Performance-Based
Turnover on Corporate Boards

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Abstract

We document an economically significant relation between director turnover and prior firm performance. This relation manifests in idiosyncratic stock returns consistent with relative performance evaluation and the monitoring of actions attributable to directors. The director turnover-performance sensitivity increases substantially throughout the 2000s, and varies with a number of governance characteristics, most notably with the presence of an active external blockholder. Directors who leave firms following poor performance are significantly less likely to obtain new directorships in the future. In sum, the threat of replacement for poor firm performance has become an increasingly significant incentive for the directors of public corporations.

Eurofidi keywords: Corporate Governance, Ownership, Investment Policy/Capital Budgeting

JEL Classification: G34, J23

1. Introduction

The fiduciary role of the corporate board of directors is to monitor and advise management and, more generally, to represent the interests of shareholders in a firm's business dealings (Fama, 1980, Fama and Jensen, 1983). Over the past three decades, boards of public corporations have faced increasing scrutiny over their effectiveness by institutional investors, regulators, and other stakeholders (Parrino, Sias, and Starks, 2003, Linck, Netter, and Yang, 2009). This heightened attention is predicated on the expectation that directors can have a significant influence over corporate policies and firm performance.

Agency theory posits that directors should be exposed to the threat of replacement for poor performance as an incentive mechanism to align their interests with those of shareholders. The existing literature provides abundant evidence for a significant and negative turnover-performance sensitivity for executives of public firms, however, we know considerably less about whether board members also experience elevated rates of turnover following poor performance. In the first paper to systematically address the issue, Yermack (2004) documents an economically significant relation between director turnover and contemporaneous stock returns for directors with two or fewer years of service, but not for more seasoned directors.

While turnover for poor performance is a sensible incentive mechanism, there are a number of plausible reasons that a sensitivity of director turnover to firm performance may not obtain. For example, it is well known that board members exercise a substantial degree of discretion in determining board membership and their own tenure through the nominating and proxy process. Indeed, recent practitioner attention has focused on proxy access in corporations whose boards are perceived to be unresponsive to the concerns of investors.[1] Consistent with this, Yermack (2004)

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[1] "Some Firms Resist Handing Over the Keys to the Boardroom" (*Wall Street Journal*, April 17, 2017).

suggests that director turnover may be limited because no higher authority exists to discipline seasoned directors for poor performance. Other researchers have argued that directors' own reputational concerns can substantially influence turnover in the context of firm performance. Fahlenbrach, Low, and Stulz, (2017) document that reputational costs motivate some directors to resign prior to the realization of poor firm performance, which may confound the sensitivity of director turnover to past firm performance. Masulis and Mobbs (2014) also find that directors with multiple board seats are less likely to relinquish a directorship in firms that are relatively more prestigious, even after conditioning on firm performance. Finally, the collective actions of boards may hinder performance attribution to any individual director.

We estimate the sensitivity of turnover to firm performance for non-executive directors of U.S. public firms from 2000 to 2011. Our sample is drawn from Management Diagnostic's BoardEx database and covers virtually all publicly traded firms. Our results indicate that directors are more likely to turn over after the realization of poor stock and accounting performance. Directors of firms in the lowest quartile of industry-adjusted stock returns in a given year are 1.0 percentage points more likely to exit in the next year. Similarly, for directors of firms in the lowest quartile of industry-adjusted accounting returns, the likelihood of turnover is 1.5 percentage points higher. These effects are economically meaningful given an unconditional annual turnover rate of 7.6% for sample directors. The results are similarly significant at the board level, providing strong evidence for a collective incentive. For example, relative to a 7.2% unconditional rate of proportional board turnover, firms in the lowest quartile of industry-adjusted stock returns experience a 2.4 percentage point increase in the proportion of departing directors in the next year.

Following Jenter and Kanaan (2015), we decompose stock returns into their idiosyncratic and industry components and find that the turnover-performance relation for directors manifests

only in the idiosyncratic component of returns. This result is consistent with strong-form relative performance evaluation (RPE) and suggests that director turnover is a function of poor performance attributable to a board rather than industry or market conditions.

To provide additional evidence on the disciplinary nature of director turnover, we investigate the future employment outcomes for directors that leave a board. Prior studies such as Fama (1980) and Kaplan and Reishaus (1990) suggest that CEOs face lost future wages if they shirk responsibility or perform poorly. For the threat of replacement to be a meaningful incentive for directors, we expect to observe a negative relation between director turnover and future career opportunities, particularly when turnover occurs in the context of poor performance. To test this, we examine the change in the number of board seats held by a director, as well as the probability that a director gains an additional board seat, over a three-year window after turnover. Directors are 41% less likely to gain a new directorship after they leave a board relative to directors that retain their positions. Most importantly, we find that this difference only holds when director turnover is preceded by poor firm performance.

Our study examines the secular variation in the sensitivity of director turnover to firm performance during a period that witnessed substantial changes in institutional ownership and regulation. Kaplan and Minton (2012) document an increase in blockholdings over the decade of the 2000s, and find that external blockholdings are associated with a higher turnover-performance sensitivity for CEOs between 2000 and 2007. In addition, the implementation of the Sarbanes-Oxley Act of 2002 (SOX), and contemporaneous changes in exchange listing standards, increased financial disclosure requirements and mandated a structural shift towards boards comprised largely of unaffiliated outside directors. Linck et al. (2009) assert that these changes increased the scrutiny over director decisions and their accountability for firm performance. Consistent with this, Guo

and Masulis (2015) relate an increasing sensitivity of CEO turnover to performance during the 2000s to exchange mandated changes in the composition of boards.

To illustrate the time-series pattern in director turnover, we estimate the sensitivity of turnover to the idiosyncratic component of returns using a rolling three-year window over our sample period. The results, plotted in Figure 1, depict a nearly fourfold increase in the estimated sensitivity from 2000 to 2005. After accounting for selection, we find that the presence of an active blockholder or hedge fund substantially increases the turnover-performance sensitivity for directors. This effect is increasing over time, most notably during the first half of the decade. Finally, we consider the time series variation in the turnover-performance sensitivity across various measures of performance. While the overall incidence of director turnover is unchanged over the sample period, there is a notable shift away from industry-induced performance turnover observed during the pre-SOX period to idiosyncratic performance turnover post-SOX. This finding is consistent with an increase in the quality of information and monitoring over the decade.

We consider three potential alternative interpretations for our findings. One is that directors may voluntarily step down to preserve their remaining reputational capital. Given the structure of our tests, it is likely too late for directors to detach their reputation from past performance, however, directors may anticipate further poor firm performance and exit to avoid additional damage. Contrary to the conjecture above, we find no evidence that firm performance continues to decline after directors depart following poor performance.

Another explanation is that highly qualified directors may voluntarily exit to provide a costly, yet credible, signal of quality by disassociating themselves from the poor performing firm. In this case, we would expect that these directors should be more likely to experience a net gain in

future directorships relative to directors that do not leave the same board. Contrary to this, we find that the departing directors actually experience a net loss in the number of future directorships.

Finally, we explore whether our findings are a byproduct of coincidental turnover between CEOs and directors documented in Hermalin and Weisbach (1988), Farrell and Whidbee (2000) and Yermack (2004). While our results confirm these earlier findings, we also document that a substantial turnover-performance sensitivity persists for directors in the absence of CEO turnover.

Having established a turnover-performance sensitivity for directors, we next examine factors that could potentially weaken or amplify this relation. Research including Weisbach (1988) and Denis, Denis, and Sarin (1997) shows that some features of corporate governance moderate the turnover-performance sensitivity for executives. We document that corporate governance has a direct impact on the likelihood of director turnover. Directors are less likely to turn over when there is weak internal governance such as CEO-chair duality or if directors are co-opted (e.g. joined the board under the current CEO). Conversely, directors have a higher likelihood of turnover at firms with an active blockholder and when a director receives fewer 'for' proxy votes.

The turnover-performance sensitivity for directors is also moderated by governance characteristics. While we find that co-opted directors are less likely to turn over generally, this insulation is attenuated in years following poor firm performance. Consistent with our time series results, we also find that directors of firms with an active blockholder are significantly more likely to turn over after relatively poor performance. This result suggests that active investors represent a primary channel through which directors are disciplined for poor performance.

The positive incentives associated with a turnover-performance sensitivity for directors may be partially mitigated by the expected cost of replacing the skill and experience of directors that exit. Using the methodology of Knyazeva, Knyazeva, and Masulis (2013) we consider

whether the depth of the local supply of prospective directors moderates a firm's turnover-performance sensitivity. Our evidence indicates that local supply is positively correlated with the absolute level of director turnover, but is not correlated with the sensitivity of turnover to performance. Given the importance of reputation in the director labor market, we posit that firms with poor performance and coincident director turnover will find it difficult to hire qualified directors in the near future. Consistent with this prediction, higher performing firms tend to attract higher quality replacements (e.g., candidates with CEO and prior directorships) after director turnover, while firms with poor prior performance, on average, hire directors that are not superior to the directors that they replace. These findings suggest that poorly performing firms are handicapped in the director labor market just at the time when they would most benefit from director experience.

2. Related Literature

Our paper builds on a literature that examines how incentive mechanisms in the labor market align the interests of corporate agents with those of shareholders. Yermack (2004) notes that direct compensation, including stock and option grants as well as the threat of turnover, provide the most significant economic incentives for directors. He considers the relation between director turnover and firm performance for 734 Fortune 500 directors appointed between 1994 and 1996 with tenure of five or less years. For these newly appointed directors there is a negative relation between director turnover and contemporaneous stock performance, but no relation for accounting or lagged stock performance. Yermack also finds that the turnover-performance sensitivity obtains for directors in their first two years of service, but not for more seasoned directors, suggesting that any discipline ascribed to poor performance is limited at best. In contrast, our evidence indicates that the performance turnover sensitivity obtains in lagged performance and

is significant even for directors with substantial seniority. Notably our results depict a remarkable upward time trend in the sensitivity of director turnover to lagged firm performance, consistent with the notion that the adverse incentives in turnover have become increasingly important for corporate directors over the last two decades.

Fahlenbrach et al. (2017) find that some directors anticipate future poor performance and step down in advance to protect their reputation. Similarly, Asthana and Balsam (2010) also find that director turnover is increasing in contemporaneous and future performance, a result more pronounced for inside (informed) directors.[2] Consistent with a director's own discretion in turnover, Masulis and Mobbs (2014) note that individuals are less likely to leave one of multiple directorships if it is a relatively more prestigious seat, even after controlling for firm performance. Further, directors allocate greater effort on their more prestigious boards; a result that is consistent with a positive sensitivity of turnover to performance if effort is observable.[3]

Our work is closely related to the literature on turnover and incentives for corporate executives. Weisbach (1988) and Parrino (1997) find a negative relation between CEO turnover and firm performance. Kaplan and Minton (2012) and Peters and Wagner (2014) find that CEO turnover and its sensitivity to firm performance has increased since 2000. Jenter and Kanaan (2015) examine if executive turnover is a byproduct of relative performance evaluation (RPE), and more specifically, strong form. They show, however, that CEO turnover is a function of both idiosyncratic firm performance and a performance component common to a firm's industry peers.

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[2] While Asthana and Balsam (2010) conclude that their results are largely consistent with voluntary turnover, they note that, given the construction of their performance variables, they are empirically unable to differentiate between voluntary and involuntary director turnover and thus urge caution in interpreting their results.

[3] The majority of the directors in our sample (over 60%) hold only one board seat in a given year; thus for the average director, relative directorship prestige is a not an issue. Throughout the paper, we control for the impact of the number of contemporaneous directorships held on the turnover-performance sensitivity for individual directors.

While this paper considers the broad implications of firm-specific performance on the career outcomes of outside directors, other researchers have focused on director departures in a variety of specific contexts. Harford (2003) finds that a majority of the directors of 91 takeover targets from 1988 to 2001 lose their board seat after completed deals. Farrell and Whidbee (2000) examine director turnover that coincides with 66 forced CEO departures from 1982 to 1992 and show an increased likelihood of outside director turnover following forced CEO turnover. Fos and Tsoutsoura (2014) document a higher incidence of director turnover in the context of 396 proxy contests from 2000 to 2010. Brochet and Srinivasan (2014) find that independent directors at 805 firms named in securities litigation from 1996 to 2010 are more likely to leave. Gao, Kim, Tsang, and Wu (2017) show an abnormal rate of outside director turnover at 195 firms involved in financial fraud. Ertimur, Ferri, and Maber (2012) note that compensation committee members of 186 firms that engaged in option backdating experience a greater rate of turnover than the non-committee directors. Finally, Davidoff, Lund, and Schonlau (2014) examine outside director turnover at banks and other financial firms around the financial crisis and find an increased probability of director replacement at firms with poor performance.

An additional contribution of this paper is the examination of consequences of turnover for departing directors and the firms they leave. Yermack (2004) documents a positive relation between performance and the number of board seats obtained by outside directors in the future. Coles and Hoi (2003) find that directors who rejected provisions of Pennsylvania Senate Bill 1310 were more likely to gain additional directorships. Fich and Shivdasani (2007) show that directors of firms facing lawsuits experience a decline in the number of other board seats they hold, while Dou (2017) reports that preemptive resignations before lawsuits and earnings restatements do not insulate directors from adverse labor market consequences. Harford and Schonlau (2013) find that

the likelihood of future directorships is positively correlated with the experience of directors in acquiring firms. Finally, Ertimur, Ferri, and Maber (2015) document that directors experience a decrease in the number directorships following proxy contests.

3. Data and summary statistics

The director data for this study is drawn from Management Diagnostic's BoardEx database from 2000 through the end of 2011. The BoardEx database covers virtually all U.S. publicly traded firms and includes 430,993 director-firm-year observations during our sample period.[4] We merge the sample of director-firm-year observations with Compustat to obtain firm-level accounting data, with the Center for Research of Stock Prices (*CRSP*) database for stock returns, and with the Thomson Reuters Institutional Ownership database. After excluding director-firm-year observations with missing values for returns, book value of assets and institutional ownership, the sample consists of 388,695 director-firm-year observations.

We follow a director from one firm-year board report date on BoardEx to the next, where a report date corresponds to a firm's fiscal year end. Directors not listed at a subsequent report date are considered as having left a board. We exclude turnover attributable to death (reported by BoardEx) and also eliminate 40,465 director-firm-year observations where there is no subsequent report date. As we require a follow-on report date, none of our turnover observations are due to acquisition, delisting, or privatization. We remove 64,723 director-firm-year observations where the director is also an officer of the firm. BoardEx provides information on director characteristics including age, tenure, committee membership, and past and current employment and directorships.

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[4] Yermack (2004) examines director turnover at Fortune 500 firms, while Fahlenbrach et al. (2017) and Masulis and Mobbs (2013) examine director departures from S&P 1500 firms.

We exclude 2,445 director-year observations (0.87% of the director-firm-year observations in our final sample) with missing values for age and tenure as these are essential controls for this study.[5]

The final sample consists of 281,062 director-firm-year observations and 21,275 observations of director turnover yielding an unconditional turnover rate of 7.6%. The sample includes 5,802 unique firms and 43,351 distinct directors. At the firm level, the sample has 39,975 firm-year observations of which 14,220 are associated with at least one director turnover event.

Panel A of Table 1 summarizes four measures of lagged firm performance.[6] Industry-adjusted stock return is a sample firm's annual buy-and-hold return minus the buy-and-hold return for the median firm in the same Fama-French 48 industry.[7] Industry-adjusted ROA is a sample firm's operating income scaled by the total book value of assets, minus the median scaled operating income for firms in the same Fama-French 48 industry. Following Bushman, Dai, and Wang (2010) and Jenter and Kanaan (2015), we implement a two-stage regression approach to estimate both peer (industry) and idiosyncratic (firm-specific) performance. In the first stage, we estimate the industry-induced component of stock returns as the fitted value from cross-sectional regressions using one-year lagged annual buy-and-hold returns of the sample firms on the corresponding median Fama-French 48 industry return. Idiosyncratic stock returns are then estimated as the residual from this fitted value. The second stage predicts the probability of director turnover as a function of both the estimated industry-induced and residual component of performance. Jenter and Kanaan (2015) note that this two-stage approach helps defray concerns

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[5]BoardEx expanded its coverage of firms in 2003. To address this, we repeat our main analyses using only a sample of S&P 1500 firms, using only observations in 2003 or later, and using a constant composition sample that consists only of firms that survive through the entire sample period. In all cases, we obtain results that are qualitatively similar to those presented in the paper.

[6] A description of the construction of each of the variables used in this paper is provided in the Appendix.

[7] We also evaluate stock price performance relative to a value-weighted market index and our results are statistically and economically equivalent to those presented in the paper.

about an endogenous relation between turnover and performance, given that peer group performance serves as an instrument for firm performance.

Panel B summarizes characteristics of directors, boards, and outside blockholders as of the fiscal year-end before a turnover event. The first seven rows of variables are director characteristics. Summary statistics for these variables are computed as the average (median) for all director-firm-year observations. We compute director age as the average (median) age for the full sample, which is 60.49 (61.0) years. The average tenure of a director is 7.34 years. Nearly one third of directors hold more than one public directorship at a point in time, and roughly 4% gain a new directorship. Just over 20% of the director-firm-year observations are individuals who also hold a position as a CEO at another public firm. One in ten director-firm-year observations are female, while over one third of director-firm-year observations are co-opted, defined following Coles, Daniel, and Naveen (2014) as directors with tenure less than that of the current CEO.

Panel B also includes measures of internal and external governance. On average, 17.6% of boards are "busy" which we define following Fich and Shivdasani (2006), as directors who hold three or more public directorships. Fifty (fifteen) percent of firm-years have a current (former) CEO who is also Chair. On average, about 22% of the observations have an active blockholder in a given firm-year.[8] The average board has 8.65 directors and 71.63% are outsiders. Panel C summarizes firm characteristics. Roughly 10% of the firm-year observations exhibit CEO turnover in the current fiscal year. The average firm in our sample is 19.32 years old with a market capitalization of $3.9 billion, and the average annualized volatility of monthly stock returns is 0.47.

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[8] In keeping with Clifford and Lindsey (2016), we define an active blockholder as an outside shareholder who files a 13D disclosing at least a 5% stake with intentions to affect the firm or management. We thank the authors for sharing the blockholder classifications used in this study.

In Panel D, we compare lagged firm performance for subsamples of turnover and non-turnover firm-years. Turnover by one or more non-executive directors occurs in roughly 36% of the firm-years. Firm-year observations with turnover are associated with relatively poor firm performance in the year prior as compared to firm-year observations with no turnover. The average industry-adjusted stock return prior to a turnover event is 10.68%, which is 1.12 percentage points lower than the average industry-adjusted stock return for a firm-year observation with no turnover. Similar differences obtain for idiosyncratic stock returns.

4. The Sensitivity of Director Turnover to Firm Performance

4.1 Director-level estimates

Table 2 summarizes logistic regressions modeling the likelihood that an individual director experiences turnover in a given firm-year as a function of prior firm performance plus director and firm attributes.[9] The regressions include year fixed effects to capture any unmodeled macroeconomic trends. In untablated results, we also include firm fixed effects and find similar results for director-level specifications. Standardized coefficients are reported with coefficient p-values in parentheses. The standardized coefficient relates the modeled effect on the likelihood of director turnover for a one standard deviation change in a continuous variable, or for a change from 0 to 1 for an indicator variable. The unconditional rate of turnover rate is 7.6%. Models 1-3 incorporate continuous measures of prior firm performance. In Model 1, the coefficient on industry-adjusted stock return is negative and statistically significant, where a one standard deviation decrease in industry-adjusted returns is associated with an increase in the likelihood of director turnover of 0.5 percentage points. In Model 2, the coefficient on industry-adjusted ROA

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[9] These specifications largely follow those in the director turnover models summarized in Fahlenbrach et al. (2017).

is also negative and significant with a one standard deviation decrease in industry-adjusted ROA associated with a 2.5 percentage point increase in the probability of turnover.

Model 3 estimates the sensitivity of director turnover to industry-induced and idiosyncratic stock returns. The coefficient associated with industry-induced returns captures the sensitivity of turnover to performance presumably beyond a board's control. The coefficient on idiosyncratic stock return relays the sensitivity ascribed to decisions of a firm's directors and managers. Director turnover is uncorrelated with industry-induced stock returns, but is negatively and significantly correlated with idiosyncratic stock returns, suggesting director turnover is uniquely a byproduct of relative performance evaluation. A one standard deviation decrease in idiosyncratic performance increases the likelihood of turnover by 0.5 percentage points. This result is interesting in the context of Jenter and Kanaan (2015) who find evidence of relative performance evaluation for CEOs, but also note that CEOs are often fired for subpar industry-induced performance.

In Models 4-6 of Table 2, we estimate director turnover as a function of measures of lagged firm performance constructed as indicators equal to one if the sample firm-year performance falls in the lowest quartile for a given year. Our intent is to identify disciplinary turnover, thus our focus is on director turnover for the worst performing firms. The inferences drawn from Models 1-3 of the table are unchanged in these specifications although, as expected, the economic effects of performance are magnified. The results in Model 4 suggest that the likelihood of turnover for directors of firms in the lowest quartile of industry-adjusted stock performance is 1.0 percentage points higher than the likelihood of turnover for those on boards in the top three quartiles of performance. Similarly, a director of a firm in the lowest quartile of industry-adjusted ROA is 1.5 percentage points more likely to turn over than a director in the top three quartiles. When we sort annual stock returns into quartiles of industry-induced and idiosyncratic stock returns, director

turnover is sensitive to only the idiosyncratic component of returns, and the economic significance of this effect is quite large; 0.9 percentage points. In untabulated results, we find that being in the lowest decile of idiosyncratic performance increases the turnover-performance sensitivity by fully 1.6 percentage points (a 21 percent increase relative to the unconditional probability), with similar results for the extreme tails of performance as measured by industry-adjusted stock returns and ROA.

The regressions in Table 2 also control for a variety of director characteristics including reputation and experience. We include two indicator variables to control for the effects of retirement including near retirement age (65-71) and the average mandatory retirement age of 72 (or older) following Cline and Yore (2016). As expected, the likelihood of director turnover is positively correlated with age. Characteristics related to experience and reputation are also significantly related to turnover. Directors that hold more than one directorship are less likely to turn over, consistent with the value of connections and reputation. In addition, directors who gained an additional directorship in the prior year are more likely to turn over, suggesting that additional responsibilities and limited attention may force directors to curb their directorships held. While studies find that CEO experience is positively correlated with the likelihood of gaining board seats, our results indicate that CEO experience is uncorrelated with turnover.

All coefficients associated with committee membership (audit, compensation, and nominating) are significantly negative. Audit committee has the greatest economic significance, suggesting that directors on this committee are 3.3 percentage points less likely to turn over.[10] Female directors are 0.2 percentage points less likely to leave a board than male directors, which

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[10] Anecdotal evidence suggests that audit committee members have taken on increased responsibilities, especially post-SOX. With these increased duties, the supply of qualified individuals has decreased. See R. Teitelbaum, and D. Johnson, "Board Face Recruiting Challenges – Audit-committee Workloads Often Make it Tough to Find Members" *The Wall Street Journal*, December 15, 2015.

is consistent with their scarcity in the director labor market and the hypothesized benefits of board diversity outlined in Adams and Ferreira (2009). Co-opted directors are, all else equal, 1.9 percentage points less likely to turn over. The rate of turnover is lower for larger firms and for boards with more outside directors, and is increasing in the volatility of returns and board size.

4.1.1 Director-level estimates over extended performance windows

A single year provides a limited window for prior performance, and we expect that extended periods of poor performance are likely to result in higher rates of director turnover. In untabulated regressions, we estimate the sensitivity of director turnover to cumulative industry-adjusted firm performance over two and three-year windows and find a higher sensitivity of turnover to performance measured over these longer periods. For example, when we estimate models of director turnover similar to those in Table 2, we find that directors in the lowest quartile of industry-adjusted stock returns cumulated over the prior two (three) years are 1.4 (1.3) percentage points more likely to leave the firm's board in a given year. While these results suggest that annual performance provides a lower bound for the turnover-performance sensitivity, extending the performance window introduces survival bias and attribution concerns.

4.1.2 Director-level estimates and firm size

We also consider whether the sensitivity of director turnover to performance is moderated by firm size. In equilibrium matching models such as Gabaix and Landier (2008), CEOs with higher talent are matched to larger firms and receive greater compensation to reflect their higher marginal product. In the same vein, we expect that more talented directors may match to boards of larger firms (S&P 500) and thus may be less likely to depart in the context of poor firm performance. Alternatively, given a measure of idiosyncratic performance, even talented directors may not be insulated from attributable poor performance. In untabulated results, we estimate a

regression similar to that of Model 6 in Table 2, but add an indicator variable equal to one for directors on an S&P 500 board, as well as interaction terms for this indicator and our measures of industry-induced and idiosyncratic performance. Our results suggest that directors serving on S&P 500 boards experience a *higher* level of unconditional turnover (1.4 percentage points) relative to directors of smaller firms. This result is consistent with the notion that directors of larger firms are subject to more scrutiny from market participants such as analysts and institutions. Both of the performance-based interaction terms with the S&P 500 indicator are insignificantly different from zero, suggesting that directors at large firms experience a similar sensitivity of turnover to performance relative to their peers in smaller firms.

4.2 Board-level estimates

If individual director turnover is a disciplinary response to poor past performance, we also expect to see a higher proportion of a board of directors leave following poor accounting and stock price performance. This relation is important because it presents the ex-ante collective incentive for boards. Table 3 reports Tobit regressions modeling the proportion of non-executive directors that turn over in a given firm-year as a function of lagged firm performance as well as board and firm characteristics.[11] The unconditional rate of turnover is 7.2% of the average outside board seats in a given year, approximately 0.45 directors per year. In Models 1-3, we use the continuous measures of firm performance. In Model 1 (2), the coefficient estimate on industry-adjusted stock return (ROA) is negative and significant, suggesting that as firm performance decreases boards experience higher proportional turnover. For example, a one standard deviation decrease in ROA is associated with a 0.95 percentage point increase in the fraction of board seat turnover in the following fiscal year.[12] Model 3 delineates returns by industry-induced and idiosyncratic stock

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[11] For robustness, we estimate Poisson count regressions modeling the number of directors that turn over in a given firm-year and find statistically and economically similar results.

[12] The marginal effect equals the coefficient (0.053) multiplied by industry-adjusted ROA standard deviation (0.18).

performance. Consistent with our findings at the director level, the relation between proportional turnover and performance holds only for the idiosyncratic component of returns.

Models 4–6 of Table 3 estimate proportional turnover using our quartile measures of lagged performance. The coefficients suggest that relatively poor firm performance results in a higher proportion of outside director turnover. The coefficient on low industry-adjusted performance in Model 4 is positive and statistically significant where firms in the lowest quartile of stock performance exhibit a 2.4 percentage point higher proportion of board turnover. Boards in the lowest quartile of industry-adjusted ROA experience 3.8 percentage points more turnover. The proportional turnover-performance sensitivity is significant only for the idiosyncratic component of returns. We report the effects of firm- and board-level characteristics on the proportion of director turnover in Models 1-6 and document results similar to those in Table 2.[13]

Our findings in Table 3 suggest a negative and economically significant relation between performance and the proportion of directors that turn over the following year. This turnover-performance sensitivity is robust to performance measures and provides evidence consistent with a collective incentive for boards as a whole. Tables 2 and 3 provide evidence that directors, and boards as a whole, are disciplined through turnover following poor firm performance.

4.3 Post-turnover outcomes in the director labor market

While the direct costs of turnover include the loss of expected future compensation and benefits, we also consider the indirect costs of turnover in terms of future directorships in other public firms. For the threat of replacement to be meaningful, we should observe post-turnover career consequences in the labor market for directors, particularly following poor performance.

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[13] We replicate Table 3 with director-level variables averaged at the firm-year level: director age, gain new seat, hold additional seats, current CEO elsewhere, and female. For robustness, we re-estimate Table 3 models using firm fixed effects. The sign/significance of our turnover-performance results are unchanged in all specifications (untabulated).

To provide evidence on labor market outcomes we examine the change in the number of directorships and the probability of gaining a new board seat over a three-year window following each firm-year. Models 1-3 of Table 4 summarize OLS regressions of the change in the number of public board seats over the three-year window and Models 4-6 outline logistics of the likelihood of obtaining a new public directorship. All specifications control for director characteristics and firm-year fixed effects enabling a comparison of these outcomes for directors that do and do not turn over for a given firm in a given year.[14] The average change in the number of board seats over a three-year period is -0.04, while the unconditional probability of gaining a directorship is 21.5%.

Model 1 of Table 4 reveals a significant negative relation between turnover and the change in the number of a director's future seats. Notably, this relation manifests for directors who experience turnover from firms in the lowest quartile of prior performance (Model 2), but not for those in the highest quartile (Model 3). These results are consistent with the notion that directors who turn over following poor firm performance are penalized in the director labor market. Models 4-6 yield a similar conclusion. Directors that turn over are 8.8 percentage points less likely to gain a future seat relative to those that remain in a turnover year. Model 5 suggests that the negative relation between turnover and the likelihood of gaining a new directorship is most pronounced for directors that turn over following very poor firm performance. These directors experience a 70% decrease in the unconditional probability of gaining a future board seat.

4.4 The sensitivity of director turnover to firm performance over time

Our sample period is characterized by substantial changes in institutional ownership and regulation. Kaplan and Minton (2012) document an increase in blockholdings over the 2000s and

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[14] To utilize firm-year fixed effects, for each firm-year at least one director must experience a change in future board seats or gain a new seat in the next three years. Otherwise, all observations within a given firm-year are completely determined and excluded from these analyses.

find that blockholder presence is associated with a higher CEO turnover-performance sensitivity from 2000 to 2007. Implementation of Sarbanes-Oxley Act of 2002 (SOX) and contemporaneous changes in exchange listing standards, increased financial disclosure requirements and mandated a structural shift towards boards comprised largely of unaffiliated outside directors. Linck et al. (2009) assert that these changes increased scrutiny over director decisions and their accountability for firm performance. Consistent with this, Guo and Masulis (2015) tie an increasing sensitivity of CEO turnover to performance to changes in board composition over the first half of the decade.

To illustrate the secular variation in turnover, we estimate the sensitivity of director turnover to the idiosyncratic component of returns using Model 6 of Table 2 for rolling three-year windows over the sample period. As summarized in Figure 1, there was a nearly fourfold increase in the estimated sensitivity from 2000 to 2005. Each of these rolling time series coefficients are statistically different from zero with *p*-values consistently at the one percent level or better, with the exception of the 2002 estimate which is zero. In Figure 2, we illustrate the proportion of firm-years in our sample with an active blockholder and with a hedge fund (active or passive) with at least a 5% ownership stake. We focus on active institutional blockholders and hedge funds given findings in Brav, Jiang, Partnoy, and Thomas (2008) that CEO turnover increases with ownership by activist hedge funds. While the proportion of firms with at least one active blockholder remains relatively constant over time, hedge fund ownership nearly triples during the sample period.

In Figure 3, we plot the turnover-performance sensitivity for firm-years with active blockholders and hedge funds over our sample period. As in Figure 1, we estimate the sensitivity for rolling three-year windows. The coefficients are derived from a term interacting an indicator for the presence of a blockholder and lagged idiosyncratic returns, in a model otherwise identical to Model 6 of Table 2. It is possible that a correlation between an ownership block and turnover-

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performance sensitivity is not causal, but rather the byproduct of unmodeled selection. We account

for selection when comparing firm sensitivity using a propensity score matching methodology

from Heckman, Ichimura, and Todd (1997) and Smith and Todd (2005).[15] The propensity score

computes the predicted value (probability) of being in the treatment versus control group based on

observable determinants. We perform a one-to-many (up to three) nearest neighbor match for our

treatment group using modeled parameters derived from Denes, Karpoff, and McWilliams (2017)

who survey characteristics of firms that attract active blockholders.[16] Each treatment-control pair

is determined based on the linearized propensity score distance in Imbens and Rubin (2015).

We calculate the probability of the presence of an active blockholder or hedge fund

blockholder for each company based on the following probit model:

$$
\begin{aligned}
Active\ &(hedge\ fund)\ blockholder_{i,t} \\
&= \beta_0 + \beta_1 Stock\ return_{i,t-1} + \beta_2 ROA_{i,t-1} + \beta_3 MTB_{i,t-1} + \beta_4 Leverage_{i,t-1} \\
&\quad + \beta_5 Institutional\ ownership_{i,t-1} + \beta_6 Firm\ size_{i,t-1} \\
&\quad + \beta_7 Dividend\ yield_{i,t-1} + \beta_8 Sales\ growth_{i,t-1} + \beta_9 Illiquidity_{i,t-1} \\
&\quad + Industry\ fixed\ effects + Year\ fixed\ effect + \varepsilon_{i,t-1}
\end{aligned}
$$

where the dependent variable is an indicator variable equal to one if a company has the presence

of an active (hedge fund) blockholder. Stock return is the market-adjusted buy-and-hold return,

ROA is operating income scaled by book value of assets, MTB is market value of equity scaled

by the book value of equity, leverage is total debt scaled by book value of assets, institutional

ownership is total percentage of outstanding shares held by institutional investors, firm size is

market value of equity, dividend yield is total dividends scaled by stock price, sales growth is the

annual sales growth, and illiquidity is the Amihud (2002) ratio defined as the average ratio of the

daily absolute return to the daily dollar trading volume. The average linearized propensity score

distance for active blockholder and hedge fund matched pairs is 0.0019 and 0.0042 respectively.

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[15] Ertimur, Ferri, and Muslu (2011) adopt a similar matched firm approach in the context of active shareholders.
[16] For robustness, we limit our matched firms to the closest one neighbor and find similar results.

The performance-turnover sensitivities outlined in Figure 3 are derived for the subsample of 66,382 treated and control director-firm-year observations. The plot suggests that the increase in the turnover-performance sensitivity for directors during the first half of our sample is amplified for firms with an active investor or hedge fund owner. The sensitivity declines in the middle of the decade, but increases after 2008; again most dramatically for firms with an active or hedge fund blockholder. This time trend and Figure 1 is consistent with Jenter and Kanaan (2015) who find that firm performance during downturns is more informative about management's relative quality than performance during market upturns, particularly for the worst performing firms.

Finally, we consider the time series variation in the turnover-performance sensitivity across various measures of accounting and stock price performance. Table 5 presents linear probability models of the likelihood of director turnover as a function of lagged firm performance and controls for director and firm characteristics.[17] Following Linck et al. (2009), we estimate changes over time using a post-SOX cutoff defined as 2003 onward. We focus on our binary measures of relative performance for ease of interpretation, although the economic and statistical results are similar when we use continuous performance measures. Results in Model 1 (2) indicate that a relation between director turnover and industry-adjusted stock (accounting) returns existed prior to 2003, but is not significantly different after. Model 3 decomposes returns into industry-induced and idiosyncratic components. While the coefficient on low industry-induced return is positive and statistically significant pre-SOX, it essentially disappears post-SOX. The interaction between low idiosyncratic return and the post-SOX time period is positive and significant, indicating that the turnover-performance sensitivity associated with idiosyncratic returns significantly increased

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[17] Cornelli, Kominek, and Ljungqvist (2012) and Guo and Masulis (2015) also use a linear probability model to estimate the likelihood of CEO turnover and interpret interaction terms.

from the pre to post-SOX era. This result is consistent with enhanced informativeness of stock prices coinciding with the implementation of SOX documented in Brochet (2010).

4.5 Potential alternative explanations for the turnover-performance sensitivity

In this section, we consider three alternative explanations for the negative relation between director turnover and past firm performance. One explanation is that directors voluntarily leave to preserve their remaining reputational capital. As noted in Fahlenbrach, et al. (2017), voluntary turnover by directors seeking to preserve their reputation is more likely to occur before the realization of poor performance. Given the structure of our tests, it is likely too late for directors to elude attribution for poor performance. Yet directors anticipating further poor performance may seek to avoid further damage; we should observe continued poor performance when directors leave after poor performance. A second explanation is that directors voluntary leave to disassociate themselves from the poorly performing firm, providing a costly, but credible signal of quality to the labor market. In this case, directors leaving after poor performance should be more likely to experience a net gain in future directorships relative to directors that remain. Finally, Hermalin and Weisbach (1988), Farrell and Whidbee (2000), and Yermack (2004) link director departures to contemporaneous CEO turnover. It is conceivable that our director turnover-performance sensitivity is driven largely by coincident CEO departures and a wholesale change in management.

We perform two untabulated tests to examine directors' reputational concerns. In univariate tests, we evaluate firm performance in the years after departure of one or more directors. Focusing on firms in the lowest quartile of lagged industry-adjusted stock performance, those with turnover earn significantly higher future stock returns than an equally-weighted portfolio of sample firms in the same Fama-French 48 industry and decile of firm size that did not experience turnover. For example, firms with director departures obtain two-year stock returns that are 4.8 percentage

points higher than firms without turnover. This result suggests that, if anything, firm performance improves after turnover. We also evaluate future performance in a multivariate setting, controlling for firm and board characteristics and find no evidence that performance continues to decline after director departures in the context of poor performance. In sum, our results do not suggest that reputational concerns can explain the sensitivity of director turnover to lagged firm performance.

Our results in Section 4.3 are inconsistent with a signaling explanation. Directors who turn over after poor firm performance are significantly less likely to gain future directorships and experience a net loss of board seats at other public firms. Thus, on average, directors that leave boards following poor performance are penalized, not rewarded, in the director labor market.

To consider if our results are driven by contemporaneous CEO turnover, we examine if there are differences in director turnover-performance sensitivity in years where there is also CEO turnover. We run regressions (untabulated) similar to Tables 2 and 3, and include interaction terms between a CEO turnover indicator and our lagged performance measures. At both the director and firm level, the coefficients on low stock return and its interaction with CEO turnover are positive and significant, suggesting turnover-performance sensitivity is almost twice as high for directors in years after CEO turnover. Yet our results are not driven solely by coincident CEO turnover as the coefficient on low stock return is also positive and significant. Models using industry-adjusted ROA or idiosyncratic stock return yield similar results. While these findings fit with prior studies, a substantial director turnover-performance sensitivity persists in the absence of CEO turnover.

5. Corporate Governance and Director Turnover

Prior studies of executive turnover have highlighted the important effects of a variety of governance features. In our context, the association between the director turnover-performance sensitivity and governance attributes is of substantial interest because board characteristics

themselves are recognized as governance features that can have a significant effect on the sensitivity of executive turnover to performance. For directors, however, it remains unclear which internal or external governance features might impact director turnover generally, or more specifically the sensitivity of director turnover to firm performance.

In this section, we examine if governance features, proxy voting, and ISS recommendations alter the likelihood of director turnover and the turnover-performance sensitivity. We consider three internal governance features associated with heightened agency conflicts that may insulate directors from internal monitoring. The first is co-opted, defined by director-firm-years in which a director's tenure is less than that of the current CEO. The second is board busyness, measured as the percentage of directors holding three or more public directorships. The third are measures of CEO duality where the current (former) CEO is also chair. Institutions and other large external shareholders increase the likelihood of executive turnover.[18] Further, Schmidt and Fahlenbrach (2017) suggest that active institutional ownership lowers agency costs. We therefore also consider the effect of active blockholders defined as an outside shareholder who files a 13D disclosing a minimum 5% equity stake with the intention to affect change in a firm or its management.[19]

To establish the effects of governance on turnover, Models 1-3 of Table 6 summarize logistic regressions estimating the likelihood of director turnover in a given firm-year as a function of lagged firm performance, director characteristics, and governance measures. Models 4-6 present the results of Tobit estimates of proportional turnover. We restrict our sample to the 109,331 director-firm-year and 14,560 firm-year observations with available data on active blockholders. For brevity, we only report coefficients of our low performance indicator variables

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[18] See for example Denis, Denis, and Sarin (1997); Huson, Parrino, and Starks (2001); Goyal and Park (2002); and Del Guercio, Seery, and Woidtke (2008).

[19] A number of papers examine the effects of active blockholders on a variety of corporate policies, CEO turnover, and firm value. For example, see Brav et al. (2008) and Klein and Zur (2009).

and suppress output related to both the director and firm controls, although the coefficients have the same sign and significance as in Tables 2 and 3.

Results in Table 6 indicate that, after controlling for governance features, the director turnover-performance sensitivity remains negative across all performance measures. The coefficient estimate for co-opted is negative in all models, suggesting that co-option insulates directors from turnover. Directors appointed under the current CEO are, all else equal, 2.3 percentage points less likely to turn over. The positive and significant coefficient for busyness suggests that directors on a busy board are more likely to turn over; a result that indicates that directors with more external responsibilities and limited attention are more likely to leave a board.

The results in Models 1-3 do not suggest that duality for sitting CEOs alters the likelihood of turnover, however, a director is 0.6 percentage points less likely to turn over if the board chair is the former CEO. Given the longer tenure of the former CEO, this may reflect long-run co-option. Consistent with external monitoring, the likelihood of director turnover is higher with an active blockholder. The coefficient in Model 1 suggests an active blockholder increases the likelihood of turnover by 1.2 percentage points.[20] Results from Models 4-6 largely mirror those in Models 1-3 in the context of proportional board turnover.

In Models 1-3 of Table 7, we investigate the impact of corporate governance through proxy voting and ISS recommendations against voting for an individual director. Fischer, Gramlich, Miller, and White (2009) contend that director elections provide information about how board performance is perceived by investors. Votes for and an ISS recommendation against serve as a measure of performance attribution for an individual director. In Models 1-3, our sample is restricted to 52,228 director-firm-year observations between 2003 and 2010 with voting data for

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[20] In unreported results, we replace the existence of an active blockholder with the appearance of a new active blockholder in the year prior and find a similar economic effect.

the prior annual meeting from ISS. Excess for is an indicator equal to one if a director receives

fewer 'for' votes than the average director on a board (excluding the director of interest).[21] ISS

against is an indicator equal to one if ISS recommends against voting for a director. For each

model, the coefficient on excess for is positive, indicating that directors who receive fewer 'for'

votes than average are 1.2 percentage points more likely to turn over. This result is consistent with

Fischer et al. (2009) who find that lower approval is associated with turnover in the following year.

Cai, Garner, and Walkling (2009) show that ISS recommendations impact director voting,

however, our results suggest that recommendations do not have an independent effect on turnover.

Cai et al. (2009) find that director meeting attendance is a significant determinant of

director voting and Masulis and Mobbs (2014) utilize attendance as a proxy for director effort. In

Models 4-6 of Table 7, we consider the effects of attendance on turnover for a sample of 28,796

director-firm-year observations with both voting data from ISS and information on director

attendance from RiskMetrics. While less than 1% of directors in our sample miss more than 75%

of their meetings in a given year, the results in Models 4-6 suggest that those that do are roughly

2.5 to 2.6 percentage points more likely to leave the board in the following year.

While aspects of corporate governance are unconditionally correlated with the rate of

director turnover, we also consider if governance moderates the turnover-performance sensitivity

of directors. Table 8 outlines linear probability models estimating the likelihood of turnover for

individual directors. Each model includes one governance measure, labeled in the Table 8 header,

and an interaction term between governance and an indicator equal to one if a firm's lagged

idiosyncratic stock return is in the lowest quartile. We focus on idiosyncratic turnover-performance

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[21] Following Cai, Garner, and Walkling (2009), we define the level of "excess" votes as the votes a director receives minus the average for all directors simultaneously considered for election. We find a similar relation between director voting and turnover using either the percentage or total number of "against" votes instead.

sensitivity given our evidence that turnover-performance sensitivity is concentrated in idiosyncratic performance. For brevity, we suppress the coefficients on industry-induced stock return and its governance interactions. In the last two columns, we incorporate variables associated with the presence of an active blockholder and the effects tied to the arrival of a new blockholder in the firm's ownership structure in the year prior. As in Section 4.4, we account for selection for the presence of, or arrival of, an active blockholder using a propensity score matching methodology.

The independent effects of the governance features in Table 8 mirror those in Table 6. For example, co-opted directors are less likely to experience turnover, while directors of firms with active blockholders are more likely to turn over. The results also suggest that governance features can moderate the sensitivity of director turnover to performance. While co-opted directors are insulated from turnover, this effect is significantly attenuated after poor firm performance. The positive association between director turnover and active blockholders is most pronounced after poor firm performance. The increased turnover sensitivity is observed for both existing blocks and new active blocks and suggests that active investors may be a significant external channel through which the turnover performance relation obtains for non-executive directors.[22]

Finally, we find that excess votes for, ISS recommendations, and meeting attendance do not have a moderating effect on the sensitivity of turnover to performance for corporate directors. We omit these last results from Table 8 for brevity. In untabulated tests, we also consider the effects of other governance measures that may be related to the turnover-performance sensitivity of directors. Specifically, for a subsample of S&P 1500 firms we include in our specifications the G-index and E-index of shareholder rights. We also include an indicator for a classified board,

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[22] We replicate our specifications utilizing alternative measures of institutional ownership: total percentage of institutional ownership; number of blockholders with 5% interest or more; number of motivated monitors (Fich, Harford, and Tran, 2015); and change in the number of 5% blockholders or motivated monitors. None of these measures have any significant influence on the likelihood of turnover or turnover-performance sensitivity.

and a variable equal to one in years where a director's term has expired. Neither the G- nor E-index have an independent effect on turnover or on the turnover-performance sensitivity. As expected, classified board (term expiring) has a negative (positive) effect on turnover, but neither have a significant effect on the turnover-performance sensitivity.

Changes to the exchange listing requirements of the NYSE/NASDAQ in the early 2000s mandated majority board independence of listed firms, and full independence for nominating committees. Guo and Masulis (2015) document that noncompliant firms experienced an increase in the sensitivity of CEO turnover to performance after becoming compliant, consistent with an improvement in monitoring. To consider whether this improvement in monitoring extends to the board itself, we follow Guo and Masulis (2015) and examine the sensitivity of director turnover following quasi exogenous changes in board composition. Specifically, we construct a sample of firm-years from the RiskMetrics database from 1998-2009. A propensity score matching model is estimated from 1998-2000 to match firms without a majority independent board or fully independent nominating committee (non-compliant treatment firms) to compliant firms as of 2001, the year in which the new exchange listing rules were announced. Our final sample consists of 6,890 (27,192) non-compliant (compliant) director-firm-years when compliance is defined as majority board independence and 23,120 (17,129) non-compliant (compliant) director-firm-years when compliance is defined as full nominating committee independence.

We utilize the sample of director-firm-years to estimate the sensitivity of director turnover to performance using models equivalent to those summarized in Table 2.[23] We continue to find an economically significant turnover-performance sensitivity for directors using the RiskMetrics subsample from 2001-2009. For example, directors in the lowest quartile of idiosyncratic returns

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[23] Following Gao and Masulis (2015), these regressions also include firm and year fixed effects as well as year by performance interaction terms.

experience a 0.9 percentage point increase in the likelihood of turnover the following year, indicating that our initial estimates using BoardEx are quite robust. Implementing a difference-in-difference framework, we find that the sensitivity of turnover to performance of directors at non-compliant firms does not change relative to that of compliant firms after making the mandated changes in board and committee composition. Similarly, we do not find significant differences in sensitivities for non-compliant firms that were the furthest away from compliance or had the CEO sitting on the nominating committee. Overall, it does not appear that board independence is a first order determinant of director turnover-performance sensitivity.

6. The Consequences of Director Turnover for the Firm

Turnover tied to firm performance represents a material economic incentive for the average director. The positive incentive effect for the firm may, however, be partially reduced by the costs of replacing the skill and experience of directors that exit. Given a relatively thin labor market for qualified directors, the appointment of less qualified directors represents a potential cost of director turnover. This cost is likely exacerbated when turnover and replacement coincides with relatively poor performance, which reduces the attractiveness of the position for prospective candidates.

6.1 Local supply effects on director turnover

Knyazeva, Knyazeva, and Masulis (2013) show that a firm's ability to recruit non-executive directors is positively correlated with the local supply of prospective directors, suggesting in turn, that the depth of the director pool in the local market is likely to be an important determinant of director turnover. Following Knyazeva et al., we define the supply of directors in the local labor market by the log of the number of other firms headquartered within a 60-mile radius of a sample firm. In untabulated regressions otherwise similar to those in Table 2, we find that the supply of directors in the local labor market is positively correlated with director turnover.

For example, directors of firms headquartered in markets in the top quartile of labor supply are 0.7 percentage points more likely to experience turnover in a given firm-year. When we interact labor supply with an indicator variable equal to one when a firm's lagged industry-adjusted stock return is in the lowest quartile, the coefficient on the interaction term is insignificant. Thus, the depth of the local director market does not moderate the turnover-performance sensitivity for directors.

6.2 Firm performance and the quality of replacement directors

In Table 9, we summarize differences between the directors that leave a board and those appointed after they turn over. Given that each director departure does not always match to one replacement, we quantify differences among departing and replacement directors by pairing each departing director with each replacement over a one-, two- and three-year horizon.[24] Differences for each pair are averaged over each firm-year with at least one director exit. Panel A summarizes all turnover-replacement pairs for 12,752 director turnovers and 13,113 replacements over a one-year horizon after turnover. Panels B and C detail all turnover-replacement pairs over a two and three-year horizon following turnover, respectively.

Column 1 in each panel of Table 9 reports average differences in director characteristics for all turnover-replacement pairs. Overall, replacement directors are almost six years younger and exhibit higher proxies for reputation and experience in terms of additional directorships and current CEO experience than the directors they replace. Replacement directors are also less likely to have compensation and nominating committee experience, and are more likely to be female.

We examine whether turnover may have unintended consequences for firms replacing directors after poor performance. The literature indicates that holding a directorship in a poorly performing firm might be a relatively unattractive option for qualified replacements. Fich and

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[24] We examine short and long-term horizons to account for search and matching frictions in the director labor market.

Shivdasani (2007) note that outside directors of firms subject to lawsuits for financial fraud experience a decline in the number of board seats held, while Srinivasan (2005) finds that reputation declines for directors after earnings restatements. Gilson (1990) shows that outside directors on boards of firms in financial distress hold fewer additional board seats.

To consider the moderating influence of firm performance on the quality of replacement directors, columns 2 and 3 separate turnover-replacement pairs into firms-years in the lowest (column 2) and highest quartile (column 3) of lagged industry-adjusted stock returns. Replacement directors at firms with low performance are generally of no better quality than those that turn over (Panel A). Firms in the highest quartile, however, are able to attract higher quality replacements compared to directors that turn over as defined by additional directorships, CEO experience, and audit committee experience. These results suggest that poorly performing firms with director turnover are subsequently handicapped in the director labor market. While this result may seem counterintuitive, it is consistent with our findings that the turnover-performance sensitivity for directors is not attenuated by the depth of the pool of prospective directors in the local labor market.

7. Conclusion

In this paper, we examine performance-based turnover on corporate boards. Our results suggest that directors are more likely to leave boards following both poor accounting and stock price performance. The turnover-performance sensitivity to stock returns manifests in the idiosyncratic component of returns, but not in the component of returns common to the firm's industry peers. This suggests that director replacement is a byproduct of relative performance attribution, and not to aspects of firm performance that are beyond their control. The consequences of the threat of turnover extend to the broader labor market for directors as individuals who leave a firm in the context of poor performance are less likely to obtain other directorships in the future.

Our findings are robust to alternative explanations for the turnover-performance sensitivity including voluntary director exit for reputation concerns and coincident CEO turnover.

The sensitivity of director turnover to firm performance increases substantially over our sample period, particularly during the first half of our sample (2000-2005). This result is highlighted by the increase in turnover-performance sensitivity in the presence of an active institutional blockholder or hedge fund. Director turnover also became increasingly sensitive to idiosyncratic stock returns while becoming less sensitive to industry-induced returns over time, consistent with relative performance evaluation. These results are consistent with the notion that the director labor market became considerably more dynamic over the decade of the 2000s and increasingly tied to relative firm performance. This evidence complements recent evidence that the sensitivity of CEO turnover to firm performance also increased over the same period.

We also find that governance characteristics affect the rate of turnover and influence the director turnover-performance sensitivity. Most notably, directors are more likely to turn over and exhibit a higher turnover-performance sensitivity at firms with an active institutional blockholder. This suggests that one of the main channels by which the observed turnover-performance sensitivity may work is outside pressure from investors. Overall, a firm's governance structure moderates or strengthens the relation between director turnover and prior firm performance.

To investigate the impact of director turnover on a firm, we consider supply effects in the local labor market as well as the quality of directors appointed to a board after turnover. The supply of prospective directors in the firm's local market increases the likelihood of director turnover, however, this supply effect does not moderate the turnover-performance sensitivity for directors. Consistent with this result, we find that poorly performing firms are unable to attract higher quality replacements precisely when additional expertise would be most valuable. After

poor firm performance and turnover, newly appointed directors are no more qualified, in terms of additional directorships and executive experience, than the directors they replace. Thus, while the threat of turnover for poor performance may have positive incentive effects, the replacement of these directors does not yield a substantial improvement in the quality of the overall board.

Overall, our results are consistent with Fama (1980) and Fama and Jensen (1983) who contend that outside directors have incentives to be effective monitors to signal their value in the director labor market. Our findings provide broad support for the notion that individual directors, and boards collectively, are disciplined for poor performance and experience post-turnover reputational consequences in the director labor market. The threat of replacement, particularly in the context of poor firm performance, presents an economically significant incentive for directors.

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Appendix A: Variable Definitions

	Variable Definition
Panel A: Firm Performance Measures	
Industry-adjusted stock return	Annual buy-and-hold return adjusted by median Fama-French 48 industry return of all CRSP firms
Industry-adjusted ROA	Operating income scaled by total book value of assets adjusted by median Fama-French 48 industry ROA of all Compustat firms
Industry-induced stock return	Fitted value from a cross-sectional regression of annual stock return on median Fama-French 48 industry return of all CRSP firms
Idiosyncratic stock return	Residual from a cross-sectional regression of annual stock return on median Fama-French 48 industry return of all CRSP firms
Low stock return	Indicator equal to one if industry-adjusted stock return falls in the lowest quartile of industry-adjusted stock return in a given sample year
Low ROA	Indicator equal to one if industry-adjusted ROA falls in the lowest quartile of industry-adjusted ROA in a given sample year
Low industry-induced stock return	Indicator equal to one if industry-induced stock return falls in the lowest quartile in a given sample year
Low idiosyncratic stock return	Indicator equal to one if idiosyncratic stock return falls in the lowest quartile in a given sample year
Panel B: Director Characteristics	
Age	Director age in years
Tenure	Director tenure in years
Number of other seats	Total number of other public directorships held by director
Hold additional seats	Indicator equal to one if director holds additional directorships at outside public firms, zero otherwise
Current CEO elsewhere	Indicator equal to one if director is currently a CEO of an outside public firm, zero otherwise
Attendance < 75%	Indicator equal to one if director attends less than 75% of board meetings in a given sample year, zero otherwise
Audit committee	Indicator equal to one if director sits on the audit committee, zero otherwise
Compensation committee	Indicator equal to one if director sits on the compensation committee, zero otherwise
Nominating committee	Indicator equal to one if director sits on the nominating committee, zero otherwise
Gain new seat - prior year	Indicator equal to one if director gains an additional directorship at an outside public firm in the prior year, zero otherwise
Female	Indicator equal to one if director is female, zero otherwise
Co-opted	Indicator equal to one if director tenure is less than current CEO tenure, zero otherwise
Age (65-71)	Indicator equal to one if director age is greater than or equal to 65 and less than or equal to 71, zero otherwise
Age (72+)	Indicator equal to one if director age is greater than or equal to 72, zero otherwise

Appendix A (continued): Variable Definitions

	Variable Definition
Panel B: Director Characteristics (continued)	
Audit committee experience	Indicator equal to one if director currently sits or previously sat on audit committee of a public firm, zero otherwise
Compensation committee experience	Indicator equal to one if director currently sits or previously sat on compensation committee of a public firm, zero otherwise
Nominating committee experience	Indicator equal to one if director currently sits or previously sat on nominating committee of a public firm, zero otherwise
Excess for	Indicator equal to one if the director receives less 'for' votes than the average director on the board, zero otherwise
ISS against	Indicator equal to one if ISS recommends a vote against the director, zero otherwise
Panel C: Firm Governance Measures	
Busy board	Percentage of outside directors holding three or more public directorships
CEO chair	Indicator equal to one if CEO also holds position of chair of the board, zero otherwise
Former CEO is chair	Indicator equal to one if chair of the board was previously CEO of the firm, zero otherwise
Active blockholder	Indicator equal to one if firm has an outside shareholder who files a 13D disclosing a 5% stake with intentions to affect the firm or management, zero otherwise
Active appearance	Indicator equal to one if active block exists as of fiscal year-end prior to when turnover is identified but did not exist in year prior to this, zero otherwise
Hedge fund blockholder	Indicator equal to one if firm has a hedge fund shareholder with at least a 5% stake in the firm's equity, zero otherwise
Board size	Total number of directors on the board
Outsiders	Percentage of outside directors on the board
Panel D: Firm Characteristics	
CEO turnover	Indicator equal to one if CEO turnover occurs during the current fiscal year, zero otherwise
Firm age	Firm age in years
Firm size	The natural log of total book value of assets
Return volatility	Annualized standard deviation of monthly stock returns in prior fiscal year

Figure 1: Time series of director turnover-performance sensitivity

The figure reports the time series variation in director turnover-performance sensitivity with respect to idiosyncratic stock returns over the sample period (2000 - 2011). For each three-year window over the sample period, regressions are estimated similar to those of Model 6 in Table 2. The marginal effects from the coefficients on idiosyncratic stock return are plotted for each three-year rolling window.
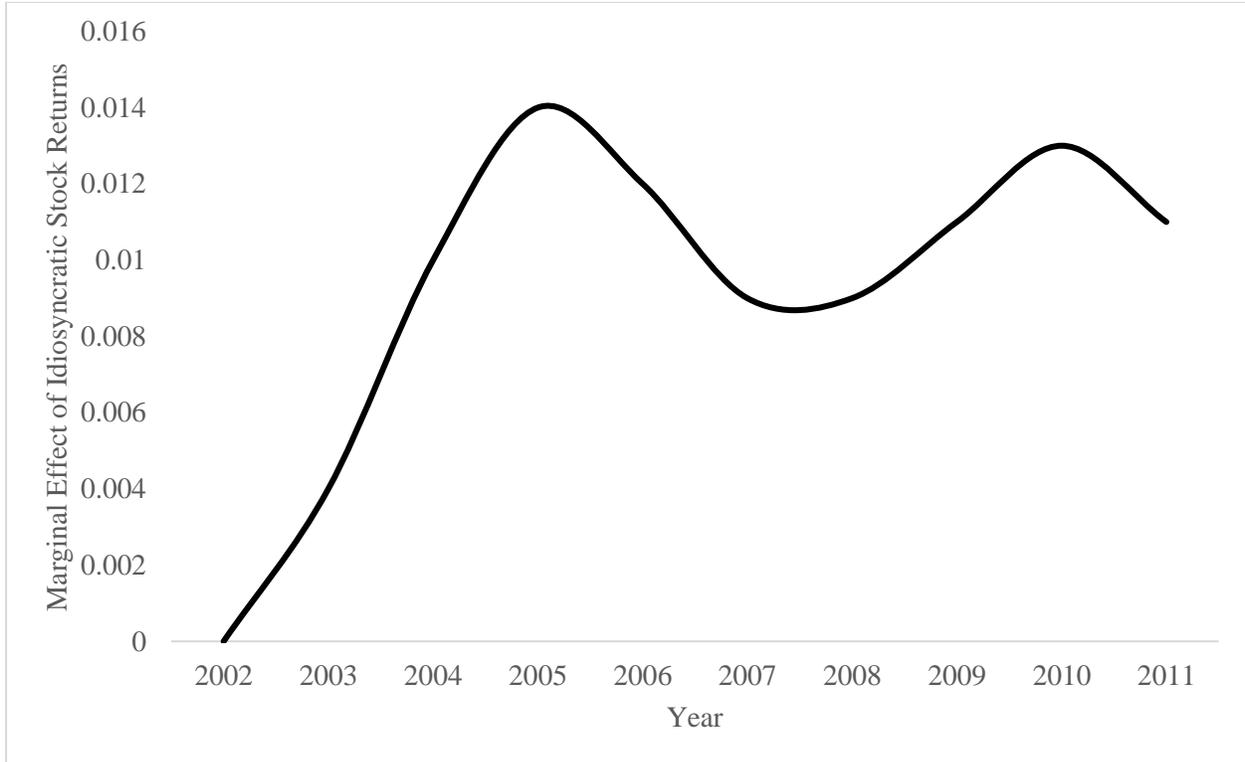
Figure 2: Active blockholder and hedge fund blockholder ownership over time

The figure reports the time series variation in the proportion of firm-years with the presence of an active blockholder or a hedge fund blockholder over the sample period (2000 - 2011). An active blockholder is an outside investor who files a 13D disclosing a 5% stake with intentions to affect the firm or management. A hedge fund blockholder is a hedge fund investor who holds at least a 5% stake of the firms' equity.
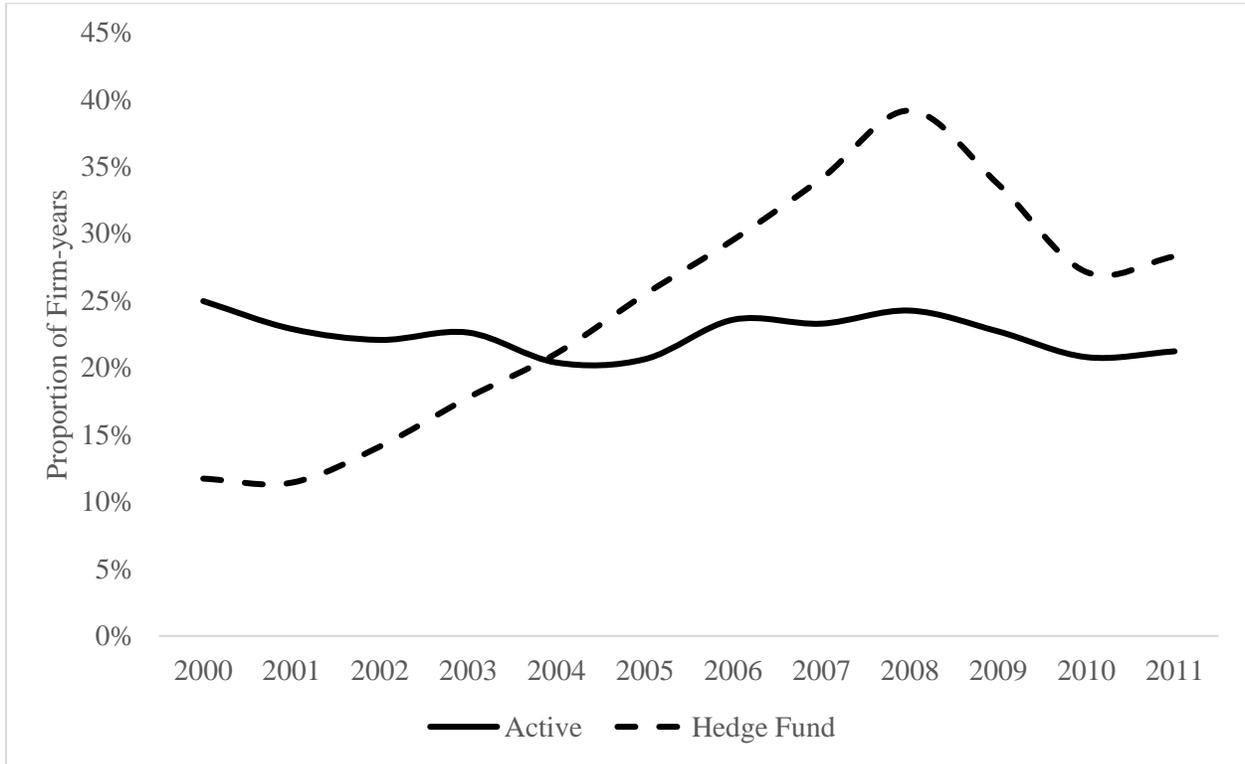
Figure 3: Time series of director turnover-performance sensitivity at firms with blockholders

The figure reports the time series variation in director turnover-performance sensitivity with respect to idiosyncratic stock returns at firms with the presence of an active blockholder or a hedge fund blockholder over the sample period (2000 - 2011). For each three-year window over the sample period, we estimate regressions similar to those of Table 8. The sample consists of a propensity score matched sample. Firms with the presence of an active blockholder or hedge fund blockholder are matched to up to three control firms based a propensity score matching model described in Section 4.4. The marginal effects from the coefficients on the interaction term between idiosyncratic stock return and the presence of an active blockholder/hedge fund blockholder are plotted for each three-year rolling window. An active blockholder is an outside investor who files a 13D disclosing a 5% stake with intentions to affect the firm or management. A hedge fund blockholder is a hedge fund investor who holds at least a 5% stake of the firms' equity.
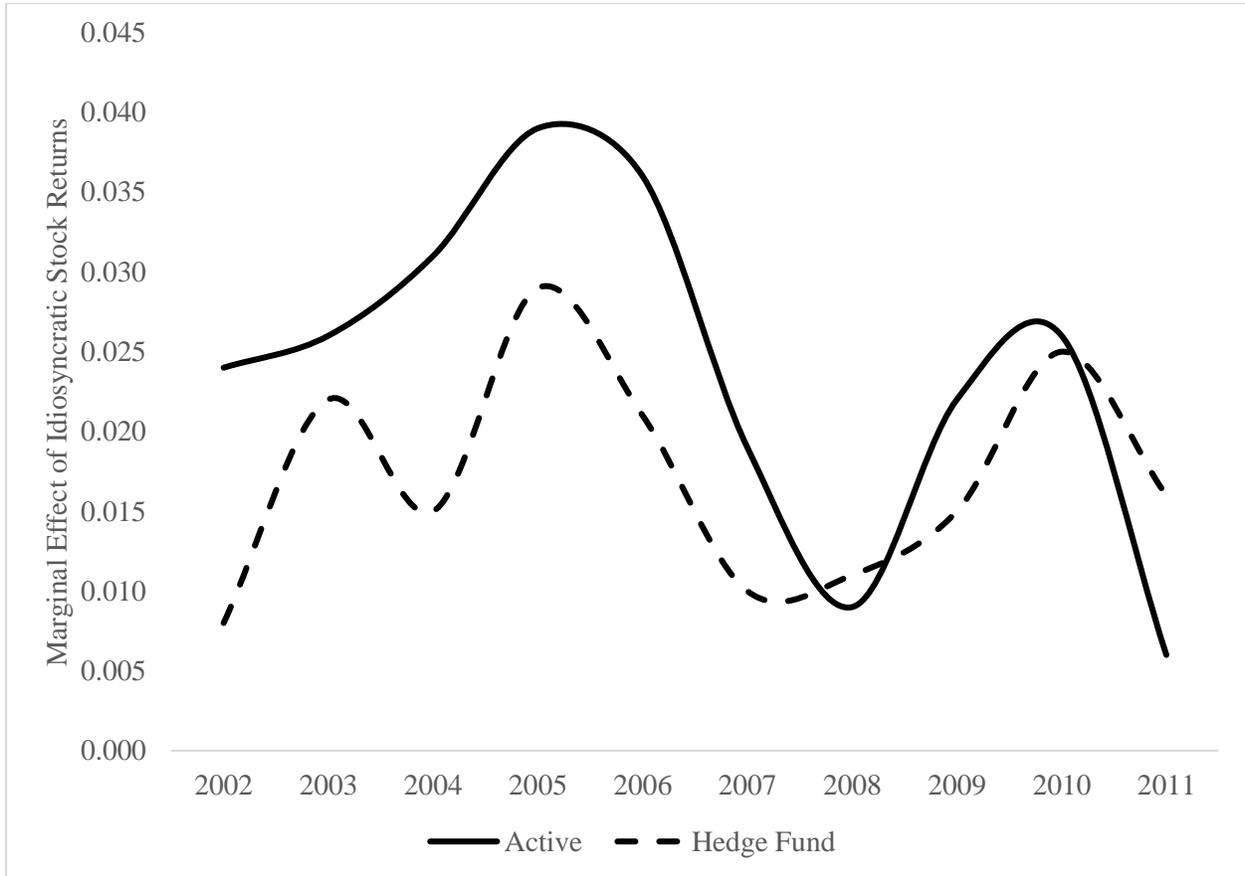
Table 1: Summary of firm characteristics

The table summarizes firm characteristics for 39,975 firm-years between 2000 and 2011. Panel A summarizes one-year lagged firm performance measures from CRSP and Compustat. Industry-adjusted stock return (ROA) is the annual buy-and-hold return (ROA) adjusted by the median Fama-French 48 industry return (ROA) based on all firms in CRSP (Compustat). ROA is operating income scaled by the total book value of assets. Industry-induced (idiosyncratic) stock return is the fitted (residual) value from a cross-sectional regression of annual buy-and-hold returns on the median Fama-French 48 industry return based on all firms in CRSP. All stock and accounting performance measures are winsorized at the 1st and 99th percentiles. Panel B reports board, director and governance characteristics as of the fiscal year-end prior to when turnover is identified from BoardEx and Thomson Reuters. Age is director age in years. Tenure is director tenure in years. Hold additional seats is an indicator equal to one if the director holds an additional directorship at an outside public firm, zero otherwise. Gain new seats - prior year is an indicator equal to one if the director gains an additional directorship at an outside public firm in the past year, zero otherwise. Current CEO elsewhere is an indicator equal to one if the director is currently a CEO of an outside public firm, zero otherwise. Female is an indicator equal to one if the director is female, zero otherwise. Co-opted is an indicator equal to one if the director's tenure is less than the current CEO's tenure, zero otherwise. Busy board is the percentage of outside directors holding three or more directorships. CEO chair is an indicator equal to one if the CEO also holds the position of chair of the board, zero otherwise. Former CEO is chair is an indicator equal to one if the chair of the board was previously the firm's CEO, zero otherwise. Active blockholder is an indicator equal to one if a firm-year has an outside shareholder who files a 13D disclosing a 5% stake with intentions to affect the firm or its management, zero otherwise. Board size is the total number of directors on the board. Outsiders is the percentage of outside directors on the board. Panel C reports firm characteristics as of the fiscal year-end prior to when turnover is identified from Compustat, BoardEx, and CRSP. CEO turnover is an indicator equal to one if a CEO turnover occurs during the current fiscal year, zero otherwise. Firm age is the age of the firm in years. Firm size is the log transformed total book value of assets. Return volatility is the annualized standard deviation of monthly stock returns. Panel D sorts the sample into firm-years experiencing director turnover(s) (14,220 firm-years) and firm-years with no director turnover (25,755 firm-years) to compare firm performance. ***, **, * denote statistically significant differences at the 1%, 5%, and 10%, levels respectively.

	Mean	Median	Std Dev
Panel A: Firm Performance Measures			
Industry-adjusted stock return	11.40%	1.21%	0.59
Industry-adjusted ROA	0.82%	0.93%	0.18
Industry-induced stock return	15.13%	13.38%	0.28
Idiosyncratic stock return	0.00%	-8.62%	0.62
Panel B: Board, Director and Governance Characteristics			
Age	60.49	61.00	9.26
Tenure	7.34	6.77	4.13
Hold additional seats	37.14%	0.00%	0.48
Gain new seat - prior year	3.81%	0.00%	0.19
Current CEO elsewhere	20.59%	0.00%	0.40
Female	10.31%	0.00%	0.30
Co-opted	33.81%	0.00%	0.47
Busy board	17.63%	0.00%	0.38
CEO chair	50.02%	100.00%	0.50
Former CEO is chair	15.45%	0.00%	0.36
Active blockholder	22.38%	0.00%	0.42
Board size	8.65	8.00	2.73
Outsiders	71.63%	75.00%	0.15
Panel C: Firm Characteristics			
CEO turnover	10.07%	0.00%	0.30
Firm age	19.32	14.00	14.90
Firm size	6.51	6.51	2.10
Return volatility	0.47	0.39	0.34

	Turnover Firm-Years (1)	Non-Turnover Firm-Years (2)	Difference (1) – (2)
Panel D: Firm Performance Measures			
Industry-adjusted stock return	10.68%	11.80%	-1.12%**
Industry-adjusted ROA	0.68%	0.89%	-0.21%
Industry-induced stock return	16.18%	14.54%	1.64%***
Idiosyncratic stock return	-1.26%	0.69%	-1.95%***

Table 2: Logit regressions modeling individual director turnover

The table reports logistic regressions modeling the likelihood that a director turns over in a given firm-year. The sample consists of 281,062 director-firm-year observations between 2000 and 2011. In each model, the dependent variable is an indicator equal to one if the director turns over and zero otherwise. Models 1-3 include continuous measures of lagged performance: industry-adjusted stock return (Model 1), industry-adjusted ROA (Model 2), industry-induced and idiosyncratic stock returns (Model 3). Industry-adjusted stock return (ROA) is the annual buy-and-hold return (ROA) adjusted by the median Fama-French 48 industry return (ROA) based on all firms in CRSP (Compustat). ROA is operating income scaled by the total book value of assets. Industry-induced (idiosyncratic) stock return is the fitted (residual) value from a cross-sectional regression of annual buy-and-hold returns on the median Fama-French 48 industry return. Models 4-6 include measures of lagged performance based on sample quartiles for a given sample year: low stock return (Model 4), low ROA (Model 5), low industry-induced and low idiosyncratic stock return (Model 6). Low stock return (ROA) is an indicator equal to one if the lagged industry-adjusted stock return (ROA) falls in the lowest quartile of performance for the sample year, zero otherwise. Low industry-induced (idiosyncratic) stock return is an indicator equal to one if industry-induced (idiosyncratic) stock return falls in the lowest quartile of performance for the sample year, zero otherwise. All stock and accounting performance measures are winsorized at the 1st and 99th percentiles. All other independent variables are measured as of the fiscal year-end prior to when turnover is identified. Age (65-71) is an indicator equal to one if the director is between the ages of 65 and 71, zero otherwise. Age (72+) is an indicator equal to one if the director is 72 years or older, zero otherwise. Hold additional seats is an indicator equal to one if the director holds additional directorships at outside public firms, zero otherwise. Gain new seat - prior year is an indicator equal to one if the director gained an additional directorship at an outside public firm in the past year, zero otherwise. Current CEO elsewhere is an indicator equal to one if the director is currently a CEO at an outside public firm, zero otherwise. Audit, Compensation, and Nominating committee are indicators equal to one if the director sits on the respective committee, zero otherwise. Female is an indicator equal to one if the director is female, zero otherwise. Tenure is director tenure in years. Co-opted is an indicator equal to one if the director's tenure is less than the current CEO's tenure, zero otherwise. CEO turnover is an indicator equal to one if CEO turnover occurs during the current fiscal year, zero otherwise. Firm age is the age of the firm in years, firm size is the log transformed total book value of assets, return volatility is the annualized standard deviation of monthly stock returns, and board size is the total number of directors on the board and outsiders is the percentage of outside directors on the board. Year fixed effects are also included. Marginal effects are reported and computed at the mean values of the independent variables. Marginal effects are the change in the probability of director turnover for a one standard deviation change in a continuous variable or a shift from zero to one for an indicator variable. *p*-values based on standard errors clustered by firm and by year are in parentheses.

Table 2 (continued)

	Firm Performance, Continuous			Firm Performance, Low		
	Model 1	Model 2	Model 3	Model 4	Model 5	Model 6
Intercept	-1.961	-1.969	-1.977	-2.033	-2.105	-2.036
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
Industry-adjusted stock return	-0.005			0.010		
	(0.008)			(0.000)		
Industry-adjusted ROA		-0.025			0.015	
		(0.000)			(0.000)	
Industry-induced stock return			-0.003			0.003
			(0.753)			(0.282)
Idiosyncratic stock return			-0.005			0.009
			(0.003)			(0.000)
Age (65-71)	0.014	0.014	0.014	0.014	0.014	0.014
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
Age (72+)	0.056	0.056	0.056	0.056	0.055	0.056
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
Hold additional seats	-0.004	-0.004	-0.004	-0.005	-0.005	-0.005
	(0.012)	(0.014)	(0.011)	(0.009)	(0.007)	(0.007)
Gain new seat - prior year	0.006	0.006	0.006	0.006	0.006	0.006
	(0.027)	(0.024)	(0.028)	(0.025)	(0.025)	(0.029)
Current CEO elsewhere	0.001	0.001	0.001	0.001	0.001	0.001
	(0.686)	(0.748)	(0.684)	(0.703)	(0.745)	(0.697)
Audit committee	-0.033	-0.033	-0.033	-0.032	-0.032	-0.032
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
Compensation committee	-0.022	-0.022	-0.022	-0.022	-0.022	-0.022
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
Nominating committee	-0.019	-0.019	-0.019	-0.019	-0.019	-0.019
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
Female	-0.002	-0.002	-0.002	-0.002	-0.002	-0.002
	(0.076)	(0.076)	(0.071)	(0.087)	(0.083)	(0.081)
Tenure	-0.000	0.000	-0.000	0.000	0.000	0.000
	(0.967)	(0.814)	(0.957)	(0.937)	(0.672)	(0.950)
Co-opted	-0.019	-0.019	-0.019	-0.019	-0.019	-0.019
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
CEO turnover	0.036	0.036	0.036	0.035	0.035	0.035
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
Firm age	0.000	0.000	0.000	0.000	0.000	0.000
	(0.749)	(0.792)	(0.706)	(0.668)	(0.915)	(0.615)
Firm size	-0.001	-0.001	-0.001	-0.001	-0.001	-0.001
	(0.030)	(0.211)	(0.029)	(0.057)	(0.275)	(0.047)
Return volatility	0.023	0.019	0.023	0.020	0.018	0.020
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
Board Size	0.001	0.001	0.001	0.001	0.001	0.001
	(0.002)	(0.007)	(0.002)	(0.002)	(0.004)	(0.001)
Outsiders	-0.047	-0.047	-0.047	-0.046	-0.045	-0.046
	(0.026)	(0.024)	(0.025)	(0.027)	(0.030)	(0.026)
Year FE, Director, Firm Controls	Yes	Yes	Yes	Yes	Yes	Yes
Observations	281,062	281,062	281,062	281,062	281,062	281,062
Pseudo r^2	0.044	0.045	0.044	0.045	0.045	0.045

Table 3: Tobit regressions modeling percentage of board turnover

The table reports Tobit regressions modeling the percentage of outside directors on a board that turn over in a given firm-year. The sample consists of 39,975 firm-year observations between 2000 and 2011. In each model, the dependent variable is the number of outside directors that turn over scaled by the total number of outside directors on the board in a given firm-year. Models 1-3 include continuous measures of lagged performance: industry-adjusted stock return (Model 1), industry-adjusted ROA (Model 2), industry-induced and idiosyncratic stock returns (Model 3). Industry-adjusted stock return (ROA) is the annual buy-and-hold return (ROA) adjusted by the median Fama-French 48 industry return (ROA) based on all firms in CRSP (Compustat). ROA is operating income scaled by total book value of assets. Industry-induced (idiosyncratic) stock return is the fitted (residual) value from a cross-sectional regression of annual buy-and-hold returns on the median Fama-French 48 industry return. Models 4-6 include measures of lagged performance based on sample quartiles for a given sample year: low stock return (Model 4), low ROA (Model 5), low industry-induced and low idiosyncratic stock returns (Model 6). Low stock return (ROA) is an indicator equal to one if lagged industry-adjusted stock return (ROA) falls in the lowest quartile of performance for the sample year, zero otherwise. Low industry-induced (idiosyncratic) stock return is an indicator equal to one if industry-induced (idiosyncratic) stock return falls in the lowest quartile of performance for the sample year, zero otherwise. All stock and accounting performance measures are winsorized at the 1st and 99th percentiles. All other independent variables are measured as of the fiscal year-end prior to when turnover is identified. CEO turnover is an indicator equal to one if CEO turnover occurs during the current fiscal year, zero otherwise. Firm age is the age of the firm in years. Firm size is the log transformed total book value of assets. Return volatility is the annualized standard deviation of monthly stock returns. Board size is the total number of directors on the board. Outsiders is the percentage of outside directors on the board. Year fixed effects are also included. p-values based on standard errors clustered by firm and by year are in parentheses.

	Firm Performance, Continuous			Firm Performance, Low		
	Model 1	Model 2	Model 3	Model 4	Model 5	Model 6
Intercept	-0.235	-0.235	-0.236	-0.245	-0.254	-0.244
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
Industry-adjusted stock return	-0.009			0.024		
	(0.052)			(0.000)		
Industry-adjusted ROA		-0.053			0.038	
		(0.000)			(0.000)	
Industry-induced stock return			-0.011			0.007
			(0.722)			(0.350)
Idiosyncratic stock return			-0.008			0.019
			(0.021)			(0.000)
CEO turnover	0.097	0.098	0.097	0.096	0.096	0.097
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
Firm age	0.000	0.000	0.000	0.000	0.000	0.000
	(0.004)	(0.003)	(0.003)	(0.001)	(0.006)	(0.001)
Firm size	-0.007	-0.005	-0.007	-0.006	-0.005	-0.006
	(0.000)	(0.003)	(0.000)	(0.001)	(0.005)	(0.000)
Return volatility	0.058	0.050	0.058	0.052	0.045	0.051
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
Board size	0.024	0.023	0.024	0.024	0.023	0.024
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
Outsiders	-0.111	-0.111	-0.111	-0.110	-0.109	-0.110
	(0.073)	(0.071)	(0.071)	(0.074)	(0.077)	(0.073)
Year FE	Yes	Yes	Yes	Yes	Yes	Yes
Observations	39,975	39,975	39,975	39,975	39,975	39,975
Pseudo r^2	0.063	0.064	0.063	0.064	0.066	0.064

Table 4: Regressions modeling changes and gain in future board seats

The table reports OLS regressions modeling the change in number of board seats in the following three years and logistic regressions modeling the likelihood that a director obtains a new directorship in the following three years. The sample consists of 176,958 director-year observations between 2000 and 2008. In Models 1-3, the dependent variable is the change in number of outside directorships held from year 0 to year 3. In Models 4-6, the dependent variable is an indicator equal to one if the director gains a new directorship in the following three years and zero otherwise. Models 2 (3) and 5 (6) include only directors in the lowest (highest) quartile of prior industry-adjusted stock return for that sample year. Turnover is an indicator equal to one if the director experiences turnover in year 0, zero otherwise. All other independent variables are measured as of the fiscal year-end prior to when turnover is identified. Age (65-71) is an indicator equal to one if the director is between the ages of 65 and 71, zero otherwise. Age (72+) is an indicator equal to one if the director is 72 years or older, zero otherwise. Tenure is director tenure in years. Hold additional seats is an indicator equal to one if the director holds additional directorships at an outside public firm, zero otherwise. Current CEO elsewhere is an indicator equal to one if the director is currently a CEO at an outside public firm, zero otherwise. Audit, Compensation, and Nominating committees are indicators equal to one if the director sits on the respective committee, zero otherwise. Gain new seat - prior year is an indicator equal to one if the director gained an additional directorship at outside public firms in the past year, zero otherwise. Female is an indicator equal to one if the director is female, zero otherwise. All regressions include firm-year fixed effects. p-values based on standard errors clustered by firm are in parentheses.

	Delta Seats (0,+3)			Gain New Seat (0,+3)		
	Model 1	Model 2	Model 3	Model 4	Model 5	Model 6
	All	Low	High	All	Low	High
Intercept	0.128	0.122	0.130			
	(0.000)	(0.000)	(0.000)			
Turnover	-0.022	-0.033	-0.018	-0.088	-0.149	-0.020
	(0.000)	(0.010)	(0.166)	(0.014)	(0.034)	(0.787)
Age (65-71)	-0.157	-0.151	-0.154	-0.828	-0.711	-0.726
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
Age (72+)	-0.114	-0.117	-0.116	-1.334	-1.412	-1.221
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
Tenure	-0.003	-0.003	-0.003	-0.070	-0.072	-0.076
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
Hold additional seats	-0.307	-0.318	-0.298	0.747	0.756	0.738
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
Current CEO elsewhere	0.069	0.082	0.056	0.221	0.240	0.201
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
Audit committee	0.029	0.038	0.032	0.200	0.221	0.234
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
Compensation committee	0.002	-0.002	0.001	0.116	0.070	0.101
	(0.543)	(0.799)	(0.875)	(0.000)	(0.057)	(0.007)
Nominating committee	-0.012	-0.011	-0.021	0.046	0.030	0.021
	(0.001)	(0.176)	(0.009)	(0.029)	(0.483)	(0.626)
Gain new seats – prior year	-0.084	-0.097	-0.120	0.393	0.476	0.368
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
Female	-0.009	0.002	0.005	0.210	0.277	0.228
	(0.097)	(0.838)	(0.679)	(0.000)	(0.000)	(0.000)
Firm-Year FE	Yes	Yes	Yes	Yes	Yes	Yes
Observations	176,958	40,559	41,015	92,867	21,455	20,971
Pseudo r^2	0.064	0.065	0.062	0.110	0.111	0.108

Table 5: Regressions modeling pre- and post-SOX turnover-performance sensitivity for directors

The table examines the difference in turnover-performance sensitivity between pre- and post-SOX time periods using linear probability models estimating the likelihood of director turnover for 281,062 director-firm-year observations between 2000 and 2011. In all models, the dependent variable is an indicator equal to one if the director turns over and zero otherwise. Interactions between a post-SOX indicator variable and lagged performance measures are included to capture the difference in turnover-performance sensitivities between the two time periods. Low stock return (ROA) is an indicator equal to one if lagged industry-adjusted stock return (ROA) falls in the lowest quartile of performance for the sample year, zero otherwise. Low industry-induced (idiosyncratic) stock return is an indicator equal to one if lagged industry-induced (idiosyncratic) stock return falls in the lowest quartile of performance for the sample year, zero otherwise. Post-SOX is an indicator equal to one if the director-firm-year occurs in 2003 or after, zero otherwise. All other independent variables are measured as of the fiscal year-end prior to when turnover is identified. Director controls not shown include age (65-71), age (72+), hold additional seats, gain new seat - prior year, current CEO elsewhere, audit committee, compensation committee, nominating committee, female, co-opted, and tenure. Firm controls not shown include CEO turnover, firm age, firm size, return volatility, board size and outsiders. All variable definitions are included in Appendix A. p-values based on standard errors clustered by firm and by year are in parentheses.

	Director-Level		
	Model 1	Model 2	Model 3
Intercept	0.132	0.126	0.131
	(0.000)	(0.000)	(0.000)
Low stock return	0.009		
	(0.009)		
Low stock return * Post-SOX	0.003		
	(0.382)		
Low ROA		0.015	
		(0.001)	
Low ROA * Post-SOX		0.003	
		(0.579)	
Low industry-induced stock return			0.009
			(0.000)
Low industry-induced stock return * Post-SOX			-0.007
			(0.054)
Low idiosyncratic stock return			0.003
			(0.252)
Low idiosyncratic stock return * Post-SOX			0.008
			(0.005)
Post-SOX	0.003	0.004	0.003
	(0.623)	(0.519)	(0.591)
Director/Firm Controls	Yes	Yes	Yes
Observations	281,062	281,062	281,062
Adjusted r^2	0.024	0.025	0.024

Table 6: Regressions modeling director turnover with governance

The table reports regressions modeling the likelihood of director turnover with a focus on the impact of governance. Models 1-3 present logistic models estimating the likelihood of director turnover for 109,331 director-firm-year observations between 2000 and 2011. In Models 1-3 the dependent variable is an indicator equal to one if the director turns over and zero otherwise. Models 4-6 present Tobit regressions modeling the percentage of directors on a board that turn over in a given firm-year for a sample of 14,560 firm-year observations between 2000 and 2011. In Models 4-6 the dependent variable is the percentage of directors on the board that turn over. Low stock return (ROA) is an indicator equal to one if lagged industry-adjusted stock return (ROA) falls in the lowest quartile of performance for the sample year, zero otherwise. Low industry-induced (idiosyncratic) stock return is an indicator equal to one if industry-induced (idiosyncratic) stock return falls in the lowest quartile of performance for the sample year, zero otherwise. All other independent variables are measured as of the fiscal year-end prior to when turnover is identified. Co-opted is an indicator equal to one if the director's tenure is less than the current CEO's tenure (Models 1-3) or the percentage of directors with tenure less than the current CEO's (Models 4-6). Busy board is the percentage of outside directors holding three or more public directorships. CEO chair (Former) is an indicator equal to one if the CEO (former CEO) also holds the position of chair of the board, zero otherwise. Active blockholder is an indicator equal to one if a firm-year has an outside shareholder who files a 13D disclosing a 5% stake with intentions to affect the firm or its management, zero otherwise. In Models 1-3, director controls not shown include age (65-71), age (72+), hold additional seats, gain new seat - prior year, current CEO elsewhere, audit committee, compensation committee, nominating committee, female, and tenure. In all models, firm controls not shown include CEO turnover, firm age, firm size, return volatility, board size and outsiders. All variable definitions are included in Appendix A. Year fixed effects are also included. Coefficients for Model 1-3 are marginal effects computed at the mean values of the independent variables. Marginal effects are the change in the probability of director turnover for a one standard deviation change in a continuous variable or a shift from zero to one for an indicator variable. p-values based on standard errors clustered by firm and by year are in parentheses.

	Director-Level			Firm-Level		
	Model 1	Model 2	Model 3	Model 4	Model 5	Model6
Intercept	-2.033	-2.009	-2.019	-0.171	-0.168	-0.170
	(0.000)	(0.000)	(0.000)	(0.002)	(0.002)	(0.002)
Low stock return	0.007			0.017		
	(0.000)			(0.002)		
Low ROA		0.016			0.042	
		(0.000)			(0.000)	
Low industry-induced stock return			-0.000			0.004
			(0.959)			(0.612)
Low idiosyncratic stock return			0.005			0.012
			(0.020)			(0.100)
Co-opted	-0.023	-0.023	-0.023	-0.039	-0.038	-0.039
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
Busy board	0.018	0.017	0.018	0.019	0.017	0.019
	(0.018)	(0.021)	(0.017)	(0.379)	(0.418)	(0.375)
CEO chair	-0.004	-0.003	-0.004	-0.017	-0.015	-0.017
	(0.208)	(0.283)	(0.207)	(0.015)	(0.022)	(0.014)
Former CEO is chair	-0.006	-0.006	-0.006	-0.019	-0.017	-0.019
	(0.017)	(0.024)	(0.016)	(0.012)	(0.018)	(0.012)
Active blockholder	0.012	0.011	0.012	0.029	0.028	0.030
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
Year FE, Director, Firm Controls	Yes	Yes	Yes	Yes	Yes	Yes
Observations	109,331	109,331	109,331	14,560	14,560	14,560
Pseudo r^2	0.059	0.059	0.059	0.106	0.110	0.106

Table 7: Logit regressions modeling individual director turnover with director voting

The table reports logistic regressions modeling the likelihood that a director turns over in a given firm-year. Models 1-3 include 52,228 director-firm-year observations with available information on director voting between 2003 and 2010. Models 4-6 restrict the sample to 28,796 director-firm-year observations with available information on director voting and director attendance between 2003 and 2010. The regression specifications include measures of lagged performance based on sample quartiles for a given sample year: low stock return (Models 1 and 4), low ROA (Models 2 and 5), low industry-induced and low idiosyncratic stock returns (Models 3 and 6). Low stock return (ROA) is an indicator equal to one if lagged industry-adjusted stock return (ROA) falls in the lowest quartile of performance for the sample year, zero otherwise. Low industry-induced (idiosyncratic) stock return is an indicator equal to one if industry-induced (idiosyncratic) stock return falls in the lowest quartile of performance for the sample year, zero otherwise. Excess for is an indicator equal to one if the director receives less 'for' votes than the average director on the board, zero otherwise. ISS against is an indicator equal to one if ISS (Institutional Shareholder Services) recommends a vote against the director, zero otherwise. Attendance < 75% is an indicator equal to one if the director attends less than 75% of board meetings in a given sample year. All other independent variables are measured as of the fiscal year-end prior to when turnover is identified. Director controls not shown include age (65-71), age (72+), hold additional seats, gain new seat - prior year, current CEO elsewhere, audit committee, compensation committee, nominating committee, female, co-opted, and tenure. Firm controls not shown include CEO turnover, firm age, firm size, return volatility, board size and outsiders. All variable definitions are included in Appendix A. Year fixed effects are also included. Marginal effects are reported and computed at the mean values of the independent variables. Marginal effects are the change in the probability of director turnover for a one standard deviation change in a continuous variable or a shift from zero to one for an indicator variable. p-values based on standard errors clustered by firm and by year are in parentheses.

	Director Level					
	Model 1	Model 2	Model 3	Model 4	Model 5	Model 6
Intercept	-3.339	-3.359	-3.327	-6.073	-6.113	-6.050
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
Excess for	0.012	0.012	0.012	0.013	0.013	0.013
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
ISS against	-0.001	-0.001	-0.000	-0.009	-0.009	-0.009
	(0.877)	(0.866)	(0.921)	(0.225)	(0.194)	(0.217)
Low stock return	0.013			0.010		
	(0.000)			(0.081)		
Low ROA		0.014			0.014	
		(0.000)			(0.004)	
Low industry-induced stock return			0.004			0.002
			(0.513)			(0.749)
Low idiosyncratic stock return			0.019			0.013
			(0.000)			(0.012)
Attendance < 75%				0.026	0.026	0.025
				(0.006)	(0.005)	(0.007)
Year FE, Director, Firm Controls	Yes	Yes	Yes	Yes	Yes	Yes
Observations	52,228	52,228	52,228	28,796	28,796	28,796
Pseudo r^2	0.041	0.041	0.042	0.062	0.063	0.063

Table 8: OLS regressions modeling director turnover with governance interaction

The table reports linear probability regressions modeling the likelihood that a director turns over in a given firm-year. In each model, the dependent variable is an indicator equal to one if the director turns over and zero otherwise. The sample in the first four models consists of 109,331 director-firm-year observations between 2000 and 2011. The sample in the last two models consists of a propensity score matched sample. Firms with the presence (appearance) of an active blockholder are matched to up to three control firms based a propensity score matching model described in Section 4.4. The measure of performance in all models is based on sample quartiles in a given sample year. Low idiosyncratic stock return is an indicator equal to one if the lagged idiosyncratic stock return falls in the lowest quartile of performance for the sample year and zero otherwise. All models include an interaction between low idiosyncratic stock return and the measure of governance indicated in the column header. For brevity, low industry-induced stock return and its interaction with the governance measure are suppressed. All other independent variables are measured as of the fiscal year-end prior to when turnover is identified. Co-opted is an indicator equal to one if the director's tenure is less than the current CEO's tenure, zero otherwise. Busy board is the percentage of outside directors holding three or more public directorships. CEO chair (Former) is an indicator equal to one if the CEO (former CEO) also holds the position of chair of the board, zero otherwise. Active blockholder is an indicator equal to one if a firm-year has an outside shareholder who files a 13D disclosing the 5% stake with intentions to affect the firms or its management, zero otherwise. Active appearance is an indicator equal to one if an active block exists as of the fiscal year-end prior to when turnover is identified but did not exist in the year prior to this, zero otherwise. Director/firm controls not shown include tenure, co-opted, CEO turnover, firm age, firm size, return volatility, board size and outsiders. All variable definitions are included in Appendix A. Marginal effects are reported and computed at the mean values of the independent variables. Marginal effects are the change in the probability of director turnover for a one standard deviation change in a continuous variable or a shift from zero to one for an indicator variable. p-values based on standard errors clustered by firm and by year are in parentheses.

			Governance measure			
	Co-opted	Busy board	CEO chair	Former CEO is chair	Active blockholder	Active appearance
Intercept	0.114	0.102	0.097	0.096	0.121	0.106
	(0.000)	(0.000)	(0.000)	(0.001)	(0.000)	(0.006)
Low idiosyncratic stock return	0.004	0.008	0.007	0.008	0.001	0.002
	(0.183)	(0.006)	(0.050)	(0.001)	(0.889)	(0.764)
Low idiosyncratic stock return * Governance	0.008	-0.005	-0.001	-0.009	0.019	0.021
	(0.041)	(0.611)	(0.820)	(0.106)	(0.017)	(0.032)
Governance	-0.025	0.028	-0.005	0.001	0.005	0.006
	(0.000)	(0.002)	(0.135)	(0.782)	(0.040)	(0.044)
Age (65-71)	0.015	0.016	0.016	0.016	0.014	0.017
	(0.006)	(0.004)	(0.003)	(0.003)	(0.025)	(0.005)
Age (72+)	0.113	0.113	0.113	0.113	0.106	0.114
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
Hold additional seats	-0.008	-0.009	-0.007	-0.007	-0.009	-0.009
	(0.000)	(0.000)	(0.001)	(0.001)	(0.002)	(0.025)
Gain new seat – prior year	0.006	0.004	0.005	0.005	0.005	0.008
	(0.059)	(0.188)	(0.118)	(0.116)	(0.174)	(0.150)
Current CEO elsewhere	-0.000	-0.000	-0.000	-0.000	-0.001	0.005
	(0.900)	(0.855)	(0.906)	(0.898)	(0.677)	(0.196)
Audit committee	-0.037	-0.036	-0.036	-0.036	-0.037	-0.035
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
Compensation committee	-0.028	-0.028	-0.028	-0.028	-0.028	-0.027
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
Nominating committee	-0.024	-0.023	-0.023	-0.023	-0.023	-0.023
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
Female	-0.002	-0.003	-0.002	-0.002	-0.004	0.000
	(0.300)	(0.272)	(0.355)	(0.348)	(0.149)	(0.967)
Year FE, Director, Firm Controls	Yes	Yes	Yes	Yes	Yes	Yes
Observations	109,331	109,331	109,331	109,331	66,382	33,744
Adjusted r^2	0.035	0.034	0.033	0.033	0.033	0.033

Table 9: Characteristics of replacement directors following turnover

The table summarizes differences between turnover directors and directors appointed to the same firm in the following year(s). Each turnover director is paired with each replacement director over the given time horizon. The difference in director characteristics for each pair is then averaged over the turnover firm-year. Column 1 reports average differences in director characteristics for all turnover-replacement pairs. Column 2 reports average differences in director characteristics for turnover-replacement pairs in the lowest quartile of lagged industry-adjusted stock return in each sample year and Column 3 reports average differences in director characteristics for turnover-replacement pairs in the highest quartile of lagged industry-adjusted stock return in each sample year. All director characteristics are measured as of the fiscal year-end prior to when turnover is identified. Panel A summarizes all pairs for 12,752 turnover directors and 13,113 replacement directors over a 1 year horizon following turnover. Panel B summarizes all pairs for 15,369 turnover directors and 20,827 replacement directors over a 2 year horizon following turnover. Panel C summarizes all pairs for 16,252 turnover directors and 26,608 replacement directors over a 3 year horizon following turnover. Age is director age in years. Number of other seats is the total number of public directorships held by the director. Hold additional seats is an indicator equal to one if the director holds at least one additional public directorship, zero otherwise. Current CEO elsewhere is an indicator equal to one if the director is currently a CEO at an outside public firm, zero otherwise. Audit, Compensation, or Nominating committee experience is an indicator equal to one if the director has current or previous outside respective committee experience, zero otherwise. Female is an indicator equal to one if the director is female, zero otherwise. ***, **, * denote statistical significance from zero at the 1%, 5%, and 10%, levels respectively.

	All Turnovers (1)	Low Stock Return (2)	High Stock Return (3)
Panel A: Replacement-Turnover Pairs, 1-year Horizon			
Age difference	-5.98***	-4.85***	-5.20***
Number of other seats difference	0.01	-0.03	0.05*
Hold additional seats difference	0.03***	0.01	0.05***
Current CEO elsewhere difference	0.03***	-0.01	0.02*
Audit com. experience difference	0.01	0.02	0.04***
Comp com. experience difference	-0.02***	-0.02	0.00
Nom com. experience difference	-0.02***	-0.01	0.00
Female difference	0.05***	0.04***	0.06***
Panel B: Replacement-Turnover Pairs, 2-year Horizon			
Age difference	-5.98***	-4.80***	-5.10***
Number of other seats difference	0.01	-0.01	0.05**
Hold additional seats difference	0.04***	0.02*	0.06***
Current CEO elsewhere difference	0.02***	-0.01	0.02
Audit com. experience difference	0.01**	0.02**	0.05***
Comp com. experience difference	-0.02***	-0.01	0.00
Nom com. experience difference	-0.01***	-0.01	0.00
Female difference	0.06***	0.04***	0.06***
Panel C: Replacement-Turnover Pairs, 3-year Horizon			
Age difference	-5.91***	-4.74***	-5.14***
Number of other seats difference	0.02*	0.00	0.06***
Hold additional seats difference	0.04***	0.02**	0.06***
Current CEO elsewhere difference	0.02***	-0.01	0.01
Audit com. experience difference	0.02***	0.03***	0.06***
Comp com. experience difference	-0.01*	-0.01	0.01
Nom com. experience difference	0.00	0.00	0.01
Female difference	0.06***	0.04***	0.06***