Internal Governance Mechanisms and Operational Performance: Evidence from Index Mutual Funds[♣]

John C. Adams
Coggin College of Business, University of North Florida

Sattar A. Mansi
Pamplin College of Business, Virginia Tech

Takeshi Nishikawa
Peter J. Tobin College of Business, St. Johns University

We provide new evidence linking board characteristics and performance. We employ a sample of index funds to isolate the operational component of performance, thereby minimizing investment policy effects in our performance measures. Using manually collected governance data from the mutual fund industry covering the period from 1998 to 2007, we find an inverse relation between board size and fund performance. We also find evidence supporting our hypotheses that organizational form (whether the fund sponsor is publicly or privately held) plays an important role in determining operational performance. Specifically, we find that board size, the presence of fund sponsor officers, and boards comprised of all independent directors are related to operational performance when the sponsor is publicly held. For privately held firms, board structure is insignificantly related to performance. Overall, the results are consistent with the notion that there may not be a single optimal board structure that is applicable to all funds, attempts to regulate board attributes should be considered with caution, and sponsor level factors are important board structure considerations. (*JLE* G34, G32, G20)

[♣] We thank Richard Burns, Delroy Hunter, Patrick Kelly, Steve Kowitski of Lord Abbett and Company, Mathew Spiegel (the editor), Lei Wedge, Tina Yang, an anonymous referee, and seminar participants at Texas Tech University, University of North Florida, and Virginia Tech for their comments and suggestions. Special thanks to Antti Petajisto and Martjin Cremers for providing their mutual funds active share and tracking error measures. Mansi acknowledges financial support received from partial summer funding at Virginia Tech. The remaining errors are ours. Send correspondence to Takashi Nishikawa, Peter J. Tobin College of Business, St. John's University, 8000 Utopia Parkway, Queens, NY 11439. E-mail: nishikat@stjohns.edu.

A board of directors is responsible for monitoring and evaluating senior management. Central to the board's effectiveness is the question of board structure or composition (Hermalin and Weisbach, 2003). Inside directors provide specific knowledge that assists the board in understanding the detailed aspects of the organization. In contrast, outside (or independent) directors contribute expertise and objectivity that ostensibly mitigates managerial entrenchment and expropriation of resources. The governance literature suggests that as boards become increasingly independent of managers, their monitoring effectiveness increases thereby decreasing managerial opportunism and enhancing overall performance.

In this paper, we examine the relation between boards of directors and shareholder wealth by employing a sample of mutual funds designed to track the performance of various domestic equity indices. In doing so, we attempt to answer the following two questions: (i) Does board structure, as an internal governance mechanism, have an impact on fund performance, and if so (ii) How does this relation change when the sample is segmented by index fund type and by organizational structure.[1] Overall, our results suggest that funds with smaller boards, boards with inside directors who are also fund sponsor officers, and boards made up exclusively of independent directors are associated with improved performance. We also find that board structure impacts operating performance in funds offered by publicly traded sponsors where agency costs are higher and in funds with easily replicable benchmarks where monitoring costs are lower. These findings imply that there is not a single ideal board structure, rather different funds have different optimal board structures (Hermalin, 1994).

Index mutual funds provide an ideal laboratory to examine the relation between board structure and performance for three reasons. First, index mutual funds have identical investment strategies and their primary assets offer the same return, yet there are economically significant return differences among the funds that may only be explained by differences in operational policies (e.g., Elton, Gruber, and Busse, 2004).[2] These policies are negotiated and governed by mutual fund boards of directors. One possible explanation for the inconsistency of prior research relating board structure to performance is the use of metrics that combine operational and investment results. Because boards of directors only meet a few times a year

[1] Segmenting the sample by index fund type refers to those with easily replicable portfolios and significant followings and by organizational structure refers to public and private ownership of fund sponsors.
[2] Operational policies include fee setting, marketing plans, cash management, index tracking strategies, servicing shareholder accounts policies, governmental requirements compliance procedures, and securities lending programs.

and fund sponsors make the day to day investment decisions, the relation between monitoring effort and overall performance is not clear. Therefore, by isolating operational performance from investment performance, index funds permit us to minimize measurement error and allow us to effectively examine the board-performance relation.[3]

Second, index funds have performance measures such as expense ratios, differential returns between the fund and its benchmark index, and alpha that are immediately available and easily comparable to their benchmark indices. This comparability of index fund performance has important implications for the ability of boards to effectively monitor fund management. Parrino (1997) documents a positive relation between board monitoring effectiveness and industry homogeneity, supporting the hypothesis that the availability of a reliable benchmark enhances the ability of the board to identify inferior managers and policies. Our premise is that if boards cannot effectively monitor when the costs are low, it is unlikely they will be good monitors for actively managed funds where monitoring costs are higher.[4]

Third, although mutual fund and corporate boards both have legal mandates to monitor management, there are differences between the two entities. A mutual fund has no employees and necessary services are provided on a contract basis that the board renegotiates annually. These services are provided by fund sponsors, underwriters, administrators, transfer agents, custodians, independent public accountants, and other providers of services that funds require.[5] It is also customary for mutual fund boards to include officers and directors of the fund sponsor. While these inside directors have monitoring incentives because their compensation and career prospects are linked to fund performance, having a sponsor officer may represent a conflict of interest as these directors have opposing fiduciary responsibilities to the fund sponsor and fund shareholders. In addition, mutual fund boards often monitor several funds within the fund complex overseen by a particular fund sponsor. Since directors are compensated for each individual fund, aggregate compensation can be significant for directors in large fund complexes.

[3] Since lowering operational costs generally results in better overall performance, operational policy is also an important consideration in actively managed funds.
[4] Monitoring investment policy is important, but problematic for boards since actively managed funds seek to make investments that will increase in value, although there is uncertainty as to whether increases will occur.
[5] For a detailed list of the mutual funds required services, see the 2008 Investment Company Fact Book.

Performance is an important driver of the cash flows in or out of mutual funds. Open-end mutual fund shareholders can buy or sell shares at net asset value and therefore, can readily move from one fund to another based on superior performance. Consistent with this notion, Sirri and Tufano (1998) report a positive relation between prior period fund performance and subsequent cash inflows. Because fund sponsors manage mutual funds in exchange for fees that are annually negotiated, operating strategies employed by the fund sponsor companies affect performance and therefore, net cash flows. The cash flow maximizing strategy of fund sponsors is to set performance levels at an equilibrium point where the marginal fee revenue, which is a function of fee level and fund size, equals the marginal cost of operating the fund. Fund sponsors following this cash flow maximizing strategy in turn maximize the wealth of their own shareholders.

However, due to agency problems between sponsor company managers and sponsor company shareholders the actual performance level can deviate from this equilibrium point. This suggests that the level of agency problems prevalent at the sponsor level may have significant influence on fund performance. That is, as the severity of agency problems at the sponsor level declines mutual fund shareholders enjoy better performance.[6] The Investment Company Act of 1940 requires all investment companies, whether privately or publicly held, to release detailed performance information of the funds they oversee. Therefore, we are able to directly examine the impact of ownership structure on performance. Our basic premise is that ownership of publicly held sponsors tends to be more atomistic and suffer more from the effects of agency costs than does the ownership of privately held sponsors. As such, mutual fund board structure and its effectiveness may vary across different fund sponsor ownership structures as a result of varying agency environments.

Using hand collected board of directors data consisting of 976 fund-year observations representing 148 mutual funds (benchmarked to 28 U.S. equity indices offered by 78 fund sponsors) covering the period from 1998 through 2007, we find that boards with inside directors who are also officers of the fund sponsor are associated with improved fund performance. We also find that boards that are made up exclusively by independent directors are also linked to

[6] It is possible that the reduction of agency problems between fund sponsor shareholders and managers can also result in fee strategies that maximize fund sponsor shareholder wealth but hurts mutual fund investors. However, it seems unlikely that lower agency problems at the sponsor level would result in a cash flow strategy designed to lower the wealth of sponsor shareholders.

superior performance. This duality in the board independence-performance relation suggests that there is not a single board structure that is optimal for all funds. Consistent with Gertner and Kaplan (1996) and Del Guercio, Dann, and Partch (2003), we also find evidence that board size is negatively related to overall performance. Further, when we examine other director attributes that may impact boards' ability to mitigate agency costs, we do not find any evidence that director time constraints such as retirement status, number of funds overseen with the fund family complex, and outside directorships impact fund performance. Similarly, tenure, fund ownership as well as director compensation, commonly cited director-shareholder alignment proxies are also not significantly related to performance.

In further testing, we segment the sample by fund type and find that the board-performance relation is stronger in funds that benchmark easy to replicate indices with large market shares (such as the S&P 500 and Russell 1000) than in funds that benchmark smaller and more difficult to replicate indices (such as the S&P 400, S&P 600, Wilshire 4500, and Russell 2000). This suggests that board monitoring is more effective for funds that track frequently used indices with reliable performance benchmarks where monitoring costs are lower. Alternatively, the performance measures for large cap index funds have less measurement error than small and midcap funds. We find that boards made up of all independent directors, boards with sponsor officer representation, and funds with more outside monitoring (i.e., higher levels of institutional ownership), are associated with superior performance for large cap index funds but not for small and mid cap index funds.

We also find evidence supporting our hypotheses that organizational form (whether the fund is publicly or privately held) as an internal governance mechanism plays an important role in determining operational performance.[7] Consistent with our arguments, we find that board size, the presence of fund sponsor officers, and boards of all independent directors are related to operational performance when the sponsor is publicly held, while none of the board structure variables are consistently and significantly related to performance for privately held sponsors. We also examine specific operational policies, including marketing (i.e., front end loads and 12b-1 fees), cash management, and portfolio benchmarking strategies. Again, we find that board structure matters for publicly sponsored funds only. These results imply that the returns on

[7] Jack Bogle, former chairman of the Vanguard Group, sponsor of the largest S&P 500 index mutual fund, argues that sponsors that are publicly owned have greater conflicts of interest with mutual fund shareholders than do sponsors that are privately held.

investments in governance depend on the severity of potential agency costs.[8] These results also suggest that the findings of prior studies on the effectiveness of boards and the relation between board characteristics and performance are applicable only to publicly owned firms.

This study makes several contributions to the literature on mutual funds. First, to the best of our knowledge we are the first to examine the impact of board structure on performance using index funds to isolate operating performance. Second, this paper documents that many board structure characteristics thought to mitigate agency costs only matter when the fund sponsor has a public ownership structure. This finding illustrates the importance of controlling for various agency cost environments when examining mechanisms designed to mitigate such conflicts of interest. Third, we are the first to examine the role insiders with opposing fiduciary responsibilities, sponsor officers who also serve on mutual fund boards within their fund complex, play in fund performance.[9] Finally, our study provides new and relevant insights into the current regulatory debate on optimal board structure in the mutual fund industry.[10]

The remainder of the paper is organized as follows. Section 1 discusses the sample, variable measures, and descriptive statistics. Section 2 outlines our methodology and presents our hypotheses relating board characteristics, sponsor ownership, and performance in a multivariate framework. Section 3 provides alternative specification regarding boards, operational policies, and ownership type. Section 4 provides the conclusion.

1. Data and Variable Measures

We construct our sample by identifying open-ended U.S. equity index funds in the December 31st editions of *Morningstar Principia Pro* mutual fund databases from 1998 to 2007. The Morningstar database contains monthly class level returns and yearly information including total net assets, 12b-1 fees, expense ratios, fund class age, purchase constraints (e.g.,

[8] We also find that public funds, where the benefits of monitoring are greater, invest significantly more in governance via director compensation than private funds.

[9] Cremers et al. (2009) examine the role of non-independent director fund ownership on subsequent period fund performance. However, they take a different methodological approach and make no distinction between officer and non-officer inside directors as we do.

[10] An added benefit to our approach is that sponsor level factors (e.g. sponsor ownership type and sponsor officers chairing mutual fund boards) are less subject to the endogeneity problems common in board studies as the causality may run in one direction but not likely the other (e.g., firms decide on organizational form first and then make performance related decisions).

institutional share classes) as well as historical returns. For each fund, we also gather sponsor level information including number of funds managed and total net assets from all funds under management.[11] The Morningstar and CRSP databases list information on a per share-class basis. Since many mutual funds have multiple share classes that differ primarily in expenses, loads, and clientele, we combine the different classes into a single fund. Specifically, we compute the net asset value weighted average of the class-level data items. In addition, we manually gather data on each fund's board of trustees (directors) from the Statement of Additional Information (SAI), which is located in Form 485 of each fund's prospectus. Because multiple filings are common, data are obtained from the Form 485 whose submission date is closest to December 31st of each year. Merging the data and applying these requirements yields a dataset of 976 fund-year observations on 148 funds from 78 sponsors covering the period from 1998 to 2007.[12]

1.1 Measuring Board and Trustee Characteristics

We measure board and trustee independence using four variables. First, a dummy variable that takes a value of one if the trustee is an outsider (independent) of the fund in accordance with SEC (2004) regulations. Under these regulations, an outsider is a trustee who is not an employee, not an employee family member, a trustee who is not an employee or a 5% shareholder of a registered broker-dealer, or a trustee who does not have any affiliation with any recent legal counsel to the fund. Second, a dummy variable that takes a value of one if the board chairperson is an outsider as identified in Form 485. Third, a dummy variable that takes a value of one if all directors of a fund's board are independent. Fourth, a dummy variable that takes a value of one if the insider trustee is also an executive officer of the sponsor (e.g., chairperson, CEO, and executive vice-president).

We also collect director level data including age and tenure. The SAI also lists each trustee's employment history for the preceding five years and notes whether a trustee is retired. From the employment history, we count the number of outside directorships excluding appointments to not-for-profit organizations and board appointments associated with a trustee's primary

[11] As a cross-check, we compare the data gathered from the Morningstar database with the CRSP Mutual Fund database and find 27 inconsistencies. We refer to each fund's Form 485 to resolve discrepancies between the two databases.

[12] We track funds through sponsor level mergers and acquisitions.

employer. We assign a dummy variable (Retired) to indentify retired trustees. We also record from each Form 485 the number of funds each director oversees within the fund family. Starting in 2002, each Form 485 lists the dollar value, in specific ranges, of all funds owned by each trustee in the fund family. Further, we obtain the overall compensation received for all funds overseen within the same fund family for both independent and inside directors. The sponsor compensates fund sponsor officers and employees who serve on the mutual fund board.

For each of the trustee level data items collected above, we compute board level values by computing the average of each trustee level variable. We also collect data on the number of trustees serving on each fund's board (Board Size) and manually search each Form 485 to ascertain whether a single board oversees all of the funds of the sponsor (Unitary).[13] The sample generation process results in six board structure variables (board size, unitary board, percentage outsider, all independent dummy, independent chairperson dummy, and a sponsor officer dummy) and six trustee attribute measures (retired, number of funds overseen, tenure, trustee compensation, trustee fund family share ownership, and outside director appointments) for each fund.

1.2 Measuring Fund Performance and Characteristics

We follow Elton, Gruber, and Busse (2004) and use three benchmarks to measure index fund performance: expense ratio, return differential, and alpha. We use each fund's expense ratio as our primary performance measure. Christoffersen and Musto (2002) and Carhart (1997) note that fees represent a large proportion of the return differential among funds. We compute each fund's differential return by subtracting the annual dividend adjusted return of the index (the fund tracks) from the corresponding return of each fund.[14] We also use the risk adjusted return for each fund, alpha, computed over a 36 month horizon using each fund's benchmark index and the 30 day T-bill return. Lastly, we obtain each fund's return sensitivity to the benchmark index (Beta) and the corresponding coefficient of determination (R^2).

[13] We redo the analysis using board size as the number of independent directors and find similar results.

[14] For robustness, we also compute the fund's competitive return, computed as the difference between each fund's calendar year return and the median return for all funds employing the same benchmark index. Directors and shareholders can compare their own index fund's performance to the performance of other "competitive" index mutual funds. The results are similar to those of differential returns.

In addition, we control for fund specific characteristics using size, age, institutional ownership, and dummy variables that capture different fund investment objectives. Fund and family size, a proxy for economy of scale effects related to performance and fees, is computed as the natural log of total net assets. Fund age, a proxy for possible subsidization of lower fees, is computed as the log of the years since the inception of the oldest share class. Institutional ownership, a proxy for monitoring and clientele effects, is the proportion of each fund's total net assets that are in share classes designed to attract institutional shareholders. Institutional share classes typically charge lower fees in exchange for higher investment account balances and lower servicing costs. Finally, we include dummy variables to denote enhanced and managed funds, and benchmark dummies to capture variations in fees and performance that are due to investment objectives. A brief description of the sample variables and the data sources used, to obtain or compute them, is presented in Table 1.

[Insert Table 1 about here]

1.3 Sample Description

Table 2 provides summary statistics for the variables used in the analysis. Panel A reports the incidence of fund benchmarks by index and investment categories. Included is the frequency of each index as well as market share data for each investment category for the first year (1998) and last year (2007) of the sample. The data indicates that the S&P 500 index is the most frequently used index in the sample with 502 observations representing over half of all index funds in the sample. For the beginning year of our sample (1998), the S&P 500 index funds accounted for about 77% of the overall market share (assets under management), with this number declining to about 45% in the last year of the sample (2007). Similar declines in market share occur for several other index benchmarks. The declines are the result of increased indexing opportunities throughout the sample period.[15] The market share of large cap index funds fell by about 6%, from 95% to 89%, while the market share of mid and small cap index funds rose between two to three fold over the ten-year sample period.

[15] For example, Vanguard, a prominent index fund provider switched most of its funds from S&P indices to Morgan Stanley indices over the period 2002 to 2004. Large cap funds represent 69% of all fund year observations.

[Insert Table 2 about here]

Panel B of Table 2 reports descriptive statistics for the variables used in the analysis for all, public, and private sponsors. Included are the mean, median, and standard deviation for the measures of fund performance, fund characteristics, and governance characteristics. For brevity, we limit our discussion to the public and private sponsored funds only.

The mean and median expense ratios and differential returns of private sponsored funds are slightly less than those of publicly sponsored funds. However, the negative alphas of privately sponsored funds are less than one-half of the alphas of publicly sponsored funds. Of the three performance measures, expense ratios have the lowest variations while differential returns the highest. The private sponsor standard deviations are about one third larger for expense ratios and about three times larger for differential returns. We also find that beta and R^2 show larger cross sectional variations for private than public sponsor funds. Consistent with the Elton et al. (2004) we find that our index funds, on average, underperform their benchmark indices. The similar size of expense ratios, differential returns, and alpha combined with the variation in these performance measures across public and private sponsors indicate that differences in performance among funds are due largely, but not exclusively, to expense ratios and sponsor ownership type.

In terms of fund characteristics, the mean and median fund size of public funds, measured by total net assets under management (TNA), is $1.1 billion and $466 million, respectively. The private index funds have a similar median TNA, but much larger mean and standard deviation measures. A similar, but more pronounced pattern exists for family size. The increased variation in fund and family size for private sponsor funds is consistent with the increased variation of the performance measures. Fund age and institutional ownership levels are similar for both private and public funds. It is interesting to note that while some funds are only held by institutions, the average index fund has about three different share classes, indicating most funds have varying fee structures and clienteles.

In terms of board and director characteristics, we find that the governance summary statistics for private and public sponsor funds are similar. The median private sponsor mutual fund board has one fewer director than public fund boards (eight versus nine). Approximately 68% of public funds and 85% of private funds utilize a unitary board structure. As expected,

independent (outside) board members dominate the index fund board structure due to the proposed (2004) SEC regulations requiring at least 75% of directors to be independent (up from the previous requirement of 50%).[16] About 12% of the funds have boards made up entirely of independent directors and 37% have independent chairpersons. However, the definition of independent director under the Investment Company Act creates a gray area in classifying interested (or insider) directors. Our interest is not in insiders per se, but rather insiders who we expect to be more aligned with the sponsor as opposed to mutual fund shareholders. Therefore, we focus on fund sponsor officers whose median representation on public and private sponsor mutual fund boards as reported in panel B is about 11% and 14%, respectively.[17]

The median compensation per director is about $64K for private vs $85K for public index funds, consistent with funds investing more in governance when agency costs and the potential benefits from monitoring are greater.[18] The demand for directors is high, with the average director in both ownership categories serving on about one outside board. Directors serve on many boards within the fund family, with the average public and private director overseeing about 72 and 79 funds, respectively. The funds per director, computed as the number of funds overseen divided by board size, is about eight funds. The median director age for both ownership categories is about 61 years, consistent with the notion that experience is a factor in director selection. Director turnover is infrequent given that the mean tenure is equal to the average fund age. Many directors are retired, making up about 21% of all fund directors. Directors appear to own many of the funds they oversee. About 83% of public sponsor directors own shares in at least one of the funds they oversee versus 80% for private sponsor directors. The ownership levels are similar to those in Chen, Goldstein, and Jiang (2008).

Panel C describes the correlations among the variables in the sample. We segment the table into performance variables, fund characteristics, and governance characteristics. The correlations between the three performance measures (expense ratio, alpha, and differential return) have their anticipated sign and significance. The level of the correlations vary from 18% to 41% in absolute terms indicates that operational policies (such as expense ratio levels) are

[16] Since our sample period covers both regimes, independent directors range from 50% to 100%.
[17] Although not reported in panel B of Table 2, about 68% of public boards and 74% of private boards have at least one sponsor officer.
[18] When comparing director compensation across ownership types (public vs private), we find the differences to be significant at the 1% level.

important performance considerations. The three fund characteristics are negatively correlated with expense ratios, consistent with increased economies of scale. Of the six governance characteristics, only outside directors and institutional ownership are positively related to all three performance measures (negative sign on expense ratio indicates higher performance). The sponsor officer variable is associated with higher expense ratios and higher alpha, the size of the correlations suggests officer influence on higher expense ratios is offset by increased risk adjusted performance.

2. Empirical Results

In this section, we examine the hypotheses relating board characteristics, sponsor ownership, and performance. Elton, Gruber, and Busse (2004) find that past performance of index funds relative to the underlying index is a good predictor of future performance primarily because expense ratios are fairly consistent from year to year. Since our goal is not to predict future performance, our analysis excludes prior performance measures. We acknowledge that prior performance may be highly correlated with current performance, but argue the relation is not causal. Instead, performance is a function of governance factors and operating strategies that determine the actual level of expenses and performance. Despite having a clear-cut and easily replicable investment policy, each index fund has considerable discretion in determining its operational policies. Therefore, failing to account for changes in governance factors that ultimately affect fund operating policies and performance may have a negative impact on investor wealth. In our analysis we use family and fund level factors as well as board of director factors to examine fund performance.

2.1 Methodology

Boards and fees do not change frequently in the mutual fund industry. This means that our panel dataset may be correlated both across funds and across time. As a result OLS standard errors can be biased and either over- or underestimate the true variability of the coefficient estimates. The bias becomes larger as the number of years in a panel set increases (Bertrand,

Duflo, and Mullainthan, 2004).[19] OLS assumes each additional year provides new information and as a result the estimated standard error will incorrectly decrease. While the standard approach to remedy this problem is to use heteroskedastic robust standard errors adjusted for the correlations (clustering) within fund and/or year groups (Petersen, 2009; Thompson, 2006), this methodology may be problematic when the number of groups and the number of observations within each group is small (Donald and Lang, 2007). Wooldridge (2003) points out that clustered robust standard errors for pooled OLS do not work well, even with 50 clusters, which is much greater than the number of years in our overall sample.[20] We address this issue by estimating our models using year fixed effects with fund level clustered robust standard errors. Although not reported, we repeat the analysis using robust standard errors without clustering. The standard error results for the latter methodology are generally lower than those of the clustered approach and our results are robust to each methodology.

Next, we address potential endogeneity concerns between internal governance measures and performance.[21] In addition to employing year fixed effects, we also perform the following tests. First, since prior board structure may affect current performance, we regress performance measures on lags of governance variables. Second, we note that average director tenure for the sample of index funds is approximately equal to average fund age. Although this observation alone does not negate endogeneity concerns, it is nevertheless inconsistent with the notion that board attributes are a function of fund performance. Third, we employ an instrumental variable approach as in Ferris and Yan (2007) and use fund sponsor age, number of investment objectives per sponsor, portfolio turnover, and fund manager tenure as instruments.

2.2 Board Structure and Fund Performance

We test the cross-sectional relation between board structure and fund performance variables, while controlling for fund specific measures as in Elton, Gruber, and Busse (2004).

[19] As an illustration, if the board and fund characteristic variables (the independent variables in our study) are perfectly correlated with the regression residuals across time, then each additional year provides no new information, and has no effect on the true standard error.

[20] Because index funds are a relatively new financial innovation, increasing the number of yearly observations is not possible for many funds, especially the non-S&P 500 index funds. Nevertheless, we apply Thompson's (2006) correction to compute multi-level (fund and year) clustered standard errors and find similar results.

[21] This is primarily a concern for the board structure and director variables since sponsor level measures are likely exogenously determined (e.g., investment companies decide first on organizational form and then offer funds, appoint initial directors, select fund managers, etc).

The primary specification is

$$\begin{aligned} Fund\ Performance_{i,t} = \beta_0 + \sum_{j=1}^{6} \beta_j\,(Board\ Characteristics_{i,t}) + \sum_{j=7}^{10} \beta_j (Fund\ Characteristics_{i,t}) \\ + \sum_{j=11}^{27} \beta_j\,(Benchmark_{i,t}) + \beta_{28}\,(Enhanced\ Fund_{i,t}) \\ + \beta_{29}\,(Managed\ Fund_{i,t}) + \sum_{j=30}^{39} \beta_j\,(Time_t) + \varepsilon_{i,t} \end{aligned} \quad (1)$$

where Fund Performance is measured using the variables expense ratio, alpha, and differential returns, and Board Characteristics include board size, unitary structure, independent directors, all independent dummy, independent chair dummy, and fund sponsor officers. Fund Characteristics include controls such as family TNA, fund TNA, fund age, and institutional ownership. The variables benchmark, enhanced fund, managed fund, and time represent dummies for each fund's benchmark index, dummies for funds that employ performance enhancement and tax minimization strategies, and time dummies, respectively.[22]

Panel A of Table 3 reports the results from regressing the primary board structure characteristics on fund performance measures.[23] We employ three model specifications of board characteristics to reduce multicollinearity effects. Model 1 presents the results using independent directors and independent chair dummy. Model 2 includes independent chair dummy and fund sponsor officers. Model 3 includes all independent dummy and fund sponsor officers. In all models, we include board size and unitary board structure variables. Columns 1 through 3 present the results for expense ratios, columns 4 through 6 for alpha, and columns 7 through 9 for differential returns.

[Insert Panel A of Table 3 about here]

We find that board size is significantly and positively related to expense ratios in all models.[24] Unitary board structure and the proportion of independent directors, often-cited

[22] In unreported regressions, we control for differences in managed and enhanced funds from their benchmarks using the active share measure from Cremers and Petajisto (2008) and find similar results. The estimated coefficient on the active share measure in this specification is statistically insignificant.
[23] Note that prior to 2002, mutual funds were not required to provide information on many director level measures. We address this issue by examining the primary board structure variables that are available throughout the sample period separately and then examine these variables along with the director level attributes in separate specifications.
[24] In an unreported regression, we also find similar results using the number of independent directors.

mutual fund board structure factors, are insignificantly related to expense ratios. The estimated coefficient for the independent chair dummy variable is insignificant. The estimated coefficient of the sponsor officer dummy is negative and economically significant (on average, a fund with at least one sponsor officer on its board would see its expense ratio decrease by about 8 basis points, a large decrease considering the median expense ratio is only about 40 basis points). This result is inconsistent with the idea that insiders are ineffective monitors. Instead, the findings suggest that the presence of sponsor officers on mutual fund boards have a greater positive impact on operational performance than the proportion of independent directors and the presence of an independent chair. The all-independent director dummy coefficient is negative and statistically significant at the 5% level.[25]

Panel A also repeats the expense ratio regressions for the alpha and differential return variables. The results are similar across all three performance measures. The board size coefficients are negative and significant, consistent with the positive and significant relation for expense ratios. Estimated coefficients for unitary boards and the proportion of outside directors remain insignificant, as does the independent chair dummy. The all independent director dummy coefficient is positive for both alpha and differential returns, although significant only in the differential returns model. The sponsor officer coefficient is positive and significant in all specifications. Finally, consistent with the descriptive statistics the adjusted R-squared is highest for the expense ratio models and lowest for the differential returns models.

The control variables have their expected signs. Family level total net assets (TNA) is generally not significantly related to expenses, but fund level TNA is significantly and negatively related. These results are inconsistent with the argument that investors may be willing to pay higher fees in exchange for the lower search costs associated with larger fund families (Sirri and Tufano, 1998). The results indicate that investors do not tolerate high index fund expenses in exchange for diversification opportunities in large fund families. The proportion of fund ownership by institutional investors is negatively related to expense ratios, results that are statistically significant at the 1% level. These results support the hypothesis that cash flows from institutional shareholders are sensitive to performance (e.g., Hartzell and

[25] Due to the negative correlation between the all-independent dummy and the sponsor officer dummy (see e.g., Table 2, panel C), we repeat model 3 without the sponsor officer dummy and find similar results.

Starks, 2003). Institutional classes tend to have larger account sizes, require fewer services, and command lower fees resulting in lower expense ratios relative to non-institutional share classes.

Panel B of Table 3 provides results for the primary board structure variables and director level attributes including director retirement status, number of funds overseen within the fund complex, number of outside directorships, director tenure, fund family ownership, and director compensation. SEC regulations does not require disclosure of director fund ownership prior to 2002, hence the difference in the number of observations in panels A and B. The estimated coefficients for the sponsor officer variable are similar to those in panel A (negative and significant for expense ratios, positive and significant for alpha and differential returns). Likewise, the all independent director dummy remains significant in five of the six specifications. Board size is significant only for the alpha models. The coefficient for unitary board structure is negative and marginally significant for expense ratios and positively significant for differential returns (but not for alpha).

[Insert Panel B of Table 3 about here]

The estimated coefficient for retired directors is positively and significantly related to expense ratios at the 1% level, but inconsistently significant in the remaining models (columns 2 through 6). The number of funds per director and the number of outside directorships coefficients are both insignificant, findings that are at odds with the idea that less busy directors are better monitors (Fich and Shivdasani, 2006). Average director tenure is not significantly related to expense ratios, which suggests that monitoring experience is not an important contributor to performance. We also do not find director fund ownership to be significantly related to expenses (Cremers et al., 2009). Following Tufano and Servick (1997), we incorporate unexplained compensation as our measure of director compensation and also find this measure to be insignificant.[26] The control variables have their expected signs and are similar to those in Panel A of Table 3.

These results presented in panels A and B of Table 3 are consistent with sponsor officers seeking to increase fund returns, both raw and risk adjusted, and lower expenses. Similar to

[26] Specifically, we employ Tufano and Sevick's (1997) measure of relative director compensation (equation 2, page 338) scaled per $100,000. This measure is the residual obtained from the following specification:

$$\text{Director Comp}_i = \beta_0 + \beta_1 (\text{No. of funds overseen by a director}_i) + \beta_2(\text{TNAs of funds overseen by a director}_i) + \varepsilon_i$$

board monitoring, compensation schemes are important governance mechanisms. The compensation system prevalent in the mutual fund industry, in which both the sponsor and the sponsor officer(s) benefit from increased fund size, encourages sponsor officers to increase performance in order to attract cash inflows. The results are also consistent with monitoring effectiveness and overall performance increasing when boards are more independent. These mixed results, where less independent boards (those with sponsor officer representation) and more independent boards (those comprised of all independent directors) are both associated with improved performance suggest that optimal board structure varies from fund to fund.

2.2.1 Board Structure and Fund Performance Segmented by Investment Category

When examining the relation between the primary board structure variables and mutual fund performance, we utilize index funds data to reduce measurement error in the sample. However, measurement error can be problematic for some index funds. For example, the annual number of changes in the stocks that make up the index of the Russell 2000 range from around 400 to over 700 over the period from 1998 to 2007, making benchmark index replication problematic. Funds that benchmark the Russell 2000 index encounter large and costly annual portfolio turnover costs if they attempt to precisely mimic the underlying benchmark portfolio. Cai and Houge (2008) find that funds that delay selling deleted stocks and buying added stocks around index reconstitution dates significantly outperform funds that do not. Mutual funds that benchmark indices of small and mid cap stocks account for 31% of all index funds but have a combined market share of only 11%. If boards focus their monitoring efforts on funds with larger market shares or measurement error is greater in the small cap performance measures, then the board-performance relation should vary by fund type.

Table 4 reports the estimated coefficients for the expense ratio, alpha, and differential returns models for large cap index funds (columns 1 through 3) as well as the small and medium cap index funds (columns 4 through 6). We combine the former (medium and small cap fund) into one category due to the smaller number of observations in the two funds. For large cap funds, we find that the all independent director and the fund sponsor officer dummy variables are statistically significant across all performance measures. The estimated coefficients for board size and unitary board structure are only significant for the expense ratios. In

contrast, none of the board related variables for the combined small and midcap funds are significant across all three performance measures. However, three of the measures (board size, unitary board structure, and independent chair dummy) are significant for alpha, and one measure (board size) is significant for differential returns. All measures have their expected signs. This finding is consistent with both decreased monitoring efforts for small market share investment categories and increased performance measurement error in smaller funds.[27]

[Insert Table 4 about here]

2.2.2 Board Structure and Fund Performance Segmented by Sponsor Ownership Type

Table 5 presents regression results for our three performance measures segmented by ownership type. Models 1, 4, and 7 provide results for private fund sponsor, models 2, 5, and 8 for public ownership, and models 3, 6, and 9 control for ownership type.[28] The results on board size indicate a positive and significant relation for public sponsors and an insignificant relation for private sponsors. Furthermore, the differences in the board size coefficients between the two ownership types are statistically and economically significant.[29] For private sponsors, an increase in board size from 5 to 11 directors (a plus or minus one standard deviation range around the mean) implies a decrease in expense ratios of about 4 basis point, while the same board size increase for public sponsor funds results in an increase of about 13 basis points. The unitary board structure estimated coefficients for public sponsors are significant for expense ratios and differential returns, but not after controlling for public ownership status.

[Insert Table 5 about here]

The coefficients for the all-independent director and fund sponsor officer dummy variables are significant in all but one specification for public sponsors. The fund sponsor officer dummy variable is also significant for all three performance measures after controlling for sponsor

[27] The results may also be due to the smaller sample size of the medium and small cap categories.
[28] While it might be an important consideration to segment the strength of association of the fund to parent companies (i.e., wholly owned subsidiary versus partly owned subsidiary), our focus here is purely on whether the index fund's fund family is related to the publicly traded firm or not.
[29] Although not reported, we also compute differences in the estimated coefficients and their statistical significances.

ownership type. Public sponsor status is associated with significantly lower differential returns. This finding is consistent with the idea that boards have a greater impact on operating performance where agency costs are expected to be higher (for public sponsors) and less impact on performance where agency costs are lower (private sponsors). The remaining board structures coefficients do not vary consistently or significantly across ownership type.

3. Alternative Specifications

The results presented so far provide strong evidence of a link between board structure, fund sponsor ownership, and operational performance. The performance measures we employ represent the sum of several operational policy decisions. For robustness and to further examine the relation between boards and individual fund operational policies we consider front load fees, 12B-1 fees, cash holdings, tracking error, and active share measure. Implementing and executing viable marketing strategies, the optimal mix of front end sales loads and 12B-1 fees, are important operational policy considerations. Effective marketing strategies increase fund size, benefiting sponsors via increased fee revenue and potentially benefiting mutual fund shareholders via increased economies of scale and lower overall expense ratios. On the other hand, excessive marketing expenditures can erode fund performance. Consistent with previously reported results, we find that board size is positively related to marketing fees for public but not private fund sponsors, although the differences are not statistically significant. Boards of all independent directors are negatively related to marketing charges for the overall and public sponsored samples. Furthermore, the difference in the estimated coefficients on the all independent directors dummy for public and private sponsors is significant at the five percent level.

Since the expected returns on cash holdings are lower than the expected returns on stocks, inefficient cash management policies can negatively impact fund performance. Table 6 reports that the board structure-cash policy link varies in sign and significance across ownership type. Specifically, it reports a positive and significant coefficient for board size in private, but not public sponsored funds. Likewise, the estimated coefficient for sponsor officers is negative and

significant for private sponsors but positive and significant for public sponsors (differences are significant at the one percent level). [30]

[Insert Table 6 about here]

Fund sponsors can employ two basic methods to replicate benchmark indices. First, they can hold stocks in the same proportion as the underlying index. Second, they can seek to replicate the returns on the index without holding the precise stocks and weightings as the underlying index. Cremers and Petajisto (2008) use two measures: return tracking error volatility (Tracking Error) and a measure of portfolio holding differences (Active Share), to evaluate portfolio management practices. Table 6 reports a negative and significant relation between board size and tracking error for private sponsored funds but a positive, albeit insignificant relation for public sponsored funds (differences that are significant at the five percent level). None of the other board structure coefficients are convincingly significant for tracking error in either private or public sponsors. Sponsor officers are significantly and positively related to the active share measure in public funds only. Overall, the results of Table 6 corroborate our earlier findings for the overall operational performance measures. Namely, the importance of board structure on a whole host of operational policies varies in response to the agency environments of private and public sponsors and provides convincing evidence to our basic argument that a single board structure is not optimal for all funds.

4. Conclusion

In this paper, we investigate the association between operating performance, board attributes, and sponsor ownership structure using a sample of index mutual funds. The homogeneity of investment strategies among these funds provides us with a laboratory to examine the relation between operating performance and governance mechanisms. The compensation system prevalent in the mutual fund industry, where managers' payoffs are defined by the size of the funds, creates an incentive to increase fund size. One way managers

[30] An economic explanation for the signs on these coefficients is outside the scope of this study since cash holdings are also a function of other operational policies such as dividend reinvestment strategies and security lending programs.

can increase the size of their funds is by improving performance to attract more cash flows to the fund. Competing funds seek to improve performance by implementing superior investment and operational strategies. For index funds the investment strategy is rigid, they exist to replicate the performance of the underlying index. However, these index funds can employ different operational strategies to maximize performance and subsequent cash inflows.

Our analysis indicates that boards with inside directors who are also officers of the fund sponsor are associated with improved fund performance (expense ratios, alpha, and differential returns). We also find that large boards are associated with higher expense ratios and lower returns for the complete sample. When segmenting the data by investment category, the link between board size and performance varies by the market capitalization of the benchmark indices and/or the market share of the indices. Further segmenting by ownership type (public and private), we find significant differences in the board size coefficients. The evidence presented above suggests that officer representation and boards of all independent directors are associated with improved performance primarily in public sponsored funds. Combined, the results are consistent with the notion that there may not be a single optimal board structure that is applicable to all funds, that attempts to regulate board attributes should be considered with caution, and that sponsor level factors are important board structure considerations.

References

Bertrand, M., E. Duflo, and S. Mullainathan. 2004. How Much Should We Trust Differences-In-Differences Estimates? *Quarterly Journal of Economics* 119: 249-275.

Cai, J. and T. Houge. 2008. Long Term Impact of Russell 2000 Index Rebalancing. *Financial Analyst Journal* 64: 76-91.

Carhart, M. 1997. On the Persistence of Mutual Fund Performance. *Journal of Finance* 52: 57-82.

Chen, Q., I. Goldstein, and W. Jiang. 2008. Directors' Ownership in the U.S. Mutual Fund Industry. *Journal of Finance* 63: 2629-2677.

Christoffersen, S. and D. Musto. 2002. Demand Curves and the Pricing of Money Management. *Review of Financial Studies* 15: 1499-1524.

Cremers M., J. Driessen, P. Maenhout, and D. Weinbaum. 2009. Does Skin in the Game Matter? Director Incentives and Governance in the Mutual Fund Industry. *Journal of Financial and Quantitative Analysis*, forthcoming.

Cremers, M. and A. Petajisto. 2008. How Active is Your Fund Manager? A New Measure that Predicts Performance. *Review of Financial Studies*, forthcoming.

Del Guercio, D., L. Dann, and M. Partch. 2003. Governance and Boards of Directors in Closed-End Investment Companies. *Journal of Financial Economics* 69: 111-152.

Donald, S. and K. Lang. 2007. Inference with Difference-In-Differences and Other Panel Data. *Review of Economics and Statistics* 89: 221-233.

Elton, E., M. Gruber, and J. Busse. 2004. Are Investors Rational? Choices Among Index Funds. *Journal of Finance* 59: 261-288.

Ferris, S. and X. Yan. 2007. Do Independent Directors and Chairmen Matter? The Role of Boards of Directors in Mutual Fund Governance. *Journal of Corporate Finance* 13: 392-420.

Fich, E., and A. Shivdasani. 2006. Are Busy Boards Effective Monitors? *Journal of Finance* 61: 689-724.

Gertner, R. and S. Kaplan. 1996. The Value-Maximizing Board. University of Chicago and NBER *Working Paper*.

Hartzell, J. and L. Starks. 2003. Institutional Investors and Executive Compensation. *Journal of Finance* 58: 2351-2374.

Hermalin, B. 1994. Heterogeneity in Organizational Form: Why Otherwise Identical Firms Choose Different Incentives for Their Managers. *RAND Journal of Economics* 25: 518-537.

Hermalin, B. and M. Weisbach. 2003. Boards of Directors as an Endogenously Determined Institution: A Survey of the Economic Evidence. *Economic Policy Review* 9: 7-26.

Petersen, M. 2009. Estimating Standard Errors in Finance Panel Data Sets: Comparing Approaches. *Review of Financial Studies* 22*:* 435-480*.*

Parrino, R. 1997. CEO Turnover and Outside Succession: A Cross Sectional Analysis. *Journal of Financial Economics* 46: 165-197.

Sirri, E.R. and P. Tufano. 1998. Costly Search and Mutual Fund Flows. *Journal of Finance* 53: 1589-1622.

Thompson, S. 2006. Simple Formulas for Standard Errors that Cluster by both Firm and Time. Harvard University *Working Paper.*

Tufano, P., and M. Sevick. 1997. Board Structure and Fee-Setting in the U.S. Mutual Fund Industry. *Journal of Financial Economics* 46: 321–355.

Wooldridge, J. 2003. Cluster Sample Methods in Applied Econometrics. *American Economic Review,* 93: 133-138.

Table 1
Variable definitions and primary source

Variable	Data Source	Explanation
Performance and Risk		
Differential Return	Morningstar/CRSP	Annual difference between an index fund's return and it's benchmark index (%)
Expense Ratio	Morningstar/CRSP	Expense ratio of fund (%)
Alpha	Morningstar/CRSP	Annualized Jensen's alpha computed from benchmark index (%)
Beta	Morningstar/CRSP	Sensitivity of fund's return, computed from the benchmark index (%)
R^2	Morningstar/CRSP	3 year measure of fund's return model fit, computed from the benchmark index (%)
Fund Characteristics		
Fund TNA	Morningstar/CRSP	Log of total net assets of fund ($MM)
Family TNA	Morningstar/CRSP	Log of total net assets for all funds managed by sponsor ($MM)
Fund Age	Morningstar/CRSP	Log of number of years since the fund's inception
Institutional Holding	Morningstar/CRSP	Percentage of institutional class holdings in fund
Front Load	Morningstar/CRSP	Sales charge at initial fund purchase, not included in expense ratio (%)
12B-1 Fees	Morningstar/CRSP	Promotional and advertising expense charge, included in expense ratio (%)
Cash Holdings	Morningstar/CRSP	Percentage of portfolio held in cash
Tracking Error	Morningstar/CRSP	Times series standard deviation of the difference between fund and benchmark
Active Share	Morningstar/CRSP	Fraction of portfolio that is different from the benchmark index
Governance Characteristics		
Board Size	Form 485	Log of number of directors on fund board
Unitary Board Structure	Form 485	Indicator variable if a single board oversees all funds managed by sponsor
Independent Directors	Form 485	Proportion of directors who are classified as outsiders (independent)
All Independent	Form 485	Indicator variable if all directors are classified as outsiders
Independent Chair	Form 485	Indicator variable if the chairman of the board is classified as an outsider
Fund Sponsor Officers	Form 485	Proportion of directors who are officers of fund sponsor
Other Directorships	Form 485	Average number of outside directorships held by directors
Age of Director	Form 485	Average age of directors
Tenure	Form 485	Average tenure of directors
Funds per Director	Form 485	Proportion of average number of funds overseen by each board to board size
Retired Directors	Form 485	Proportion of board members who are retired
Director Compensation	Form 485	Average yearly compensation ($) a director receives from all funds supervised
Family Ownership	Form 485	Proportion of directors who have ownership in funds in family

For fund with multiple share classes we compute the weighted average value (using TNA of each class), where the reported fund TNA is the sum of the TNA from all classes. Returns on the benchmark indices are obtained from the index providers. All Morningstar data are cross- checked or recomputed with the CRSP Mutual Fund database. In the case of discrepancies (27 instances), information from the fund's form 485 is used.

Table 2
Summary statistics

Panel A: Incidence of fund benchmarks

Benchmark	Frequency	(%)	Cumulative (%)	Market Share (%) As of Year 1998	Market Share (%) As of Year 2007
Index					
S&P 500	502	51.43	51.43	77.02	44.87
S&P 400	77	7.89	59.32	0.30	1.83
Russell 2000	72	7.38	66.70	2.30	0.38
S&P 600	60	6.15	72.85	0.02	1.46
Wilshire 5000	59	6.05	78.90	7.74	2.93
Wilshire 4500	40	4.10	83.00	2.30	1.09
Nasdaq 100	25	2.56	85.56	NA	0.07
Russell 1000	20	2.05	87.61	4.55	2.84
MSCI Small Cap	15	1.54	89.15	NA	5.00
MSCI Prime	13	1.33	90.48	NA	5.60
Other (Less the 1%)	93	9.52	100.00	5.77	33.93
Investment category					
Large Cap	675	69.16	69.16	95.07	88.54
Mid Cap	128	13.11	82.27	2.60	6.72
Small Cap	173	17.73	100.00	2.33	4.74

This table reports the distribution of 28 indexes and three investment category benchmarks used by the funds in our sample. The sample consists of 976 fund year observations, representing the domestic equity index mutual fund market covering the period from 1998 through 2007. The benchmark index and investment category designations are obtained from each of the fund's prospectus and Morningstar, respectively. Market share is the percentage of each benchmark's total net assets to the sample's and is reported for first sample year 1998 and last sample year 2007, respectively.

Panel B: Descriptive statistics

	All sponsors			Public sponsors			Private sponsors		
	Mean	Median	Standard Deviation	Mean	Median	Standard Deviation	Mean	Median	Standard Deviation
Performance and Risk									
Expense Ratio	0.492	0.401	0.359	0.496	0.425	0.297	0.487	0.335	0.415
Alpha	-0.317	-0.278	0.486	-0.406	-0.350	0.519	-0.223	-0.117	0.429
Differential Return	-0.478	-0.391	1.045	-0.526	-0.417	0.668	-0.427	-0.312	1.897
Beta	0.991	1.000	0.062	0.996	1.000	0.024	0.986	1.000	0.086
R^2	0.994	1.000	0.030	0.999	1.000	0.009	0.989	1.000	0.041
Fund Characteristics									
Fund TNA	2,885	464	11,366	1,128	466	1,571	4,755	456	16,046
Family TNA	134,616	21,660	268,715	42,847	30,969	43,772	232,206	15,288	358,611
Fund Age	8.407	7.167	5.646	8.304	7.674	4.129	8.517	6.849	6.905
Institutional Ownership	34.465	8.670	40.715	38.123	7.284	42.453	30.507	8.955	38.447
Governance Characteristics									
Board Size	8.121	8.000	2.597	8.637	9.000	2.763	7.573	8.000	2.287
Unitary Board Structure	0.759	1	0.428	0.676	1	0.468	0.848	1	0.360
Independent Directors	0.787	0.778	0.133	0.781	0.778	0.145	0.792	0.800	0.119
All Independent	0.122	0	0.327	0.135	0	0.342	0.109	0	0.310
Independent Chair	0.369	0	0.483	0.421	0	0.494	0.313	0	0.464
Fund Sponsor Officers	0.140	0.125	0.120	0.132	0.111	0.121	0.149	0.143	0.118
Age of Director	60.687	60.900	3.942	61.463	61.556	3.548	59.862	60.500	4.170
Tenure	6.972	6.600	3.308	6.608	6.083	3.213	7.368	7.286	3.368
Funds per Director	8.877	7.860	5.648	8.423	8.000	4.831	9.326	7.500	6.326
Other Directorships	1.067	1.000	0.768	1.104	1.000	0.753	1.028	1.000	0.782
Retired Directors	0.215	0.200	0.169	0.214	0.200	0.161	0.215	0.143	0.176
Director Compensation	84,295	77,000	60,303	94,456	85,137	57,084	73,714	63,536	61,789
Family Ownership	0.816	1.000	0.272	0.830	0.923	0.244	0.803	1.000	0.298

This table reports descriptive statistics for our sample of 976 fund year observations covering the period from 1998 through 2007. Columns 1 through 3 report metrics for all U.S. equity Index funds. Columns 4 through 6 report metrics for U.S. equity Index funds sponsored by a public sponsor. Columns 7 through 9 report the measures for U.S. equity Index funds sponsored by a private sponsor.

Panel C: Pearson correlations

	Performance			Fund Characteristics				Governance Characteristics			
	Expense	Alpha	Diff. Return	Family TNA	Fund TNA	Fund Age	Board Size	Unitary Board	Indep.	Indep. Chair	Fund Officer
Alpha	**-0.41**										
Diff. Return	**-0.30**	**0.18**									
Family TNA	**-0.38**	**0.18**	**0.15**								
Fund TNA	**-0.49**	**0.17**	**0.13**	**0.67**							
Fund Age	**-0.21**	**0.07**	**0.12**	**0.30**	**0.55**						
Board Size	**-0.11**	-0.04	0.02	**0.46**	**0.29**	**0.13**					
Unitary Board	-0.01	-0.02	-0.04	**-0.28**	**-0.14**	**-0.07**	**-0.14**				
Independent	**-0.13**	0.04	**0.08**	**0.30**	**0.16**	**0.15**	0.04	**-0.12**			
Indep. Chair	-0.00	-0.05	-0.01	-0.05	**-0.10**	0.03	0.01	-0.03	**0.46**		
Fund Officer	0.02	**0.09**	0.02	**-0.14**	**-0.10**	**-0.10**	**-0.13**	0.04	**-0.55**	**-0.43**	
Institutional	**-0.25**	0.03	0.06	**-0.06**	-0.01	0.06	**0.12**	**0.09**	**0.06**	**0.11**	**-0.14**

This table reports correlation statistics for our sample of U.S. equity index funds covering the period from 1998 through 2007. Variables that are statistically significant at the 1% and 5% are presented in bold. Variable definitions are provided in Table 1.

Table 3
Boards, member characteristics, and fund performance

Panel A: Board characteristics regressions for complete sample of index funds

	Expense Ratio			Alpha			Differential Returns		
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
Intercept	0.756[a]	0.788[a]	0.833[a]	-0.159	-0.293	-0.303	-1.436[a]	-1.153[b]	-1.237[a]
	(3.24)	(3.84)	(4.09)	(-0.51)	(-1.12)	(-1.16)	(-3.22)	(-2.70)	(-2.90)
Board Size	0.136[c]	0.147[b]	0.121[c]	-0.223[a]	-0.231[a]	-0.215[a]	-0.276[b]	-0.331[b]	-0.280[b]
	(1.95)	(2.11)	(1.77)	(-2.88)	(-3.05)	(-2.82)	(-2.23)	(-2.54)	(-2.21)
Unitary Board Structure	-0.068	-0.063	-0.065	0.016	0.0136	0.015	0.115	0.088	0.092
	(-1.43)	(-1.39)	(-1.49)	(0.33)	(0.28)	(0.32)	(1.41)	(1.11)	(1.19)
Independent Directors	-0.017			-0.114			0.582		
	(-0.12)			(-0.72)			(1.48)		
All Independent			-0.140[b]			0.086			0.272[a]
			(-2.49)			(1.30)			(2.82)
Independent Chair	0.033	-0.002		-0.010	0.025		-0.121	0.010	
	(0.88)	(-0.04)		(-0.20)	(0.49)		(-1.59)	(0.15)	
Fund Sponsor Officers		-0.078[c]	-0.126[a]		0.113[a]	0.133[a]		0.156[b]	0.248[a]
		(-1.91)	(-2.86)		(2.63)	(2.83)		(2.16)	(3.18)
Family TNA	-0.015	-0.015	-0.010	0.027	0.023	0.021	0.097[b]	0.109[b]	0.099[b]
	(-0.82)	(-0.81)	(-0.53)	(1.13)	(0.96)	(0.87)	(2.44)	(2.50)	(2.30)
Fund TNA	-0.067[a]	-0.067[a]	-0.066[a]	0.032	0.032	0.030	-0.070	-0.069	-0.072
	(-3.28)	(-3.30)	(-3.27)	(1.16)	(1.16)	(1.11)	(-0.83)	(-0.82)	(-0.85)
Fund Age	0.033	0.031	0.023	0.087	0.090	0.094	0.288[b]	0.287[b]	0.302[b]
	(0.69)	(0.66)	(0.49)	(1.04)	(1.09)	(1.13)	(1.98)	(1.98)	(2.08)
Institutional Ownership	-0.176[a]	-0.187[a]	-0.186[a]	0.1.34[c]	0.150[b]	0.150[b]	0.113	0.139[c]	0.138[c]
	(-3.59)	(-3.86)	(-3.87)	(1.83)	(2.05)	(2.07)	(1.39)	(1.78)	(1.78)
Enhanced Fund	0.385[c]	0.400[c]	0.400[c]	-0.085	-0.103	-0.109	-0.105	-0.155	-0.157
	(1.74)	(1.87)	(1.82)	(-0.31)	(-0.38)	(-0.41)	(-0.33)	(-0.49)	(-0.50)
Managed Fund	-0.110	-0.120	-0.151	0.064	0.083	0.091	-0.003	0.004	0.063
	(-0.95)	(-1.09)	(-1.40)	(0.40)	(0.50)	(0.56)	(-0.01)	(0.02)	(0.24)
Adjusted R^2	0.459	0.466	0.475	0.167	0.175	0.176	0.088	0.088	0.090
Number of Observations	976	976	976	976	976	976	976	976	976

This table reports coefficients from OLS regressions of annual performance measures on fund and board structure measures for the complete sample of domestic equity index funds. Annual performance measure include fund expense ratio (%), Jensen's alpha computed from benchmark index (%), and differential return computed as the difference between an index fund's return and it's benchmark index (%). The data covers the period from 1998 through 2007. All models include

benchmark and year dummies. Fund level clustered robust t-statistics are in parentheses. The notation a, b, c denotes significance at the 1%, 5%, and 10%, respectively. Variable definitions are provided in Table 1.

Panel B: Board characteristics and member attributes regressions for complete sample of index funds

	Expense Ratio		Alpha		Diff. Returns	
	(1)	(2)	(3)	(4)	(5)	(6)
Intercept	0.834[a]	0.941[a]	-0.157	-0.359	-1.550[a]	-1.628[a]
	(3.11)	(4.47)	(-0.65)	(-1.65)	(-3.40)	(-4.07)
Board Size	0.092		-0.180[b]		-0.087	
	(1.06)		(-2.16)		(-0.83)	
Unitary Board Structure	-0.086[c]	-0.084[c]	0.032	0.027	0.167[b]	0.163[b]
	(-1.70)	(-1.67)	(0.60)	(0.51)	(2.27)	(2.22)
All Independent	-0.124[b]	-0.161[b]	0.079	0.143[b]	0.253[a]	0.317[a]
	(-2.04)	(-2.34)	(1.16)	(2.06)	(3.06)	(3.90)
Independent Chair	-0.003	-0.004	0.003	0.010	-0.043	-0.045
	(-0.07)	(-0.11)	(0.06)	(0.21)	(-0.62)	(-0.64)
Fund Sponsor Officers	-0.125[b]	-0.126[b]	0.137[b]	0.142[b]	0.145[c]	0.142[c]
	(-2.23)	(-2.22)	(2.24)	(2.31)	(1.97)	(1.96)
Retired Directors	0.284[a]	0.321[a]	-0.123	-0.196[c]	-0.267	-0.327[c]
	(2.67)	(3.22)	(-0.97)	(-1.66)	(-1.38)	(-1.88)
No. of Funds Overseen	0.000		-0.000		-0.001	
	(0.31)		(-0.38)		(-0.97)	
Other Directorships	-0.022	-0.021	-0.013	-0.017	0.022	0.019
	(-0.74)	(0.66)	(0.34)	(-0.42)	(0.53)	(0.46)
Funds per director		0.002		0.000		-0.012
		(0.04)		(0.00)		(-1.57)
Tenure	0.001	0.001	-0.008	-0.007	-0.009	-0.008
	(0.26)	(0.14)	(-1.25)	(-1.06)	(-1.04)	(-0.88)
Family Ownership	0.076	0.082	-0.030	-0.048	0.050	0.046
	(1.02)	(1.05)	(-0.39)	(-0.57)	(0.43)	(0.40)
Unexplained Compensation	0.018	0.027	0.040	0.025	-0.080	-0.092
(per $100,000)	(0.39)	(0.61)	(0.72)	(0.44)	(-1.26)	(-1.46)
Family TNA	0.001	0.008	-0.007	-0.023	0.063[c]	0.056
	(0.05)	(0.42)	(-0.24)	(-0.91)	(1.71)	(1.61)
Fund TNA	-0.088[a]	-0.087[a]	0.064[a]	0.062[b]	0.019	0.018
	(-4.15)	(-4.01)	(2.79)	(2.57)	(0.42)	(0.38)
Fund Age	0.039	0.038	0.063	0.066	0.185[c]	0.185[c]
	(0.71)	(0.68)	(0.87)	(0.88)	(1.91)	(1.88)
Institutional Ownership	-0.232[a]	-0.227[a]	0.263[a]	0.256[a]	0.244[a]	0.237[a]
	(-4.68)	(-4.49)	(4.00)	(3.81)	(3.42)	(3.28)
Enhanced Fund	0.403[c]	0.399[c]	-0.089	-0.092	-0.033	-0.008
	(1.83)	(1.74)	(-0.34)	(-0.33)	(-0.11)	(-0.02)
Managed Fund	-0.192	-0.213	0.187	0.225	0.064	0.098
	(-1.44)	(-1.60)	(0.70)	(0.85)	(0.25)	(0.39)
Adjusted R^2	0.539	0.536	0.200	0.192	0.093	0.094
Observations	723	723	723	723	723	723

This table reports coefficients from OLS regressions of annual performance measures fund and board structure measures for the complete sample of domestic equity index funds. Annual performance measure include fund expense ratio (%), Jensen's alpha computed from benchmark index (%), and differential return computed as the difference between an index fund's return and it's benchmark index (%). The data covers the period from 1998 through 2007. All models include benchmark and year dummies. Fund level clustered robust t-statistics are in parentheses. The notation a, b, c denotes significance at the 1%, 5%, and 10%, respectively. Variable definitions are provided in Table 1.

Table 4
Boards and fund performance segmented by investment category

	Large Cap			Small and Mid Cap		
	Expense	Alpha	Diff. Return	Expense	Alpha	Diff. Return
	(1)	(2)	(3)	(4)	(5)	(6)
Intercept	0.846[a]	-0.383	-1.317[a]	0.958[b]	-0.200	-2.524[b]
	(3.66)	(-1.43)	(-3.37)	(2.22)	(-0.48)	(-2.34)
Board Size	0.157[b]	-0.104	-0.061	0.053	-0.459[a]	-0.643[b]
	(2.31)	(-1.22)	(-0.51)	(0.38)	(-3.91)	(-2.15)
Unitary Board Structure	-0.094[b]	0.024	0.075	0.017	0.129[c]	0.341
	(-2.00)	(0.46)	(0.90)	(0.18)	(1.83)	(1.22)
All Independent	-0.151[b]	0.129[c]	0.270[a]	-0.094	-0.059	0.291
	(-2.41)	(1.83)	(2.87)	(-0.79)	(-0.39)	(0.94)
Independent Chair	0.028	-0.030	-0.043	-0.055	0.204[c]	0.205
	(0.67)	(-0.60)	(-0.72)	(-0.60)	(1.70)	(1.00)
Fund Sponsor Officers	-0.155[a]	0.131[b]	0.205[b]	-0.025	0.151	0.370
	(-3.17)	(2.37)	(2.53)	(-0.27)	(1.40)	(1.27)
Family TNA	-0.025	0.019	0.047	0.024	0.011	0.198[b]
	(-1.22)	(0.67)	(1.40)	(0.64)	(0.29)	(2.06)
Fund TNA	-0.055[b]	0.04	-0.011	-0.085[c]	0.084[c]	-0.201
	(-2.55)	(0.85)	(-0.29)	(-1.87)	(1.80)	(-0.84)
Fund Age	0.039	0.079	0.191	-0.007	0.104	0.458[c]
	(0.65)	(0.99)	(1.12)	(-0.09)	(0.79)	(1.92)
Institutional Ownership	-0.202[a]	0.208[b]	0.160[b]	-0.110	-0.007	0.021
	(-3.57)	(2.49)	(2.01)	(-1.55)	(-0.06)	(0.10)
Enhanced Fund	0.497[b]	-0.157	-0.107	-0.508[c]	0.303	0.896[c]
	(2.23)	(-0.56)	(-0.35)	(-1.97)	(1.55)	(1.99)
Managed Fund	-0.030	0.160	0.188	-0.471[c]	0.001	0.074
	(-0.30)	(0.80)	(0.86)	(-1.81)	(0.01)	(0.13)
Observations	675	675	675	301	301	301
Adjusted R^2	0.520	0.160	0.130	0.433	0.276	0.062

This table reports coefficients from ordinary least squares regressions of annual performance measures on fund, board, and trustee measures segmented by the investment categories, large-cap or non-large-cap, of the index funds. Annual performance measure include fund expense ratio (%), Jensen's alpha computed from benchmark index (%), and differential return computed as the difference between an index fund's return and it's benchmark index (%). The data covers the period from 1998 through 2007. Fund level clustered robust t-statistics are in parentheses. T-statistics on the equality of coefficients across public and private funds are reported in parenthesis in the differences column. All models contain benchmark and year dummies. The notation a, b, c denotes significance at the 1%, 5%, and 10%, respectively. Variable definitions are provided in Table 1

Table 5
Boards and fund performance segmented by ownership type

	Expense Ratio			Alpha			Differential Return		
	Private	Public	All	Private	Public	All	Private	Public	All
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
Intercept	0.993[a]	0.440	0.824[a]	-0.797[a]	0.163	-0.317	-1.704[b]	-0.693	-1.011
	(4.87)	(1.20)	(3.98)	(-3.26)	(0.30)	(-1.24)	(-2.43)	(-1.32)	(-1.32)
Public			0.001			-0.067			-0.160[b]
			(0.02)			(-1.29)			(-2.27)
Board Size	-0.051	0.160[b]	0.121[c]	-0.046	-0.196[b]	-0.197[b]	0.096	-0.164[c]	-0.235[c]
	(-0.50)	(2.39)	(1.83)	(-0.65)	(-2.10)	(-2.54)	(0.38)	(-1.84)	(-1.95)
Unitary Board Structure	-0.029	-0.102[c]	-0.065	-0.049	0.068	0.003	-0.077	0.141[c]	0.064
	(-0.74)	(-1.97)	(-1.58)	(-0.78)	(1.04)	(0.05)	(-0.41)	(1.87)	(0.83)
All Independent	-0.026	-0.225[b]	-0.145[b]	-0.011	0.175[b]	0.086	0.141	0.412[a]	0.292[a]
	(-0.21)	(-2.51)	(-2.43)	(-0.08)	(2.14)	(1.32)	(0.69)	(3.55)	(3.12)
Independent Chair	0.068	0.023	0.016	-0.040	0.021	0.016	-0.341[b]	-0.015	-0.024
	(1.21)	(0.45)	(0.41)	(-0.58)	(0.30)	(0.30)	(-2.18)	(-0.24)	(-0.36)
Fund Sponsor Officers	0.039	-0.157[b]	-0.121[a]	0.061	0.134	0.135[a]	-0.152	0.230[b]	0.235[a]
	(0.56)	(-2.42)	(-2.69)	(0.84)	(1.60)	(2.78)	(-1.14)	(2.35)	(2.98)
Family TNA	0.004	0.006	-0.010	0.030	0.009	0.023	0.208[c]	0.016	0.106[b]
	(0.14)	(0.22)	(-0.56)	(1.04)	(0.20)	(0.94)	(1.70)	(0.45)	(2.47)
Fund TNA	-0.072[b]	-0.044[c]	-0.066[a]	-0.007	0.032	0.026	-0.323	0.022	-0.085
	(-2.28)	(-1.78)	(-3.07)	(-0.16)	(0.91)	(0.92)	(-1.36)	(0.61)	(-0.98)
Fund Age	-0.029	0.066	0.024	0.233[a]	-0.063	0.096	0.717[b]	0.001	0.304[b]
	(-0.45)	(0.88)	(0.51)	(2.60)	(-0.62)	(1.18)	(2.27)	(0.01)	(2.13)
Institutional Ownership	-0.221[a]	-0.178[a]	-0.187[a]	0.195[b]	0.172[c]	0.152[b]	0.215	0.193[b]	0.144[c]
	(-2.90)	(-2.86)	(-3.85)	(2.17)	(1.70)	(2.11)	(1.12)	(2.53)	(1.86)
Enhanced Fund	0.351	0.554	0.405[c]	-0.270	-0.256	-0.131	-0.919	-0.133	-0.223
	(1.21)	(1.59)	(1.84)	(-0.82)	(-0.61)	(--0.48)	(-1.39)	(-0.29)	(-0.69)
Managed Fund	-0.337[c]	0.067	-0.145	0.109	0.024	0.068	0.177	-0.606	-0.012
	(-1.96)	(0.43)	(-1.28)	(0.93)	(0.06)	(0.39)	(0.44)	(-1.19)	(-0.05)
Observations	473	503	976	473	503	976	473	503	976

Adjusted R^2	0.642	0.298	0.474	0.354	0.088	0.178	0.083	0.160	0.091

This table reports coefficients from ordinary least squares regressions of annual performance measures on fund, board, and trustee measures segmented by private or public ownership status of the sponsoring investment firm. Annual performance measure include fund expense ratio (%), Jensen's alpha computed from benchmark index (%), and differential return computed as the difference between an index fund's return and it's benchmark index (%). Fund level clustered robust t-statistics are in parentheses. T-statistics on the equality of coefficients across public and private funds are reported in parenthesis in the differences column. The notation a, b, c denotes significance at the 1%, 5%, and 10%, respectively. The sample consists of 976 fund year observations from 1998 through 2007. Variable definitions are provided in Table 1.

Table 6
Alternative specifications: boards, operational policies and ownership type

	Front Load		12B-1 Fees		Cash Holdings		Tracking Error		Active Share	
	Private	Public	Private	Public	Private	Public	Private	Public	Private	Public
	(1)	(2)	(4)	(5)	(7)	(8)	(1)	(2)	(4)	(5)
Intercept	1.040[c]	0.205	0.197[b]	0.179	4.631[c]	1.027	3.338[a]	2.277[a]	0.102[c]	0.007
	(1.88)	(0.32)	(2.05)	(0.70)	(1.77)	(0.50)	(4.85)	(7.44)	(1.87)	(0.16)
Board Size	-0.196	0.545[c]	0.002	0.079[c]	1.263[c]	0.459	-1.188[b]	0.106	0.006	-0.007
	(-0.44)	(1.98)	(0.05)	(1.87)	(1.71)	(0.71)	(-2.28)	(1.62)	(0.26)	(-0.76)
Unitary Board Structure	-0.067	0.164	0.018	-0.052	-0.468	0.214	-0.516	-0.073	0.007	0.009
	(-0.41)	(0.88)	(0.84)	(-1.37)	(-0.33)	(0.58)	(-1.56)	(-1.40)	(0.38)	(1.36)
All Independent	0.323	-0.788[a]	-0.020	-0.204[a]	1.078	-0.428	-0.189	0.077	-0.009	0.008
	(0.69)	(-3.16)	(-0.40)	(-3.17)	(1.08)	(-0.95)	(-0.67)	(1.32)	(-0.71)	(1.03)
Independent Chair	0.123	0.355[b]	0.003	0.045	-1.756[a]	-0.252	-0.337[c]	-0.024	-0.028	0.006
	(0.39)	(2.36)	(0.07)	(1.43)	(-2.76)	(-0.68)	(-1.70)	(-0.50)	(-1.48)	(1.00)
Fund Sponsor Officers	0.253	-0.550[a]	-0.022	-0.128[b]	-0.913[c]	0.809[b]	-0.109	0.054	-0.021	0.010[b]
	(0.62)	(-3.03)	(-0.54)	(-2.17)	(-1.74)	(2.05)	(-0.50)	(1.14)	(-0.97)	(2.06)
Family TNA	0.171	-0.086	-0.002	0.011	-0.107	-0.031	0.313[c]	-0.041	-0.002	0.009[b]
	(1.35)	(-1.10)	(-0.20)	(0.84)	(-0.59)	(-0.16)	(1.71)	(-1.47)	(-0.54)	(2.17)
Fund TNA	-0.259[c]	-0.053	-0.012	-0.011	-0.215	-0.220	-0.281	-0.016	0.003	-0.004
	(-1.73)	(-0.69)	(-0.84)	(-0.70)	(-0.90)	(-0.91)	(-0.99)	(-0.58)	(0.57)	(-0.93)
Fund Age	-0.312	0.156	-0.024	-0.044	0.068	0.477	-0.026	0.035	-0.014	-0.010
	(-1.27)	(0.63)	(-0.88)	(-0.91)	(0.11)	(0.63)	(-0.08)	(0.60)	(-1.36)	(-1.32)
Institutional Ownership	-0.773[a]	-0.451	-0.089[b]	-0.096[a]	-1.046	0.139	0.120	-0.015	-0.044[b]	0.001
	(-2.78)	(-1.24)	(-2.47)	(-2.84)	(-1.32)	(0.20)	(0.49)	(-0.26)	(-2.45)	(0.30)
Enhanced Fund	-0.425	-0.175	0.097	0.201	3.598	-1.064	-1.081	0.032	0.249[a]	0.298[a]
	(-0.73)	(-0.49)	(0.74)	(1.11)	(1.02)	(-1.32)	(-1.65)	(0.12)	(7.72)	(4.49)
Managed Fund	-1.427[b]	-0.862[b]	-0.062	-0.089	-2.941[b]	-0.889	-1.103[b]	0.270[b]	-0.008	0.273[a]
	(-2.07)	(-2.40)	(-1.38)	(-0.89)	(-2.62)	(-1.49)	(-2.14)	(2.38)	(-0.44)	(28.56)
Observations	473	503	473	503	464	492	460	491	179	179
Adjusted R^2	0.355	0.146	0.347	0.311	0.106	0.133	0.636	0.169	0.896	0.670

This table reports coefficients from ordinary least squares regressions of additional operational policy measures on fund, board, and trustee measures segmented by private or public ownership status of the sponsoring investment firm. Front load is the front end sales fee (%), 12B-1 fees are annual marketing fees (%), Cash holdings is the percentage of a fund's portfolio in cash or cash equivalents (%), tracking error is volatility of the return difference between a fund and its benchmark index, and active share is the fraction of a portfolio that is different from the benchmark index. Fund level clustered robust t-statistics are in parentheses. The notation a, b, c denotes significance at the 1%, 5%, and 10%, respectively. The sample consists of 976 fund year observations from 1998 through 2007. Variable definitions are provided in Table 1.