.76	0.00	0.00	2.81	3.81	4.73
Expense	1.34	0.53	0.50	1.02	1.31	1.68	2.18
Family information:							
Ownership (Total)	2,507	4,243	0	183	1,050	2,790	11,238
Ownership (Average per fund)	198	261	0	21	100	242	747
%Dir100K	54.7%	32.8%	0.0%	25%	57.1%	83.3%	100.0%
DefCompPlan	0.22	0.42	0.00	0.00	0.00	0.00	1.00
CompFam	63,435	71,054	0	4,150	45,000	98,496	196,868
Interested	11,083	42,954	0	0	0	0	77,190
Disinterested	79,857	70,374	2000	24,500	65,250	115,375	206,611
FamAsset	25,502	71,483	13	308	2,521	22,122	89,434

The average return performance of funds in our sample is close to, or slightly below, the average fund in their respective Morningstar category. The mean and median performance rank score assigned by Morningstar are, respectively, 47 and 50 in the year prior to and during the sample year (by construction, the median of all these ranks in the Morningstar universe is 50). The average *Alpha1* estimate for the SAI year using 3 years' monthly return data up to the SAI year is 2.8%.[31] Overall our sample represents fairly the mutual fund industry, and, due to the data collection process, overweights large and established fund families (which tend to house large funds). To ensure that our findings are not unique to large fund families, we conduct a sensitivity check by running the main analyses on the subsample of funds from the nontop 25 fund families. The results are qualitatively similar.

Some funds have explicit policies encouraging director ownership, and one notable such policy is a deferred compensation plan where directors can defer their compensations from the fund in the form of investments in shares of the funds they oversee. This arrangement would encourage ownership because of the convenience and preferential tax treatment it entails. We collect information on deferred compensation plans from the SAIs. A dummy variable, *DefCompPlan*, is set to one for a fund if its SAI mentions the existence of such a plan, or if at least one of the directors has reported deferred compensation.[32] About 43% of the directors in our sample have the option of deferring compensation.

IV. Empirical Results

A. Determinants of Ownership at the Fund-Director Level

A.1. Model Specification

Our purpose is to estimate the determinants of director ownership $y_{i,j}$, given as

$$y_{i,j} = f(x_i, x_j, \varepsilon_{i,j}), \tag{2}$$

where i and j are subscripts for directors and funds, $x_i(x_j)$ is a vector of director (fund) characteristics, and $\varepsilon_{i,j}$ is an error disturbance that is not correlated with the dependent variable. We assume that $corr(\varepsilon_{.,j_1}, \varepsilon_{.,j_2}) = 0$ for $j_1 \neq j_2$. We adjust all reported standard errors for arbitrary correlation among observations belonging to the same fund (same subscript j).

Two types of data censoring exist in our data that render the conventional linear least squares method improper for estimating (2). The first corresponds to

[31] In 2003, most mutual funds outperformed the market. For example, 60.1% of the Morningstar domestic stock funds outperformed the S&P500.

[32] With the exception of two fund families, all deferred compensation plans we come across are voluntary plans. And even in these two families, there are directors who do not have deferred compensation. Our analyses are virtually unchanged if we exclude observations from the funds where deferred compensation is said to be mandatory.

the observations with zero ownership (about 75.3% of the director-fund pairings have zero ownership), that is, instances in which directors find it optimal to hold zero shares in the funds they oversee. The second is the reporting censoring from the interval disclosure requirement, which represents a coarser way to record the underlying information.

To address these types of data censoring, we adopt the following two-tier model (also called the hurdle model):

$$\begin{aligned} &\Pr(y = 0 \mid x) = 1 - \Phi(x\gamma), \\ &\ln(y) \mid (x,\ y > 0) \tilde{} N(x\beta, \sigma^2). \end{aligned} \tag{3}$$

In (3), y is the *true* ownership that can have a corner solution at zero. The first equation assumes a normal cumulative probability for director ownership, where the argument in the probability function is a linear function of x. The second equation assumes that conditional on positive ownership, the amount owned follows a lognormal distribution where the mean value is a linear function of x. The lognormal specification is necessary to make sure that the density function is not truncated at zero. It also provides a reasonable approximation for the right-skewness of ownership among positive observations. The two-tier specification leaves the relation between γ and β unconstrained, and allows the independent variables x to affect the probability of ownership and the conditional amount of ownership differently. In this sense, the two-tier model is more general than alternative methods such as the censored normal regression (i.e., the Amemiya (1985) Type I Tobit) or the Heckman's Type II Tobit.[33]

If y is exactly coded, (3) can be estimated using MLE with the following likelihood function:

$$\begin{aligned} \{\hat{\gamma}, \hat{\beta}, \hat{\sigma}^2\} = \arg\max &\sum_{y_{i,j}=0} \ln[1 - \Phi(x\gamma)] \\ &+ \sum_{y_{i,j}>0} \left\{ \ln[\Phi(x\gamma)] - \ln(y) - \frac{1}{2}\ln(\sigma^2) - \frac{1}{2}[\ln(y) - x\beta]^2/\sigma^2 \right\}, \end{aligned} \tag{4}$$

where $\hat{\gamma}$ is estimated using probit. Some variation of (4) is needed to accommodate the interval and top coding to obtain $\hat{\beta}$. Let $[\alpha_{i,j}^L, \alpha_{i,j}^H]$ be the recorded interval for $\ln(y_{i,j})$. Then the likelihood function for positive ownership becomes

$$\begin{aligned} \{\hat{\beta}, \hat{\sigma}^2\} = \arg\max &\sum_{0<\alpha_{i,j}^H<\infty} \ln\left[\Phi\left(\frac{\alpha_{i,j}^H - x\beta}{\sigma} \right) - \Phi\left(\frac{\alpha_{i,j}^L - x\beta}{\sigma} \right) \right] \\ &+ \sum_{\alpha_{i,j}^H=\infty} \ln\left[1 - \Phi\left(\frac{\alpha_{i,j}^L - x\beta}{\sigma} \right) \right]. \end{aligned} \tag{5}$$

[33] For robustness check, we perform our analysis using the Heckman approach and find qualitatively similar results.

We are interested in the marginal effects of x on y, that is, $\frac{\partial \Pr(y>0)}{\partial x}$ and $\frac{\partial y}{\partial x}$, which change with the values of x (due to the nonlinearity of the model). We report these marginal effects by plugging in the estimates $\{\hat{\gamma}, \hat{\beta}, \hat{\sigma}^2\}$ and the sample mean $\overline{x}$ into the following expressions:

$$\begin{aligned} \frac{\partial \Pr(y > 0)}{\partial x} &= \phi(x\gamma)\gamma, \\ \frac{\partial y}{\partial x} &= \phi(x\gamma)\gamma E(y \mid x, y > 0) + \Phi(x\gamma)\frac{\partial y \mid y > 0}{\partial x}, \\ \frac{\partial y \mid y > 0}{\partial x} &= \exp(x\beta + \sigma^2/2)\beta. \end{aligned} \tag{6}$$

A.2. Discussion of Participation Results

Panel A of Table II reports results from estimating (3) and (5) at the director-fund level. We start with the participation decision, that is, the decision on whether to hold shares in the fund. We then discuss the magnitude of holdings given director and fund characteristics.

The coefficient estimates, t-statistics, and implied marginal probability (at sample averages of the independent variables) from estimating the first equation of (3) are reported in columns 1a to 1c, respectively.

Fund clientele has a significant impact on the likelihood of director's ownership, consistent with the predictions of the optimal contracting approach (see Section II). The coefficient on institutional ownership (*%Institution*) implies a decrease in the marginal probability of 19.8% from a pure retail fund to a fund primarily serving institutions.[34] The coefficient on *FlowSensitivity* is significantly negative (at less than 5%), suggesting that directors are less likely to own shares in funds where managers face a stronger market incentive. The economic magnitude of *FlowSensitivity*'s effect is relatively small: A one-standard deviation increase in the flow sensitivity is associated with a 1.2% decrease in the probability of positive ownership. We also use a flow sensitivity measure that focuses on bottom quartile performance (constructed as the average fund flow, in percent of total assets, after a fund's return performance falls into the bottom quartile within its category) and find consistent but insignificant results.[35]

It should be noted that the limited number of observations used to estimate *FlowSensitivity* at the individual fund level introduces noise in the measure. As a result, the relatively modest effect of *FlowSensitivity* should probably be

[34] In our sample, more than 98% of the funds issuing institutional share classes also have retail shares. Therefore, the high initial investment requirement imposed by an institutional share in a fund should not deter directors from investing in the fund because they can buy into the retail shares of the same fund. Our results are virtually unchanged if we exclude two funds that offer only institutional share classes.

[35] The insignificance could be due to the well-documented fact that flow responses tend to be flat (i.e., no significant outflow) for most funds with lower quintile performance.

Table II
Determinants of Director Ownership at the Fund-Director Level

Panel A: Participation and Level of Ownership

All variables are defined in Table I(A). Column (1) applies the probit regression, where the dependent variable is a dummy variable equal to one if the ownership of a fund-director pair is positive. Marginal probabilities reported in column (1c) represent the effects on the probability (in percentage points) of a unit change in the independent variables from their respective sample-average values. Column (2) uses an interval Tobit regression (to account for top coding of ownership) where the dependent variable is ownership in log dollars, and the analysis is constrained to the subsample with positive ownership. Marginal effects reported in column (2c) represent the effects, in $1,000, on ownership (conditional on participation) of a unit change in the independent variables from their respective sample-average values. Column (3a) ("Unconstrained" model) calculates the marginal effects on the unconditional ownership without assuming that the independent variables have the same effect on participation and on conditional ownership decisions (using coefficients from (1a) and (2a), *t*-statistics are not applicable). Columns (3b) and (3c) ("Constrained" model) estimate the effect using the two-sided Tobit interval regression (to account for censoring of zero and top coded ownership observations), assuming that the independent variables have the same effects on participation and on conditional ownership. In all regressions, standard errors adjust for heteroskedasticity and within-cluster correlation among all observations belonging to the same fund. Total number of observations is reported, as well as the number of left- (zero ownership) and right- (top coded) censored observations where applicable. ** and * indicate significance at equal to or less than the 5% and 10% levels.

	I(Ownership > 0)			ln(Ownership | Ownership > 0)			Unconditional Ownership		
Dependent Variable	(1a) Coef × 100	(1b) *t*-Stat	(1c) Marg. Prob (%)	(2a) Coef × 100	(2b) *t*-Stat	(2c) Marg. Effect ($1,000)	(3a) Unconstrained ($1,000)	(3b) Constrained ($1,000)	(3c) *t*-Stat
Fund characteristics:									
(i) Investor clientele									
%Institution (0–1)	−66.64**	−8.73	−19.75	−4.39	−0.21	−6.30	−29.66	−53.54**	−8.04
FlowSensitivity	−2.24**	−2.65	−0.66	11.36*	1.92	16.29	2.63	−1.49**	−1.98
(ii) Fund asset style									
Equity	42.40**	8.40	12.00	30.77**	2.21	44.12	27.69	36.65**	8.65
Growth	3.69	0.82	1.10	−0.25	−0.02	−0.36	1.49	3.08	0.84
SmallLowGrade	12.02*	1.95	3.69	12.91	0.94	18.51	9.17	11.23**	2.24
%International	−3.51	−0.47	−1.04	35.15*	1.93	50.41	9.59	1.16	0.19
%Top10	−17.31	−1.48	−5.13	−21.25	−0.62	−30.46	−14.04	−15.91	−1.62

(iii) Active management									
IndexFund	−50.77**	−3.15	−12.21	48.13	1.18	69.01	−6.37	−41.58**	−3.02
Rsqr	−36.42**	−2.91	−10.79	44.00	1.17	63.08	−1.59	−29.16**	−2.79
Turnover	1.92**	2.07	0.57	−3.15	−0.97	−4.52	−0.18	1.32*	1.65
(iv) Performance									
PastAlpha1	1.38	0.80	0.41	9.96**	2.18	14.28	3.72	2.61*	1.87
Alpha1	1.70	0.79	0.50	8.35	1.60	11.97	3.35	2.45	1.32
FutAlpha1	2.27	0.82	0.67	12.90*	1.84	18.50	5.03	2.82	1.22
(v) Management									
MgrTenure	−0.22	−0.48	−0.06	5.57**	5.31	7.98	1.66	0.62*	1.70
MgrTeam	8.86**	5.17	2.62	−11.62**	−2.52	−16.66	0.10	5.54**	4.22
(vi) General									
FundAsset (log)	19.22**	13.08	5.70	40.31**	11.18	57.80	20.86	18.63**	14.38
FundAge (log)	11.39**	3.53	3.38	−31.48**	−4.10	−45.14	−5.09	5.84**	2.23
LoadFund	−3.68	−0.88	−1.10	−55.59**	−5.27	−79.70	−19.08	−7.92**	−2.19
Director characteristics									
Chair	14.88**	5.23	4.61	61.53**	5.93	88.22	25.70	20.29**	7.84
Interested	13.72**	4.97	4.19	157.09**	15.84	225.25	55.32	28.45**	10.57
DirAge	0.18	1.30	0.05	0.89*	1.87	1.28	0.36	0.22	1.74
DirTenure	1.64**	8.13	0.49	4.23**	7.60	6.06	2.03	1.68**	9.57
#Overseen	−0.33**	−11.67	−0.10	−0.53**	−7.12	−0.75	−0.30	−0.31	−12.50
Other:									
DefCompPlan	24.00**	6.11	7.11	−53.24**	−5.04	−76.34	−6.59	15.70**	4.92
Year2003	−3.49**	−1.97	−1.03	17.23**	3.15	24.70	3.95	−0.89	−0.60
#obs, # Left- and right-censored	39,467	–	–	9,751	0	2,678	39,468	29,741	2,678
Pseudo R^2	0.12			–			–		

(*continued*)

Table II—*Continued*

Panel B: Choices among Alternative Funds

All variables are as defined in Table I(A) except 1/#Overseen (in sample), which is the inverse of the number of funds a director oversees within our sample. The dependent variable is the share (between 0 and 100%) of a director's total investment in the funds s/he oversees (within the sample) for director-fund pairs, and is considered zero if the total investment by the director is zero. Independent variables that do not vary among observations belonging to the same director (such as age) are not included. Column (1) uses the full sample, while column (2) uses the subsample of fund-director observations where the director's total ownership (across all the funds s/he oversees within the sample) is positive. Standard errors adjust for heteroskedasticity and within-cluster correlation at the director level. Total number of observations is reported, as well as the number of left- (zero ownership) and right- (100% of a director's total ownership being in one fund) censored observations where applicable. ** and * indicate significance at equal to or less than the 5% and 10% levels.

	(1) Full Sample		(2) Positive Director Total Ownership	
	COEF	*t*-Stat	COEF	*t*-Stat
Fund characteristics:				
(i) Investor clientele				
%Institution	−10.26**	−6.34	−7.26**	−5.45
FlowSensitivity	−0.15**	−6.33	−0.13**	−7.51
(ii) Fund asset style				
Equity	10.33**	12.53	8.64**	12.25
Growth	0.25	0.45	−0.73	−1.50
SmallLowGrade	2.49**	3.32	3.53**	5.42
%International	−2.39**	−2.62	−1.51*	−1.90
%Top10	−6.42**	−3.77	−5.72**	−3.89

(iii) Active management				
IndexFund	−5.38**	−2.06	−1.26	−0.57
Rsqr	−3.81*	−1.92	−1.25	−0.74
Turnover	0.23	1.22	0.62**	3.34
(iv) Performance				
PastAlpha1	0.13	0.43	−0.56**	−2.04
Alpha1	−0.05	−0.13	−0.50*	−1.66
FutAlpha1	1.15**	2.05	0.32	0.89
(v) Management				
MgrTenure	0.00	−0.03	−0.09	−1.36
MgrTeam	2.46**	9.07	1.29**	5.58
(vi) General				
FundAsset (log)	4.62**	17.36	3.41**	15.76
FundAge (log)	1.93**	4.10	2.02**	5.05
LoadFund	2.17**	2.25	1.92**	2.48
Director characteristics				
Chair	3.07**	1.99	1.28	1.04
Interested	0.93	0.79	−0.09	−0.09
DirTenure	0.39**	5.79	0.23**	4.23
1/#Overseen (in sample)	96.87**	26.72	169.05**	43.01
#obs	39,818		33,417	
#Left and right censored	30,061	346	23,661	346

(*continued*)

Table II—*Continued*

Panel C: Cross-family Analysis

All variables are defined in Table I(A), except that the fund/director characteristic variables are averaged or aggregated over all funds/directors within a family-year (with the exception of family age which is defined as the age of the oldest fund in the family). The dependent variable in columns (1) and (2) is the total director ownership in a family-year in millions of dollars. The dependent variable in columns (3) and (4) is the percentage of directors in a family year that hold more than $100,000 in the family funds. Estimations in columns (3) and (4) adjust for censoring at 0% and 100% using the two-sided Tobit method. Columns (1) and (3) list all family-level counterparts to regressors in Table II(A), while columns (2) and (4) keep a subset of variables that have a natural interpretation as family-level characteristics variables. ** and * indicate significance at equal to or less than the 5% and 10% levels.

	Total Ownership ($ mil.)				%Dir > $100K			
	(1)		(2)		(3)		(4)	
	COEF	*t*-Stat	COEF	*t*-Stat	COEF	*t*-Stat	COEF	*t*-Stat
Fund family characteristic:								
(i) Investor clientele								
%Institution	−1.88**	−2.64	−1.80**	−3.41	−0.09	−0.96	−0.15	−1.53
FlowSensitivity	−1.00**	−2.49	−0.93**	−2.90	−0.02	−0.42	−0.02	−0.34
(ii) Asset style								
Equity	0.89	0.74	–	–	0.17	1.36	–	–
Growth	0.74	1.36	–	–	0.11	1.21	–	–
SmallLowGrade	0.60	0.68	–	–	−0.04	−0.33	–	–
%International	0.22	0.20	–	–	−0.5**	−2.82	–	–
%Top10	1.57	0.85	–	–	0.62**	2.38	–	–
(iii) Active management								
IndexFund	2.10	0.89	–	–	0.37	1.05	–	–
Rsqr	−0.04	−0.02	–	–	0.5*	1.65	–	–
Turnover	−0.12*	−1.83	–	–	−0.04**	−2.35	–	–

(iv) Performance								
PastAlpha1	−0.06	−0.29	–	–	0.04	1.09	–	–
Alpha1	−0.03	−0.12	–	–	0.09**	2.12	–	–
FutAlpha1	0.07	0.25	–	–	0.05	0.87	–	–
(v) Management			–	–			–	–
MgrTenure	−0.04	−1.02	–	–	0.03**	3.63	–	–
MgrTeam	−0.81**	−2.28	–	–	−0.13**	−2.06	–	–
(vi) General								
FamAsset (log)	1.17**	5.84	1.06**	5.70	0.13**	8.01	0.11**	7.34
FamAge (log)	1.52	1.13	0.61	0.66	−0.04	−0.21	0.35**	1.99
LoadFund	0.02	0.04	−0.13	−0.24	−0.11*	−1.93	−0.13**	−2.15
Director characteristics:								
%Interested	5.60**	3.05	6.50**	3.63	−0.14	−0.67	0.10	0.46
DirTenure	0.11**	2.64	0.11**	2.82	0.00	0.38	0.00	−0.20
#Overseen	−0.51	−0.99	−0.41	−1.15	−0.03	−0.94	−0.08**	−3.40
Other:								
DefCompPlan	3.19**	4.31	3.09**	4.60	0.1*	1.73	0.06	1.04
Year2003	−0.36	−0.71	−0.32	−0.85	−0.04	−0.72	−0.01	−0.16
#Obs and R^2	240	0.53	260	0.517	240	–	260	

best interpreted as a conservative estimate for the effect of investors' monitoring on directors' ownership. Prior literature finds that larger, older funds have less sensitive flows (e.g., Chevalier and Ellison (1997)), and that institutional investors are more likely to pull their money from pension funds after bad performance than retail investors from mutual funds (Del Guercio and Tkac (2002)). Thus, it is likely that some of the significant effects of *FundAsset*, *FundAge*, and *%Institution* are attributable to the fact that these variables capture the strength of investor monitoring. In general, these effects are consistent with the interpretation that directors are less likely to own shares in funds where investor monitoring is relatively strong.

As for asset style, directors are more likely to own equity funds than balanced and bond funds. The differential probability of ownership is 12.0%, significant at the 1% level. Within the equity/bond classification, growth funds and international funds do not seem to attract additional director ownership participation, but small-cap equity funds and funds specialized in low grade bonds show a significant 3.69% incremental probability of director ownership. Portfolio concentration as measured by *%Top10* does not have a significant impact. Overall, the results on ownership in equity funds and in small/low grade funds are consistent with the optimal contracting hypothesis.

The results on the relation between active management and directors' ownership are highly consistent with the optimal contracting approach. The coefficient on *IndexFund* suggests that the likelihood of directors owning shares is about 12.2% lower for an index fund. When *Rsqr* changes from the 25th percentile (81%) to the 75th percentile (96%), the probability of director ownership decreases by 1.6%. Finally, a 100% increase in *Turnover* goes with a 0.6% increase in the probability of ownership.

Regarding the effects of fund performance on directors' ownership, we find that although directors' ownership participation seems to be positively related to funds' prior, current, and future performance (as measured by *Alpha* from the market factor model), none of the relations is statistically significant. Thus, the results do not provide support for the performance chasing and private information hypotheses. In Section V, we conduct additional tests concerning these hypotheses.

As for the effect of management characteristics, *MgrTenure* has an insignificant positive coefficient, while *MgrTeam* has a significant positive effect. As discussed in Section II.B.1., the effect of *MgrTeam* on directors' ownership is ambiguous as team management can either reduce managerial incentives due to a free-riding problem or increase incentives due to peer-monitoring. The positive coefficient on *MgrTeam* suggests that the effect of free-riding dominates the effect of peer-monitoring.

Fund size and age both have significantly (at less than 1%) positive effects on directors' probability of ownership. When the fund size increases from the 25th to the 75th percentile level, the probability of a director's ownership increases by 13.3% ($[\ln(903) - \ln(88)] \cdot 5.70$). The marginal effect of *FundAge* is relatively modest: The possibility that directors own shares in a 16-year-old fund (75th percentile in fund age) is only about 3.4% higher than in a

6-year-old fund (25^{th} percentile in fund age). As mentioned above, these results may be capturing some of the effect of investor monitoring on directors' ownership. The probability of ownership does not vary with whether the fund has a load or not. This is not surprising given our earlier discussion that various factors generate conflicting predictions about the relation between load and directors' ownership.

Regarding the effects of directors' characteristics on their participation decision, the results show that being the chairperson of the board (*Chair*) and being an interested director (*Interested*) increase the probability of positive ownership by 4.6% and 4.2%, respectively, statistically significant at less than the 1% level. The coefficient on director age (*DirAge*) is positive, but not significant at conventional levels. The coefficient of director's tenure is positive and statistically significant (at less than the 1% level), suggesting that longer-tenured directors are more likely to own shares. The economic magnitude of tenure's effect is modest, however, with 10 additional years of being the director increasing the probability of owning shares by 4.9%. Similarly, the coefficient estimate on the number of funds overseen is negative and statistically significant, implying that overseeing 10 more funds only decreases the probability of ownership in one particular fund by 1%. As discussed in Section II.A., these results are expected under both the contracting hypothesis and the portfolio optimization hypothesis. Finally, as expected, the existence of a deferred compensation plan increases the probability of ownership by 7.1% (significant at the 1% level).

Overall, the results in column 1 are broadly consistent with the optimal contracting hypothesis. Most variables predicted to indicate greater need for director monitoring are positively and significantly correlated with directors' ownership decision. This implies that governance considerations seem to affect whether directors own shares of the funds they oversee. Results on the relations between director characteristics and ownership can also be consistent with personal portfolio choice.

A.3. Holdings Conditional on Participation

Column 2 shows the results from estimating (5). These results serve as inputs for estimating the marginal effects of variates on directors' unconditional ownership as derived in (6). The dependent variable is the logarithm of the dollar amount of directors' ownership. The coefficients could be interpreted as semi-elasticities (that is, the effect of a one-unit change in the independent variable on the percentage change in ownership levels). Columns 2a and 2b report the coefficients and t-statistics, and column 2c extrapolates the marginal effect (in \$1,000) from the mean values of the independent variables.

Many results in column 2 are consistent with those in column 1. Some independent variables, however, exhibit significant differences between columns 1 and 2, for example, *FundAge*, *MgrTenure,* and *DefCompPlan*. Overall, the results from the conditional ownership analysis in column 2 show weaker support for the optimal contracting approach than the results from the participation analysis in column 1. Column 2 also shows overall lowered significance levels,

partly because of the dampened cross-sectional variation induced by the interval coding of ownership, and partly because of the reduced sample size. Note, however, that we are not interested in column 2 on its own as it mainly serves as an intermediate stage between column 1 and column 3 (which analyzes the unconditional amount of holding), to which we turn next.

A.4. Unconditional Relation between Holdings and Director/Fund Characteristics

Column 3a combines the participation analysis and the conditional holding magnitude analysis. It reports the unconditional effect of different variables on the holding amount. Specifically, it estimates $\frac{\partial y}{\partial x}$ from expression (6) using the inputs from the two-tier analysis in columns 1 and 2.[36]

The results in column 3a are highly consistent with those in column 1: Most variables predicted to indicate greater need for directors' monitoring are positively and significantly correlated with the unconditional magnitude of ownership. For example, on average directors invest $27,690 more in an equity fund than in a bond fund, $6,370 less in an index fund than in an actively managed fund, and $29,660 less in a fund primarily serving institutions than in a pure retail fund. The signs for the independent variables' unconditional effects under column 3 are mostly consistent with those under column 1, suggesting that the effects on a director's participation decision are the dominant factors for the unconditional relation between holdings and director/fund characteristics.

Finally, columns 3b and 3c analyze the effects of independent variables on the unconditional amount of holding by estimating (2) with the interval censored normal regression (two-sided Tobit with interval coding adjustment), taking into consideration double censoring of y at zero and top coding. This approach constrains the effects of independent variables on participation and ownership to be the same. The results are very similar to those in column 3a, and thus mostly consistent with the optimal contracting hypothesis.

B. Alternative Specifications

B.1. Choices among Alternatives

Another way to analyze directors' ownership choice is to examine how directors allocate their total fund ownership among the funds they oversee. This is a particularly relevant question in the mutual fund industry, where it is common that a director sits on many fund boards within the same fund family. In our sample, 2% of the directors oversee all funds in a fund family, 53% of the directors sit on half or more funds in the family, and the average director is on the boards of 39% of the funds in the family. As a result, directors cannot be

[36] The coefficients in column 3a are computed using inputs in columns 1a and 2a via (6). Therefore, they do not have meaningful t-statistics. Their significance could be inferred based on the significance of the participation effect and that of the conditional ownership effect.

expected to hold a significant number of shares in all funds they oversee. From an optimal contracting point of view, given that ownership at the fund level is what matters for governance, we expect directors to hold more in funds that need more monitoring. The analysis in this subsection can reveal whether they indeed do this.

To perform the analysis, we regress the percentage a director holds in a specific fund out of his/her total (in-sample) investment on a set of director and fund characteristics variables. Among directors' characteristics, we include only those that vary across funds, such as a director's tenure. We also include the in-sample number of funds overseen to provide normalization across directors. Let $y_{i,k}$ denote the amount of director i's investment in fund $k = 1, \ldots, m_i$, where k is one of the funds the director oversees, and m_i is the number of fund boards director i sits on. The dependent variable for director i in fund j is defined as follows:

$$d_{ij} = \begin{cases} y_{ij} / \sum_{k=1}^{m_i} y_{ik}, & \text{if } \sum_{k=1}^{m_i} y_{ik} > 0, \\ 0, & \text{if } \sum_{k=1}^{m_i} y_{ik} = 0. \end{cases} \tag{7}$$

Two-sided Tobit is used to account for double censoring at zero and 100%. If a director has zero total ownership, then the proportion the director invests in any fund she oversees is coded as zero. We look at both the full sample and the subsample of directors with positive total ownership (i.e., $\sum_{k=1}^{m_i} y_{ik} > 0$).[37]

Although our sample does not contain all the funds that our directors oversee, the variable "number of funds overseen" provided in the SAIs and the number of funds in our sample that a director oversees are highly correlated, with a correlation coefficient of 0.85. For an average (median) director, our sample contains 74% (61%) of the funds s/he oversees. Under the standard IIA (independence of irrelevant alternatives) assumption for unordered choice models, the marginal effect inference based on partial choice sets is still valid (see McFadden (1974) for details).

Results from analyzing directors' choice among alternatives are reported in Panel B of Table II. Column 1 reports the results for the full sample and column 2 for the subsample of positive ownership. The results are strongly consistent with those in columns 1 and 3 in Panel A of Table II. For example, among directors with positive total ownership, directors invest 8.6 more percentage points in an equity fund than in a bond fund, 7.3 percentage points less in an institution-oriented fund than in a retail-oriented fund, and 7.9 ($3.41 * [\ln(903) - \ln(88)]$) percentage points more in a 75$^{\text{th}}$-percentile sized fund than a 25$^{\text{th}}$-percentile sized fund. These results suggest that governance considerations play an important role in directors' allocation of holdings across funds they oversee.

[37] We look at the subsample separately because the economic interpretation of $d_{ij} = 0$ might be different for a director who does not own any fund shares, versus a director who does not invest in one particular fund (while owning shares in some other funds).

The specification used in Panel B of Table II has two additional benefits. The total ownership of a director must sum up to 100% under this specification. As a result, it removes any unobserved heterogeneity among directors (such as wealth) that leads to different levels of total ownership with a more parsimonious structure than a director fixed effect model. It also removes, to a large extent, unobserved fund family heterogeneity because the multiple funds that a director chooses from are within the same family. Any family effect (such as fund family policies or guidelines that encourage director ownership) would be cleared as we analyze how directors allocate their funds among the alternatives within a fund family.

It is worth noting that the relation between directors' ownership and fund characteristics as documented in Table II is not driven by the representation of different types of funds in the whole sample or in the mutual fund universe. For example, given that there are more equity funds than bond funds (61% of our sample are equity funds, comparable to those in the Morningstar mutual fund universe), it would not be surprising that directors invest more in equity funds unconditionally. However, what we find is that at the director-fund pairing level, a director is more likely to own shares conditional on the fund being an equity fund.[38] Similar argument applies to other variables representing fund types.

Another possibility is that mutual funds might suggest that directors own shares in proportion to fund size, an arrangement consistent with monitoring need. Then, if fund size is correlated with fund style, a relation between ownership and fund characteristics may arise. This is unlikely to be a factor driving our results for two reasons. First, we control for fund size in all regressions, and show that ownership is indeed positively related to fund size. Therefore, the coefficient on fund characteristics (e.g., equity funds, index funds) should be the marginal effect conditional on size. Second, there is no consistent relation between the type of funds that receive more director ownership and the typical size of those funds. For example, the median (average) net asset value of equity funds in our sample is \$276 (\$1,403) million, very close to the full-sample summary statistics. The median (average) net asset value of index funds in our sample is \$454 (\$2,850) million, larger than the typical mutual fund in our sample (but directors own less of them). In sum, a mechanical allocation rule (such as equal or value weighted distribution, or random selection) would not generate the ownership pattern we find.

B.2. Cross-family Analysis

Panel C of Table II presents results on the determinants of the total ownership of all directors aggregated at the family level. As families differ in the extent to which they require/encourage directors to own shares, we expect that

[38] For example, if a director evenly distributes ownership among all funds he oversees and there are twice as many equity funds as bond funds, then his ownership in equity funds will be twice as much as that in bond funds, but conditional on the style (equity vs. bond) of the fund, his ownership is no different.

some of the variation in directors' ownership would be attributed to fund family heterogeneity. Table II Panel C captures this with the family-level regression.

We analyze two dependent variables: aggregate holdings of all directors at the family level (presented in columns 1 and 2), and the proportion of directors in the family that hold more than $100,000 in total in the family (columns 3 and 4).[39] For each dependent variable, we present both a long regression (columns 1 and 3) and a short regression (columns 2 and 4). The long regression is presented mostly for completeness. In it, we construct the family-level analogs to all the variables used in Table II Panel A. For example, *Equity* is the percentage of funds in the family that are equity funds; *IndexFund* is the percentage of funds in the family that are index funds; *FamAsset* is the family's total assets under management; and *FamAge* is defined as the age of the oldest fund in the family. As the table shows, most of the variables are insignificant; especially the ones in the asset style/management style/performance categories. The reason, we believe, is that some of the variables are more pertinent at the fund level (as opposed to the family level), and the aggregation makes them less informative. For example, most fund families provide a spectrum of funds, including equity and fixed income funds in most subcategories. Thus, there is not much variation in asset style across families.

The short regression focuses on the variables that have a more natural interpretation at the family level. These include the investor clientele, family size, and family policy on deferred compensation. Interestingly, we find that some of these variables have predictive power for family level ownership. As expected, family-level ownership increases when the family has a deferred compensation plan and decreases when the family attracts more institutional investors (consistent with the optimal contracting approach). In addition, large families (i.e., families that manage more assets) are characterized by greater directors' ownership.

Overall, our results show that there is indeed considerable variation in ownership across fund families. At the fund level, the standard deviation of director ownership is $215,275. If we de-mean each fund-level ownership value by its family average, the standard deviation is $158,883. The significant difference between the two figures represents cross-family ownership variation. Taken together, the three panels of Table II analyze the total variation (Panel A), within-family variation (Panel B), and between-family variation (Panel C). The results indicate that both family-wide forces and optimal contracting considerations contribute to generating the patterns of ownership we see in the data.

C. Interested versus Disinterested Directors

As we note in the introduction, the monitoring roles of interested and disinterested directors may be different from each other. In addition, there has been a rising interest in the role of disinterested directors. Disinterested directors' ownership is an important factor in Morningstar's Stewardship Grade

[39] Given that this variable is bounded between 0% and 100%, our regressions adjust for censoring.

system that rates the quality of mutual fund governance. Here, we reexamine the issues discussed above for each group of directors.

About 78% of the observations belong to disinterested directors. Interested directors have significantly higher levels of ownership than disinterested directors. At the director-fund pairing level, 27.7% of interested directors own shares, compared to 23.9% of disinterested directors. The average holding for interested directors is $25,916, while that for disinterested directors is only $11,419. Among directors with positive ownership, the average interested director holds about $93,431, while the average disinterested director holds $47,738. Disinterested directors also tend to be older (their median age is 64, versus 58 for the interested directors).

To see whether both groups' ownership decisions are affected by the same set of determinants, we repeat the analyses in Table II separately on the subsamples of interested and disinterested directors using all sample, within-family, and between-family specifications. The results, shown in Table III, indicate that most variables affect the ownership decisions of the two groups in similar directions and are consistent with the results in Table II. Results are more significant for disinterested directors, possibly because that group has more observations.

D. Additional Tests

D.1. Fund-Level and Director-Level Analyses

The first column of Table IV reports the analysis of ownership at the fund level. The dependent variable is the total director ownership in a fund, and a Tobit regression is used to accommodate data censoring at zero. In the analysis, standard errors adjust for heteroskedasticity as well as correlation clustered at the family-level. Overall, the results are consistent with those from the director-fund-level analysis (shown in Table II), with some evidence consistent with the performance chasing hypothesis as the coefficient on *PastAlpha1* (in column 1) is significantly positive (at the 5% level).

Column 2 aggregates ownership at the director level and examines the relation between the total ownership of a director and the characteristics of the director (the fund characteristic variables drop out because a director typically oversees funds with different characteristics). Again, results are broadly consistent with those at the fund-director level.

D.2. Small Fund Families

As we discuss earlier, our sampling method inevitably overweights large fund families. To ascertain whether the director holding patterns are different among smaller fund families, we report both the participation and unconditional ownership analysis for funds from the nontop 25 families in column 3 of Table IV. The magnitudes, signs, and significant levels of most coefficients are similar to those in Table II. There are a few exceptions, however. Most notable are the

Table III
Ownership of Interested and Disinterested Directors

Panel A: Participation and Level of Ownership

This table repeats the analyses in columns (1a)–(1c) and (3b)–(3c) of Table II(A) except estimated separately on the subsamples of interested and disinterested directors. ** and * indicate significance at equal to or less than the 5% and 10% levels.

	Interested Directors					Disinterested Directors				
	I(Ownership > 0)			Ownership ($1,000)		I(Ownership > 0)			Ownership ($1,000)	
Dependent Variable	(1a) Coef × 100	(1b) *t*-Stat	(1c) Marg. Pr (%)	(2a) Coef	(2b) *t*-Stat	(3a) Coef × 100	(3b) *t*-Stat	(3c) Marg. Pr(%)	(4a) Coef	(4b) *t*-Stat
Fund characteristics:										
(i) Investor clientele										
%Institution	−34.24**	−3.16	−10.66	−49.10**	−2.70	−73.32**	−8.90	−21.29	−48.97**	−8.30
FlowSensitivity	−0.30	−0.29	−0.09	0.72	0.39	−2.82**	−2.97	−0.82	−1.81**	−2.70
(ii) Fund asset style										
Equity	37.03**	5.47	11.04	61.72**	5.51	44.04**	8.17	12.20	31.12**	8.52
Growth	9.34	1.55	2.95	15.28	1.58	1.88	0.38	0.55	0.90	0.27
SmallLowGrade	21.45**	2.54	7.06	38.31**	2.81	9.01	1.35	2.69	6.44	1.47
%International	19.60*	1.89	6.10	29.11*	1.74	−9.52	−1.18	−2.77	−2.10	−0.39
%Top10	−23.02	−1.54	−7.16	−33.76	−1.37	−14.98	−1.20	−4.35	−12.08	−1.45
(iii) Active management										
IndexFund	−30.88	−1.55	−8.59	−42.49	−1.31	−54.49**	−3.03	−12.55	−37.64**	−2.99
Rsqr	−33.44**	−2.00	−10.41	−41.77	−1.52	−35.19**	−2.61	−10.22	−23.67**	−2.61
Turnover	3.96**	2.21	1.23	4.57	1.50	1.44	1.42	0.42	0.67	0.95
(iv) Performance										
PastAlpha1	1.21	0.51	0.38	6.30*	1.66	1.43	0.75	0.41	1.82	1.47
Alpha1	2.39	0.78	0.74	6.15	1.22	1.18	0.51	0.34	1.47	0.92
FutAlpha1	0.32	0.08	0.10	3.10	0.48	3.10	1.03	0.90	2.95	1.47
(v) Management										
MgrTenure	0.97	1.58	0.30	2.76**	2.91	−0.57	−1.18	−0.16	0.28	0.86
MgrTeam	5.50**	2.50	1.71	3.66	1.08	9.58**	5.30	2.78	5.60**	4.82

(*continued*)

Table III—*Continued*

Panel A: Participation and Level of Ownership										
	Interested Directors					Disinterested Directors				
	I(Ownership > 0)			Ownership ($1,000)		I(Ownership > 0)			Ownership ($1,000)	
Dependent Variable	(1a) Coef × 100	(1b) *t*-Stat	(1c) Marg. Pr (%)	(2a) Coef	(2b) *t*-Stat	(3a) Coef × 100	(3b) *t*-Stat	(3c) Marg. Pr(%)	(4a) Coef	(4b) *t*-Stat
(vi) General										
FundAsset (log)	21.04**	10.79	6.55	35.90**	10.57	18.70**	11.87	5.43	15.19**	13.40
FundAge (log)	5.58	1.29	1.74	1.02	0.15	13.32**	3.80	3.87	6.31**	2.75
LoadFund	8.81	1.52	2.72	1.32	0.14	−5.00	−1.09	−1.46	−6.44**	−1.99
Director characteristics:										
Chair	29.20**	6.46	9.39	60.92**	8.18	−2.72	−0.59	−0.78	1.36	0.41
DirAge	−0.65**	−2.45	−0.20	−1.33**	−3.06	0.40**	2.38	0.12	0.49**	3.83
DirTenure	2.51**	6.38	0.78	4.09**	6.73	1.35**	5.91	0.39	1.25**	7.54
#Overseen	−0.50**	−13.49	−0.15	−0.85**	−12.14	−0.28**	−8.98	−0.08	−0.21**	−10.02
Other:										
DefCompPlan	15.80**	2.85	4.94	27.34**	3.01	27.45**	6.44	7.95	13.78**	4.88
Year2003	−1.28	−0.46	−0.40	1.67	0.37	−3.38*	−1.79	−0.98	−0.54	−0.43
#obs	8,263			8,263		31,204			31,204	
#Left and right censored	–	–		5,982	1,193	–	–		23,759	1,485
Pseudo R^2	0.17					0.12				

(*continued*)

Table III—*Continued*

Panel B: Choices among Alternative Funds

This table repeats the analyses in column (1) of Table II(B) except estimating separately on the subsamples of disinterested and disinterested directors. The dependent variable is total ownership in million dollars. ** and * indicate significance at equal to or less than the 5% and 10% levels.

	(1) Interested Directors		(2) Disinterested Directors	
	COEF	*t*-Stat	COEF	*t*-Stat
Fund characteristics:				
(i) Investor clientele				
%Institution	−0.72	−0.22	−12.74**	−6.90
FlowSensitivity	−0.07	−1.61	−0.17**	−6.98
(ii) Fund asset style				
Equity	7.91**	5.47	11.13**	11.31
Growth	0.71	0.71	0.08	0.13
SmallLowGrade	3.85**	2.76	1.92**	2.19
%International	0.37	0.23	−3.37**	−3.09
%Top10	−9.04**	−2.81	−5.53**	−2.78
(iii) Active management				
IndexFund	1.21	0.28	−7.50**	−2.42
Rsqr	0.45	0.13	−4.87**	−2.11
Turnover	0.46	1.02	0.13	0.68
(iv) Performance				
PastAlpha1	0.37	0.62	0.09	0.25
Alpha1	0.25	0.32	−0.15	−0.34
FutAlpha1	0.82	0.92	1.31**	2.47

(*continued*)

Table III—*Continued*

Panel B: Choices among Alternative Funds				
	(1) Interested Directors		(2) Disinterested Directors	
	COEF	*t*-Stat	COEF	*t*-Stat
(v) Management				
MgrTenure	0.27*	1.95	−0.10	−1.11
MgrTeam	1.72**	3.50	2.72**	8.57
(vi) General				
FundAsset (log)	4.38**	9.00	4.69**	14.86
FundAge (log)	−0.34	−0.39	2.71**	4.97
LoadFund	2.13	1.55	2.28*	1.91
Director characteristics:				
Chair	4.11**	2.22	0.45	0.19
DirTenure	0.36**	2.88	0.38**	4.82
1/#Overseen (in sample)	94.63**	17.33	96.92**	21.23
#obs	8,398		31,419	
#Left and right censored	6,106	76	23,955	270

(*continued*)

Table III—*Continued*

Panel C: Cross-family Analysis

The table repeats the analysis in Table II(C) separately for interested and disinterested directors. ** and * indicate significance at equal to or less than the 5% and 10% levels.

	Interested Directors ($ mil.)				DisInterested Directors ($ mil.)			
	(1)		(2)		(3)		(4)	
	COEF	*t*-Stat	COEF	*t*-Stat	COEF	*t*-Stat	COEF	*t*-Stat
Fund family characteristic:								
(i) Investor clientele								
%Institution	−0.37	−1.15	−0.45	−1.99	−1.52**	−3.22	−1.35**	−3.85
FlowSensitivity	−0.39**	−2.15	−0.34**	−2.40	−0.61**	−2.67	−0.60**	−3.12
(ii) Asset style								
Equity	−0.18	−0.39	–	–	1.07	1.28	–	–
Growth	0.38	1.63	–	–	0.36	1.04	–	–
SmallLowGrade	0.29	0.78	–	–	0.31	0.57	–	–
%International	0.56	1.24	–	–	−0.34	−0.43	–	–
%Top10	0.48	0.63	–	–	1.09	0.93	–	–
(iii) Active management								
IndexFund	1.44	1.32	–	–	0.65	0.46	–	–
Rsqr	0.69	0.83	–	–	−0.73	−0.58	–	–
Turnover	−0.03	−1.09	–	–	−0.09**	−2.17	–	–
(iv) Performance								
PastAlpha1	−0.01	−0.17	–	–	−0.05	−0.35	–	–
Alpha1	0.04	0.38	–	–	−0.07	−0.41	–	–
FutAlpha1	0.02	0.15	–	–	0.05	0.30	–	–

(*continued*)

Table III—*Continued*

Panel C: Cross-family Analysis								
	Interested Directors ($ mil.)				DisInterested Directors ($ mil.)			
	(1)		(2)		(3)		(4)	
	COEF	*t*-Stat	COEF	*t*-Stat	COEF	*t*-Stat	COEF	*t*-Stat
(v) Management			–	–			–	–
MgrTenure	−0.01	−0.81	–	–	−0.03	−1.01	–	–
MgrTeam	−0.35**	−2.16	–	–	−0.46**	−2.02	–	–
(vi) General								
FamAsset (log)	0.43**	4.86	0.40**	4.79	0.74**	6.32	0.66**	6.22
FamAge (log)	0.89	1.53	0.42	0.99	0.62	0.72	0.20	0.33
LoadFund	−0.26	−1.05	−0.28	−1.27	0.28	0.75	0.15	0.42
Director characteristics:								
%Interested	3.92**	4.59	4.00**	5.14	1.68	1.55	2.50**	2.25
DirTenure	0.03*	1.79	0.03**	2.06	0.08**	2.91	0.07**	2.95
#Overseen	−0.21	−0.96	−0.12	−0.76	−0.30	−0.97	−0.29	−1.40
Other:								
DefCompPlan	0.96**	3.21	0.96**	3.56	2.23**	4.52	2.13**	4.74
Year2003	−0.25	−1.09	−0.15	−0.90	−0.12	−0.36	−0.17	−0.70
#Obs and R^2	240	0.43	260	0.42	240	0.54	260	0.52

Table IV

Determinants of Director Ownership—Sensitivity Checks

Columns (1) and (2) analyze the unconditional ownership at the fund and director level. #Dir is the size of the board in column (1), and is the average size of the board a director sits on in column (2). FundAsset is the log of total fund assets a director oversees in column (2). Standard errors in columns (1) and (2) adjust for heteroskedasticity and within-cluster correlation at the fund family level. Column (3) repeats the analyses in columns (1b)–(1c) and (3b)–(3c) of Table II(A) using the only funds from non-top 25 families. ** and * indicate significance at equal to or less than the 5% and 10% levels.

	(1) Fund Level		(2) Dir. Level		(3) Director-Fund Level (Small Fund Family)			
	Ownership ($1,000)				Ownership ($1,000)		I(Ownership>0)	
Dependent Variable	Coef	*t*-Stat	Coef	*t*-Stat	Coef	*t*-Stat	Marg Pr (%)	*t*-Stat
Fund characteristics:								
(i) Investor clientele								
%Institution	−153.38**	−6.55	–	–	−55.96**	−6.83	−20.42**	−7.23
FlowSensitivity	−0.70**	−2.49	–	–	1.51	1.40	0.26	0.70
(ii) Fund asset style								
Equity	131.43**	7.81	–	–	27.05**	4.45	8.15**	3.99
Growth	17.54	1.16	–	–	10.66*	1.83	4.22**	2.05
SmallLowGrade	62.03**	3.40	–	–	8.51	1.26	3.84	1.46
%International	30.10	1.30	–	–	2.33	0.25	0.01	0.00
%Top10	−95.26**	−2.62	–	–	−10.38	−0.74	−6.36	−1.27
(iii) Active management								
IndexFund	−163.15**	−3.33	–	–	−32.21*	−1.78	−9.79*	−1.86
Rsqr	−121.02**	−2.93	–	–	−46.28**	−2.69	−17.05**	−2.90
Turnover	5.44*	2.04	–	–	−2.23**	−2.63	−0.70**	−2.46
(iv) Performance								
PastAlpha1	10.92**	2.05	–	–	0.23	0.11	−0.73	−0.97
Alpha1	7.65	1.12	–	–	3.01	1.10	0.56	0.60
FutAlpha1	7.97	0.93	–	–	−1.07	−0.29	−0.58	−0.49
(v) Management								
MgrTenure	6.34**	3.87	–	–	1.95**	3.03	0.48**	2.15
MgrTeam	31.41**	4.68	–	–	0.54	0.23	0.62	0.79
(vi) General								
FundAsset (log)	70.94**	13.50	111.45**	5.00	14.41**	7.73	3.90**	6.43
FundAge (log)	18.13*	1.81	–	–	−3.40	−0.84	0.35	0.24
LoadFund	−1.83	−0.14	–	–	29.06**	5.53	12.27**	6.95
Director characteristics:								
#Dir	5.18	1.47	−10.98	−0.99	–	–	–	–
Chair	–	–	225.59**	3.51	25.00**	6.02	4.94**	3.57
Interested	267.29**	5.13	260.59**	4.81	28.41**	6.88	3.37**	2.61
DirAge	–	–	−0.09	−0.05	0.25	1.31	0.14**	2.18
DirTenure	–	–	15.71**	4.49	1.94**	6.67	0.45**	4.42
#Overseen	–	–	6.43**	3.63	−1.04**	−13.13	−0.37**	−13.41
Other:								
DefCompPlan	13.16	1.01	–	–	0.42	0.08	1.38	0.68
Year2003	−7.08	−1.17	−24.68	−1.35	1.30	0.50	−0.61	−0.69
#obs and left censored	4,543	1,832	2,445	767	14,247	996	14,247	996
Pseudo R^2	–	–	–	–	–	–	0.18	

facts that *FlowSensitivity* and *DefCompPlan* cease to have a significant effect, and *Turnover* switches sign.

V. Fee Setting and Performance

In this section, we examine the cross-sectional relations between directors' ownership and two measures of fund performance: expense ratio and future

return. Given the lack of performance persistence, lower fees should eventually be associated with better long-term returns deliverable to investors (Gruber (1996)).

The interpretation of any relation between directors' ownership and subsequent fund performance is subject to caution. If director ownership is solely and optimally determined in equilibrium, then there is no prediction about future fund returns after controlling for fund characteristics. Further, optimal contracting predicts stable ownership over time (ownership is indeed highly persistent for the 2 years we examine). It is therefore difficult for ownership to have consistent predictive power for return performance, which has much higher time-series variability and much less within-fund persistence. That said, however, we suspect that some performance predictability (especially for measures that are persistent, such as fees) could remain because there is a residual component in ownership for reasons unrelated to ex ante monitoring needs.

The first column of Table V reports results from regressing a fund's expense ratio on variables capturing the ownership pattern of the board and other control variables.[40] The variables for the board's ownership include percentage of directors that own shares in the fund (*%Own*), and total ownership (in $10,000) by all interested (*OwnInterested*) and by all disinterested (*OwnDisinterested*) directors. Conditional on each other, *%Own* measures the breadth of ownership, while *OwnDisinterested* and *OwnInterested* measure the magnitude of ownership.

We find that the coefficient on *%Own* is significantly positive (at less than the 1% level), and those on *OwnInterested* and *OwnDisinterested* are negative (both significant at the 1% level). In our sample, *OwnInterested* and *OwnDisinterested* are highly correlated with *%Own* (that is, more owning directors is correlated with higher total ownership). The above results must be interpreted in view of each other: Conditional on the total amount of ownership, more dispersed ownership among directors (high *%Own*) is associated with higher fees; conditional on ownership dispersion, higher ownership is associated with lower fees. We do not find a significant relation between fees and total director ownership if we do not control for *%Own*. In sum, ownership alone has no relation with fees, while high and concentrated ownership is negatively correlated with fees.

Regarding the effects of other board characteristics on fund expenses, we find that consistent with prior findings (e.g., Tufano and Sevick (1997) and Del Guerico, Dann, and Partch (2003)), the fund expense ratio is positively related to board size (*#Dir*, measured as the number of directors on the board). When

[40] A sensitivity check using the sum of expense ratio and one seventh of the average loads for retail shares within the fund yields very similar results. Annualizing load charges over 7 years is a common practice to amortize the buying cost into the total investment cost (ICI (2004)). Because the alternative expense measure is only applicable to a subset of load funds and it is unlikely that directors will turn a load fund into a no-load fund, we choose to report the pure expense ratio results on the full sample. We also cross-check our sample with the CRSP database for fee waiver information. Our results are virtually unchanged if we exclude the seven funds that reported fee waivers.

board size increases from 7 (25th percentile) to 11 (75th percentile), the fees are expected to increase by 12 basis points. More experienced boards (as measured by average director tenure and number of funds they oversee) are associated with lower fees, but the magnitude is small. We also find that overlapping boards (indicated by the average number of funds overseen by the directors) are more likely to have higher fees, but the magnitude is modest (three basis points for an average increase of 10 funds overseen by a director).

The coefficient on *%Disinterested* (the percentage of disinterested directors on the board) is significantly positive, indicating that if the proportion of disinterested directors increases from 50% to 75%, other things equal, the expense ratio is expected to increase by seven basis points. This result contrasts with Tufano and Sevick's (1997) finding of a negative relation between board independence and fund expenses. We suspect that the difference results from the increasing

Table V

Director Ownership and Fund Fees/Performance

All variables are as defined in Table I(A). The dependent variable in column (1) is fund expense ratio in basis points. The dependent variables in columns (2) and (3) are current- and future-year one-factor *Alpha* of the fund return in percentage points, and that in column (4) is a fund's performance rank (from 0 to 100) within the Morningstar category. Standard errors adjust for heteroskedasticity. ** and * indicate significance at equal to or less than the 5% and 10% levels.

	(1) Expense		(2) Alpha1		(3) FutAlpha1		(4) FutRank	
Dependent Variable	Coef	*t*-Stat	Coef	*t*-Stat	Coef	*t*-Stat	Coef	*t*-Stat
# Dir	2.96**	9.40	0.01	−0.06	−0.02	−0.40	−0.71**	−4.01
%Own	22.24**	5.84	−0.80*	−1.67	−0.37	−0.86	−4.43**	−2.19
OwnInterested ($10,000)	−0.34**	−3.64	0.05**	3.33	0.02*	1.72	0.13**	2.30
OwnDisinterested ($10,000)	−0.17**	−2.76	0.02**	2.35	0.01*	1.66	0.05	1.45
%DisInterested	28.13**	2.62	0.19	0.15	0.20	0.18	−1.62	−0.30
AvgDirAge	1.28**	5.52	−0.01	−0.50	0.01	0.31	−0.22*	−1.68
AvgDirTenure	−0.76**	−3.07	0.02	0.75	0.02	0.80	0.07	0.59
Avg #Overseen (10 funds)	−0.29*	−1.90	0.02	1.17	−0.01	−0.69	−0.04	−0.52
FundAge	1.10	0.75	−0.03	−0.14	0.03	0.15	−1.83**	−2.45
Turnover	2.95**	6.64	0.12	1.34	−0.21**	−2.71	0.40	1.31
FundAsset (log)	−6.79**	−9.56	−0.21**	−2.46	−0.35**	−4.41	0.74**	2.04
FamAsset (log)	−3.67**	−4.09	0.11	1.20	0.34**	2.96	1.75**	4.68
Equity	23.97**	11.42	−5.84**	−23.87	−3.59**	−15.48	–	–
Growth	15.40**	7.08	−3.82**	−11.74	−5.01**	−17.82	–	–
SmallLowGrade	11.39**	3.60	5.50**	13.91	5.75**	16.22	–	–
%International	43.29*	10.91	9.70**	19.35	9.01**	21.59	–	–
Institutional	−4.69	−1.57	−0.77*	−1.79	−0.20	−0.51	−4.55**	−2.36
%Top10	−43.89**	−7.56	1.67**	2.90	0.04	0.09	0.39	0.16
IndexFund	−113.39**	−15.65	−2.38**	−3.20	−2.34**	−5.73	15.04**	4.30
Rsqr	−39.18**	−5.55	−5.12**	−4.77	−8.68**	−9.48	7.65**	2.15
Year2003	9.39**	11.79	2.81**	13.57	−1.20**	−6.22	0.89	0.99
# obs and R^2	4146	0.43	4135	0.31	4098	0.34	4146	0.04

representation of disinterested directors on mutual fund boards since the early 2000s.[41]

Columns 2 to 4 of Table V report results on the relation between board structure and fund return performance. The dependent variable in column 2 is *Alpha1,* the monthly average *Alpha* against the benchmark return for the SAI year, using the *Beta* estimated from the fund's monthly returns for the 3-year period ending in the SAI year. The variable *FutAlpha1* (column 3) is estimated analogously for the year after the SAI year. The dependent variable in column 4, *FutRank*, is a fund's return performance rank (from 0, the worst, to 100, the best) among funds in the same Morningstar category for the year after the SAI year.

Column 2 shows that directors' ownership is significantly positively correlated with current-year one-factor *Alpha*. Without information about when (during the year) directors' ownership is formed, the positive relation cannot distinguish between performance chasing and return predictability. Column 3 indicates that director ownership weakly predicts next-year *Alpha* (significant at the 10% level). Column 4, however, shows that the next-year performance ranking is significantly (at the 5% level) correlated with the total ownership of interested directors (but not with that of disinterested directors), suggesting that if the timely investment by interested directors is based on superior information, then information is more likely to be about managerial ability (whether they can outperform their peers) than about the return prospect of the underlying asset category/class.[42] However, the magnitude of the correlation between ownership and performance is modest: A one-standard deviation increase of total interested director ownership ($101,600) is associated with an expected increase of 23 basis points in *Alpha* and 1.2 percentage points in the performance ranking. Further, we do not find any significant relation between changes in director ownership and future fund performance.

Overall, our results are consistent with the literature on the lack of persistence or predictability of mutual fund performance (Carhart (1997), Gruber (1996)). As Baks, Metrick, and Wachter (2001) and Berk and Green (2004) point out, investors chasing after nonpersistent performance does not necessarily imply investor irrationality, nor does it imply the lack of skilled fund

[41] During our sampling period, mutual funds, especially those from large fund families, were under pressure from the regulators and the press to increase their board independence. In 2003, the median *%Disinterested* of funds from the top 25 fund families is 82%, and 15% of them have 100% disinterested directors. In comparison, the median *%Disinterested* reported by Tufano and Sevick (1997) (a sample of funds from large fund families in 1992) is 71%, and no fund has 100%. Among funds from smaller fund families (nontop 25), which we suspect are slower in catching up on independent representation on boards, the median is 75% and a negative relation prevails: Fees are expected to drop 11 basis points when the percentage of independent directors increases from 50% to 75% of the board (significance at 1%). Thus, the positive relation between board independence and expense in the whole sample is mostly driven by funds from large fund families.

[42] For example, almost all mutual funds specializing in real estate securities displayed significantly positive *Alpha* in 2003, and qualify as superior performers by the *Alpha* metric. However, by the ranking measure, only performance above the category median is deemed superior.

managers. Rather, it merely conforms to a competitive equilibrium where investors' marginal returns are roughly equalized after the flow adjustment and managers with superior skills extract most of the rents in terms of fees (Wermers (2000)). Our findings offer weak evidence that directors, especially interested ones, have information about future fund returns that is superior to the information of outside investors.

VI. Conclusion

This paper provides the first empirical analysis on the determinants of directors' ownership in the mutual fund industry. We follow an optimal contracting approach, where directors' ownership is perceived to be important in providing directors incentives to monitor the managers of funds they oversee, but is also costly, especially given the fact that most directors sit on many fund boards at the same time. Thus, the approach predicts that ownership levels will strike a balance between the costs and benefits of ownership, and will be higher on average when the benefit is expected to be greater.

Our results are mostly consistent with the optimal contracting view. Overall, directors tend to own shares in funds they oversee when the benefit from monitoring is expected to be higher, and when there is a lack of other control mechanisms. For example, directors tend to hold shares in actively managed funds, in equity funds, and in funds specializing in small-cap equity or low grade bonds investments. Directors' ownership is also less prevalent in funds with large holdings by institutional investors, and in funds with strong flow-performance sensitivity. In addition, we show that cross-family heterogeneity also explains a significant portion of the overall dispersion in directors' ownership, which suggests that family-wide policies play a role in shaping the ownership patterns.

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