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Disciplinary directors:**Evidence from the appointments of outside directors who have fired CEOs****Jay Cai* and Tu Nguyen******Abstract:**

By examining board appointments of outside directors who have previously fired a CEO, we study how directors' willingness to take disciplinary actions is related to a firm's performance and risk-taking. Such directors ('disciplinary directors') appear to benefit firms with weak monitoring, but hurt firms in innovative industries. Firms appointing a disciplinary director subsequently exhibit lower idiosyncratic risk, leverage, and R&D expense, make fewer acquisitions, and are more likely to replace poorly performing CEOs. Overall, disciplinary directors appear to influence managerial behavior and shareholder wealth.

JEL Classifications: G34; M12

Keywords: Board of directors; disciplinary effects; risk-taking; CEO turnover; director reputation

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1. Introduction

The Board of Directors recruits, contracts, advises, evaluates, compensates, disciplines, and potentially *terminates* the firm's CEO. Non-executive (outside) directors represent outside shareholders in this role. Outside directors may vary markedly in their willingness to instigate or support the firing of an incumbent CEO, and this willingness may be a function of their prior experience, personal values, and vulnerability to firm-specific organizational dynamics and agency issues. Outside directors who have *already* fired a CEO (henceforth disciplinary directors), have demonstrated a propensity not to tolerate failure.

In this paper, we ask how the appointment of disciplinary directors affects managerial behavior and corporate policies, in particular the firm's investment and financing risk, M&A activity, CEO replacement decisions, and performance. We develop the 'disciplining hypothesis,' which posits that these directors represent a credible threat of termination to CEOs if firms under-perform and may provide an impetus for CEOs to change their behaviors to reduce the probability of job termination. This hypothesis has the following two specific predictions:

First, under the threat of termination by disciplinary directors, CEOs may choose to take less risk to reduce the chance of realizing poor performance that can lead to job loss.¹ Consistent with this argument, several recent studies document that institutions more "forgiving" of business failure, such as more forgiving bankruptcy laws, are associated with more innovation and risk-taking (Acharya and Subramanian, 2009; Acharya et al., 2013). Tian and Wang (2014)

¹ To the extent that a CEO optimizes her risk-taking, reducing risk may be costly to the CEO, personally or as a shareholder. For example, lower equity volatility may reduce the value of the CEO's option holdings; lower asset risk may represent a transfer of wealth from shareholders to bondholders. CEOs, however, may tradeoff the benefits associated with risk-taking for job security and take lower risk when job termination threats arise.

find evidence that a VC's tolerance of failure prevents premature termination of risky projects and leads to more innovative startup companies. In addition, several studies in the management literature suggest a positive relation between corporate tolerance of failure and organizational learning and innovation (Gupta and Govindarajan, 1984; Edmondson, 1999). Following the premise of these studies, we hypothesize that with a disciplinary director appointed to the board, CEOs may take less risk to reduce the chance of being fired, which may result in lower leverage, lower R&D expense, fewer acquisition activities, and lower stock return volatility. Further, the termination threat posed by a disciplinary director may lead CEOs to cut risky long-term investment that produces innovation, which may be more costly for firms in more innovative industries.

Second, disciplinary directors may lead to more effort and/or less shirking by CEOs who aim to improve overall firm performance and thereby reduce the probability of job termination. Consistent with our interpretation of the relation between director disciplinary effect and managerial effort/shirking, the finance literature identifies many scenarios of governance failure in which directors tolerate poorly performing CEOs (for example: Cotter, Shivdasani, and Zenner (1997); Fich and Shivdasani (2006); Coles, Daniel, and Naveen (2014)). We argue that disciplinary directors represent a credible threat of termination to poorly performing CEOs and this governance effect is more prominent for CEOs protected from the discipline of the takeover market.² In contrast, for CEOs whose firms are more exposed to becoming a takeover target, the additional disciplinary threat imposed by such directors may be excessive and therefore have a

² While disciplinary directors and the takeover market may have a similar disciplinary effect in terminating poorly performing CEOs, they may have a different impact on the risk-taking incentives. When a takeover is announced, the target stock often gets a boost from the acquisition premium with an average two-day abnormal return of 16.7% (Song and Walkling, 2000), which benefits target CEOs who have substantial holdings. In contrast, when a CEO is forced out by the board, the abnormal return averages 2.5% (Denis and Denis, 1995). Therefore, the exposure to the takeover market may actually encourage risk taking.

negative effect on firm performance.

The alternative hypothesis is that director personal preference is irrelevant to CEO decisions, because directors do not let their personal preferences influence their decisions on CEO termination. Indeed, if all directors make their termination decisions strictly based on whether doing so produces positive NPV (and they have the same information set), directors' personal preference should not affect the termination decision. That is, each CEO turnover decision is independent of a director's personal preferences, and a director who has fired a CEO before is not more likely to fire the next CEO. Under this hypothesis, we should not see any changes in managerial behavior or corporate policies and performance after the appointment of a disciplinary director.

A director's prior experience of firing a CEO is a highly visible signal of her willingness and ability to punish poor performance. Replacing a CEO is one of the most important decisions an outside director can make. Outside directors who have fired a CEO, therefore, have established a reputation for not tolerating failure. In a contemporaneous paper, Ellis, Guo, and Mobbs (2016) also study directors who have previously fired CEOs and find that the directors' decision-making evolves with their prior experience of CEO turnover. The underlying assumption in their paper is that a director's behavior is learned. In this paper, we view the experience of forcing out a CEO as a revelation of a director's willingness and ability to discipline an under-performing CEO, and that a director's willingness to take disciplinary actions has at least some persistent component that influences all the boards on which she sits. We take an agnostic view on whether such willingness and ability is in a director's endowed personality or is acquired through experience, since the distinction is irrelevant for the director's disciplinary effects on new corporate boards she serves.

Since the decision to fire a CEO is endogenously determined by firm performance and governance, among other factors, we do not select firms where the outside directors fire a CEO to form our main sample. Rather, we examine the board appointments of outside directors who have *previously* fired a CEO at a different firm and compare the same firms before and after the appointment. We control for board and CEO characteristics such as board independence, busy boards, co-opted boards, and CEO power that are known to influence a firm's corporate policies and performance. We also include firm fixed effects in all tests to control for the unobservable time-invariant firm characteristics. This approach focuses on the time-series variation of firm performance and risk taking and addresses cross-sectional selection issues.

We find that an appointed disciplinary director is more likely to fire the CEO in the next

firm she joins when the firm suffers poor performance. This finding establishes that an individual director's willingness to take disciplinary actions against under-performing CEOs has at least some persistent component. Our results suggest that firms that appoint a disciplinary director on average experience a 3% reduction in idiosyncratic risk, carry 8% lower leverage, invest 10% less in R&D, and make 9% fewer acquisitions with 9.5% lower deal value after the appointment. In addition, the appointment of a disciplinary director is associated with significantly poorer (improved) performance and lower (higher) valuation for firms in the more innovative industries (firms with poor governance). Overall, our results are consistent with the disciplining hypothesis.

Our empirical approach may not entirely address the selection issue since the appointments of disciplinary directors could still be correlated with time-varying unobservable firm or board characteristics that are also correlated with future performance and risk taking. In particular, the appointment of a disciplinary director may not be random. Boards with private information about increased likelihood of future CEO turnover may deliberately recruit a director with such experience. We conduct the following two tests to shed some light on whether or not a director's involvement in a previous forced CEO turnover is likely a primary factor in her subsequent director appointments. First, if a board considered a disciplinary director as an important element of its governance, it is likely to replace the loss of such a director due to an exogenous shock, e.g. deaths. We find no significant correlation between the odds of a deceased director being a disciplinary director and the odds of her being replaced by another disciplinary director. Second, we examine all outside director appointments and show that the probability of appointing a disciplinary director is not correlated to the fraction of incumbent disciplinary directors. In addition, even if there is a correlation between the disciplinary level of the incumbent board and that of the new appointee, our empirical approach of comparing the same

firms before and after the appointments (with firm fixed effects) should alleviate the concern of endogeneity.

We also perform an instrumental variable analysis. We identify a control sample of firms matched with the turnover firms by industry, size, and stock performance. We contrast the subsequent new appointments of outside directors from the matching firms with those of the disciplinary directors. We then use the presence of disciplinary (matching) directors in a firm's external director network as an instrument for the probability of appointing a disciplinary (matching) director in the sample of the two groups of appointing firms. Using two stage least squares models, we find evidence consistent with the two predictions of the disciplining hypothesis.

We acknowledge that we may not have an entirely clean identification and that there might be alternative explanations for our empirical results. In particular, the appointment of a disciplinary director may be driven by unobserved time-varying firm need of such directors. Nevertheless, even if one interprets the evidence in this paper as driven by selection, i.e. firms that need to strengthen its board monitoring appoint a disciplinary director, such interpretation still points to the important role these directors play in corporate governance.

Our paper contributes to several strands of the literature. First, considerable attention in the literature focuses on the effects of board composition on corporate outcomes.³ Our evidence on the disciplinary directors adds to the discussion of the role of particular types of outside directors, such as bankers (Booth and Deli, 1996; Güner, Malmendier, and Tate, 2008; Huang et al., 2014), venture capitalists (Baker and Gompers, 2003; Hochberg, 2012; Celikyurt, Sevilir,

³ A number of factors in board composition potentially affect a board's actions and firm performance. Hermalin and Weisbach (2003) and Adams, Hermalin, and Weisbach (2010) provide thorough surveys of the literature on board composition.

and Shivdasani, 2014), CEO as directors (Fich, 2005; Fahlenbrach, Low, and Stulz, 2010), and politically connected directors (Agrawal and Knoeber, 2001; Goldman, Rocholl, and So, 2009; Wang, 2015). Our findings highlight a previously undocumented channel – the appointment of an outside director who has fired a CEO in a different firm – through which a credible and disciplinary threat can alter manager behavior and impact shareholder wealth.

Second, our results showing the enduring impact of firing a CEO on a director's reputation complement the work on the relation between director reputation and the external labor market. The labor market rewards directors who signal their expertise (Fama, 1980; Fama and Jensen, 1983). Removing a poor-performing CEO is a highly visible signal of a director's monitoring effort. Jensen (1993) argues that directors have little incentive to fire a CEO due to the risk of losing current directorships. Ellis, Guo, and Mobbs (2016) document that directors who have fired a CEO are less likely to gain directorships, while Farrell and Whidbee (2000) find that outside directors who are not closely aligned with the outgoing CEO tend to gain board seats. Our work adds to the literature by studying how a director's reputation for not tolerating failures is related to corporate policies and performance of the boards she subsequently serves.

Third, our results contribute to the management literature on the relation between tolerance of failure and innovation. Studies in this area postulate that greater tolerance of failure encourages organizational learning and innovation (Gupta and Govindarajan, 1984; Edmondson, 1999) but also hinders discipline over innovative projects (Nohria and Gulati, 1996). We provide new evidence that the threat of disciplinary actions might hurt firms in innovative industries, potentially due to less risk taking.

Finally, more broadly, our study contributes to the research on managerial styles and the way in which such styles affect firm value; e.g., risk tolerance (Graham, Harvey, and Puri, 2013),

narcissism (Aktas, De Bodt, and Roll, 2016), envy (Goel and Thakor, 2010), and overconfidence (Malmendier and Tate, 2008). In this paper, we study a director's disciplinary actions as a demonstration of certain personal characteristic and illustrate that such a trait plays an important role in shaping corporate policies and firm performance.

2. Data

We first identify 3,199 CEO turnover events during the period of 1995-2011 from the Compustat ExecuComp database. We then manually search the Factiva news database for detailed information about these CEO turnover events and identify 634 forced turnovers at 534 firms following the algorithm of Parrino (1997).⁴ We then merge these turnover firms with the BoardEx database and identify 3,022 outside directors at the time of CEO turnover whom we label 'disciplinary director.' 1,660 of these directors gain subsequent outside directorships within five years after the turnover event. We also require that the firms that subsequently appoint the disciplinary directors have data available from the Center for Research in Security Prices (CRSP), Compustat, Risk Metrics, and Execucomp databases. This process results in 575 director appointments.⁵

Table I reports characteristics of the appointing firms (Panel A) and the appointed disciplinary directors (Panel B) in our sample. According to Panel A, the average (median) market capitalization of the appointing firms is \$22.7 billion (\$5.7 billion). The typical board has

⁴ A CEO could be fired for reasons other than poor returns to shareholders. We identify 54 cases in our sample where the three-year industry adjusted stock return is non-negative. A detailed reading of news articles reveals that most of these CEOs are terminated due to scandals, strategic disagreements with their boards, or unsatisfactory performance (from the board's point of view). In a sensitivity test, we exclude these cases and find similar results.

⁵ We do not examine the turnover firms because of endogeneity issues relating to the inherent differences between firms that fire a CEO and those that do not (under similar performance). To further address endogeneity, in unreported tests we find some evidence on changes of risk taking in the director-interlocked firms (i.e. firms a disciplinary director sits on at the time of the turnover event) after the disciplinary directors forced out a CEO of another firm.

10 members; 75% are independent; about 11% have fired a CEO in the past. The average of E-index is about 2. Panel B shows that a typical appointee is male, non-CEO, 60 years old, and a member of more than two other boards. Majority of them are members of audit, compensation, or nomination committees in other firms. Of the 575 directors, 55 (9.5%) have been involved in more than one forced CEO turnovers.

3. Main results

3.1. Board appointments of disciplinary directors and subsequent CEO turnover

An outside director's willingness to replace a CEO given a level of poor performance, may depend on her relationship with the CEO, her private information about the CEO's effort, and other firm-specific factors. It is possible that an outside director's disciplinary action may be mainly driven by firm-specific factors rather than her personal preference. If this were the case, our approach of examining subsequent board appointments of directors who have previously fired a CEO may yield little useful inference. We, therefore, first examine whether a disciplinary director is more likely to replace another CEO when firm performance is poor.

To test this prediction, we estimate in Table II three logistic regressions where the dependent variable equals one if a firm experiences a forced CEO turnover, and zero otherwise. The sample consists of a panel of 3,794 firm/year observations of the 575 firms that appoint a disciplinary director. For each of the 575 director appointments, we track five years before and after the appointment for as long as the appointing firm's data is available. Our main variable of interest in Model (1) is an interaction between the 'Post' dummy variable for the years after the appointment and a dummy variable for stock returns below the industry median in the previous

three years, using the Fama-French (1997) 48-industry classification.⁶ In Models (2) and (3), the proxy for poor firm performance is a dummy variable for three-year stock returns below market and three-year ROA below industry median, respectively. These interactions capture the increased sensitivity of forced CEO turnover to poor firm performance after a disciplinary director joins the board. We control for various firm, governance, board, and CEO characteristics. We also include firm fixed effects in our tests to control for unobservable time-invariant firm characteristics.

All three models of Table II reveal a positive and statistically significant (at the 5% level) coefficient of the interaction term between the 'Post' dummy variable and the indicator for poor firm performance. This result suggests that CEOs with poor performance are more likely to be forced out after a disciplinary director joins the board. Using the marginal effect of the coefficients in Model (1), we estimate that the addition of a disciplinary director is, on average, associated with a 3.6% higher likelihood of a forced CEO turnover when stock return underperforms the industry. This figure compares to an unconditional forced CEO turnover probability of 5.2% in our sample. The results are similar in Models (2) and (3) when we use below-market stock returns and below-industry ROA indicators as proxies for poor performance.

Overall, the results in Table II suggest that if a director take disciplinary action at one company, she is also likely to do so at other companies. That is, at least some component of a director's disciplinary effect is specific to this individual and influences all the boards on which she sits. This evidence validates our approach to testing the effect of disciplinary directors in their subsequent board appointments.

⁶ Our results are robust when we use the market adjusted stock return as a proxy for performance or when we measure the performance over the previous one-year period (as opposed to the three-year period in the reported tests).

3.2. *Disciplinary directors and corporate risk taking*

The disciplining hypothesis posits that because disciplinary directors pose an implicit threat of termination for CEOs if firm performance falls below a threshold, CEOs of the firms with such directors on their board may optimally choose to take less risk to minimize the chance of being fired. Bushman, Dai, and Wang (2010) find that the likelihood of a forced CEO turnover is higher for firms with greater idiosyncratic risk. We test this hypothesis by comparing firm idiosyncratic risk, leverage, R&D, and acquisition activities before and after the appointments.

Table III presents the regression results where the dependent variable is a firm's idiosyncratic risk (Models (1) and (2)), leverage ratio (Models (3) and (4)), R&D expense (Model (5)), or M&A activities (Models (6) and (7)). The main independent variable in Table III is the dummy variable 'Post' that is equal to one for the years after the appointment of a disciplinary director and zero otherwise.

Our measures of idiosyncratic risk are similar to those in the literature (for example, Campbell et al. (2001), Bali et al. (2005), and Bushman et al. (2010)) that distinguish firm-specific volatility from industry and market volatility. Specifically, we estimate a firm's idiosyncratic risk in two ways: In Model (1), idiosyncratic risk equals the standard deviation of the residuals from a regression estimated using daily stock returns during a firm's fiscal year; the independent variable is the average stock return in the industry, with industry defined by the Fama-French (1997) 48-industry classification. In Model (2), idiosyncratic risk is estimated by the CRSP valued-weighted market return, which is the independent variable in the return regression. The coefficient of the 'Post' indicator in Model (1) is negative and statistically significant at the 5% level, suggesting that firms appointing a disciplinary director on average experience a 0.9% lower idiosyncratic volatility in the years after the appointments. Since the

average firm in our sample has an idiosyncratic risk level of 29%, appointing a disciplinary director is on average associated with a 3% ($0.009 \div 0.29 = 0.03$) lower idiosyncratic risk. In Model (2), we report the regression where the dependent variable is the market-benchmarked idiosyncratic risk. These results are very similar to those in Model (1): the coefficient of the ‘Post’ indicator is negative and statistically significant at the 10% level.

We next examine whether appointing a disciplinary director influences a firm’s capital structure decisions. Models (3) and (4) of Table III report the regression results where the dependent variable is the market and book leverage ratio of a firm, respectively, and the main independent variable is the ‘Post’ indicator. Model (3) reports a statistically significant coefficient (at the 1% level) of -0.0132 for the ‘Post’ dummy variable. Since the average firm in our sample has a market leverage ratio of 0.165, appointing a disciplinary director to the board on average is associated with an 8% ($0.0132 \div 0.165 = 0.08$) decrease in leverage. The results using book leverage in Model (4) are similar, although the coefficient on the ‘Post’ variable is statistically significant at the 10% level.

Our next channel for risk taking is R&D investment. The negative and significant coefficient (at the 5% level) of the ‘Post’ indicator in Model (5) suggests that firms R&D expense are on average 0.25% (of assets) lower after the appointment of a disciplinary director. This reduction accounts for almost 10% of pre-appointment average R&D expense (2.6% of assets) in our sample.

Acquisitions represent some of the most important corporate decisions that can substantially alter a firm’s risk exposure and value. In Models (6) and (7), we examine whether disciplinary directors influence a firm’s acquisition activities. The dependent variable in Model (6) is the number of M&A acquisitions the appointing firms make during a fiscal year and the

dependent variable in Model (7) is the total deal value scaled by the acquirer market capitalization at the fiscal year-end before the merger announcement. Models (6) and (7) show that on average firms make 9% fewer acquisitions ($0.036 \div 0.405$) with 9.5% lower deal value ($0.045 \div 0.048$) after the appointment of a disciplinary director. Taken together, the evidence in Tables III suggests that the termination threat posed by newly appointed disciplinary directors is associated with less risk taking by top management. These results are consistent with the disciplining hypothesis.

Since a number of studies show that a more ‘forgiving’ environment is often associated with innovation (for example, Gupta and Govindarajan (1984), Edmondson (1999), Acharya and Subramanian (2009), Acharya et al (2013), Tian and Wang (2014)), we next examine whether having a disciplinary director hurts the performance and valuation of firms in more innovative industries. Models (1) and (2) of Table IV report regressions where the dependent variables are ROA and Tobin’s Q, respectively.

The main independent variable in Table IV is an interaction term between the ‘Post’ indicator variable and the total number of patent applications in the appointing firm’s industry, which is used as a proxy for innovation. Our results are robust if we use the number of patents applied by the appointing firms during the five years prior to the appointments of the disciplinary directors as a proxy for innovation. The patent data from 1976 to 2006 is provided by the National Bureau of Economic Research (NBER). Note that the sample size in Table IV is smaller (2,980 firm/year observations) because the patent data are unavailable after 2006. Other independent variables in all models include firm, board, and CEO characteristics, as well as firm fixed effects.

Table IV reports negative and statistically significant (at the 1% or 5% level) coefficients

of the interaction term between ‘Post’ and the total number of industry patents in both models. This result indicates that for a firm operating in a more innovative industry, having a disciplinary director is associated with lower firm value and performance. The economic magnitude of the coefficients is also meaningful. For example, according to Model (1), for a firm in an industry in which 1,000 patents are applied annually,⁷ the addition of a disciplinary director is associated with an average decrease of 0.35% in ROA and 0.04 in Q. These effects are economically significant when compared with the average of 4.1% of ROA and 1.8 of Tobin’s Q for the appointing firms in our sample. This finding supports the disciplining hypothesis.

3.3. Monitoring effect of disciplinary directors on firm performance

Disciplinary directors may discipline poorly performing CEOs who lack exposure to alternative channels of termination, e.g. takeover market, thus improving performance and adding value to such firms. Excessive threat of termination, however, may have a negative effect on performance, in particular for firms that already have sufficient governance mechanisms in place.

In Table V, we use the interaction between the ‘Post’ indicator variable and the entrenchment index of Bebchuk, Cohen, and Ferrell (2009) in firm performance regressions. As in Table IV, the dependent variables in Table V are ROA and Q in Models (1) and (2), respectively. Both models report positive coefficients for the interaction terms between ‘Post’ and the entrenchment index, and both coefficients are statistically significant at the 5% level. This result indicates that the appointment of a disciplinary director benefits firms that lack exposure to the corporate takeover market. Using the interaction coefficient in Model (1), we estimate that for firms with two takeover protections in the E-index,⁸ appointing a disciplinary

⁷ From Table I, the average total industry patents is 965.

⁸ The average E-index of the firms in our sample is 1.9 (Table I).

director is associated with 0.9% ($0.0045 \times 2 = 0.009$) higher ROA, relative to a 4.1% average ROA in the pre-appointment period. According to Model (2), for firms with two takeover protections, adding a disciplinary director is associated with 0.1 ($0.0507 \times 2 = 0.1014$) higher Tobin's Q, compared to an average Q of 1.8 before the appointment. These results suggest that the appointment of disciplinary directors is associated with improved operating performance and higher valuation for firms with CEOs not exposed to termination threat by the takeover market. This evidence is consistent with the disciplining hypothesis.

3.4. Subsample analysis

3.4.1. Excluding disciplinary directors who might have been aligned with the outgoing CEO

It is possible that not all outside directors support a board's decision to fire a CEO. By classifying all of them as disciplinary directors, we may misclassify those who vote against firing the CEO as disciplinary directors. Farrell and Whidbee (2000) find that outside directors who are more aligned with the outgoing CEOs, and thus more likely to vote against the CEO termination decision, tend to lose their board seats soon after the CEO turnover. In robustness tests, we exclude the directors who leave the turnover firm boards within two years after the CEO turnover from the sample of disciplinary directors and find similar results as shown in Tables II to V. We summarize these results in Panel A of Table VI.

3.4.2. 'Powerful' directors, multiple firings, and incumbent disciplinary directors

We next perform the following three robustness tests. First, we identify those disciplinary directors who are the chairs of the board or of important committees (compensation, audit, or nomination committee) and label these directors 'powerful director.' Second, we identify disciplinary directors who have been involved in multiple forced CEO turnover events before

joining the new board. Third, we check if the appointing firm already has another disciplinary director on the board. We examine whether the results are different if the appointed disciplinary director is ‘powerful,’ has fired more than one CEO, or the board has another incumbent disciplinary director.

Panel B of Table VI summarizes the test results when we repeat the analyses from Table II to Table V and incorporate the three new dummy variables. We find some evidence that our results are stronger if the appointed director or appointing firms are associated with one of these characteristics. For example, firms appointing a disciplinary director have a greater reduction in idiosyncratic risk and R&D expense if the appointed disciplinary director is ‘powerful.’ In addition, the effect of a disciplinary director on firm leverage, R&D, and Tobin’s Q are stronger if the director has fired more than one CEO before joining the new firm. Finally, appointing firms are more likely to force out a poor performing CEO and engage in fewer M&A activities if there is another disciplinary director on the board.

3.5. Endogeneity

In this section, we provide additional analysis to shed some light on the potential endogeneity of the decision to hire a disciplinary director.

3.5.1. Director deaths and replacements

It could be argued that a director’s involvement in a previous CEO turnover is a first order consideration for a director appointment. If this were the case, firms appointing a disciplinary director may have certain unobserved characteristics, which may be related to their subsequent risk taking and performance. To test this prediction, we study a sample of deceased independent directors and their replacements, similar to an existing literature using sudden deaths of

independent directors as identification strategy (see, for example, Nguyen and Nielsen (2010), Falato, Kadyrzhanova, and Lel (2014), and Fogel, Ma, and Morck (2015)). We track the firms where they serve as outside directors to the point of their deaths and identify replacement directors as those first appointed within the next three years. We next classify the deceased or the replacement director as ‘disciplinary’ if she has fired a CEO by the time of her death or of the new appointment. Had a firm/board viewed the presence of a disciplinary director as a central element of its governance, the firm is likely to replace the exogenous loss of such a director with another one.

Panel A of Table VII reports the frequency of deceased directors and new directors. Of the 67 deceased directors who have fired a CEO, only four are replaced with another director who has done so. Panel B shows an insignificant correlation of 0.01 (p-value of 0.4498) between the odds of the deceased director being a disciplinary director and the odds of her being replaced by another disciplinary director. This evidence is consistent with the idea that a director’s involvement in a previous forced CEO turnover is not a primary consideration for her subsequent director appointments.⁹ Nevertheless, we acknowledge that a firm’s need for a disciplinary director may be time-varying and the sample firms with a recently deceased disciplinary director may not systematically have such needs, given the stickiness of board composition. Further, firms may not recruit new directors after director deaths because of costs and limited supply of qualified candidates. Nguyen and Nielsen (2010) document that amongst the firms that do replace deceased directors, it takes them an average of 180 days to do so.

⁹ The median age of deceased directors in our sample is 70. One might question if older directors actively monitor management in the final years before their passing. As a robustness check, we remove the deceased directors that are over 70 years old and we still do not find a significant correlation between deceased disciplinary directors and disciplinary successors (correlation coefficient = 0.0329; p-value = 0.4029). Even if we only look at deceased directors who were younger than 60, the results are still similar (correlation coefficient = -0.0219; p-value = 0.8613).

3.5.2. *Disciplinary incumbent directors and probability of appointing disciplinary new directors*

We next test empirically whether firms with disciplinary directors tend to appoint another disciplinary director. In Table VIII, we examine 12,184 outside director appointments during 1996-2012 period from the BoardEx database. The dependent variable takes the value of one if the firm hires a disciplinary director and zero otherwise. The independent variable of interest is the fraction of incumbent disciplinary directors in the appointing board. The coefficient of this independent variable is not statistically different from zero, suggesting that the probability of appointing a disciplinary director is not correlated to the presence of such directors on the incumbent board.

Nevertheless, even if there is a correlation between the disciplinary level of the incumbent board and that of the new appointee, our empirical approach of comparing the same firms before and after the appointments of a disciplinary director should alleviate the concern of selection.

3.5.3. *Instrumental variable*

In this section, we employ an instrumental variable approach to address the potential selection issue of an appointment of a disciplinary director. For each of the 575 turnover firms, we identify a matching firm that does not experience a forced CEO turnover event. The matching criteria is explained in Appendix B1. This process results in 437 turnover firms and 437 matching firms. Panel A of Table IX shows that there is no systematic difference in firm size or performance measures between the turnover firms and the matching firms. The 2,666 outside directors of our turnover firms are defined as ‘disciplinary directors,’ and the 2,570 outside directors of the matching firms are classified as ‘matching directors.’ If a director sits on both a turnover firm board and a matching firm board, she is excluded from the analysis. We identify 392 subsequent

new board appointments of disciplinary directors and 334 of matching directors, using the BoardEx databases.¹⁰ Panel B of Table IX shows that the appointed disciplinary directors are not systematically different from the matching ones.

We estimate a logistic regression in Panel C of Table IX where the dependent variable equals one if a firm appoints a disciplinary director and zero if it appoints a matching one. Independent variables include performance, governance, and other firm characteristics, at the end of the fiscal year preceding the director appointments. We use the fractions of disciplinary (matching) directors in the hiring firms' director network as instruments, since firms often appoint candidates from their own directors' network. Appendix B1 explains the IV and its potential caveats in details. As expected, the fraction of disciplinary (matching) directors who share boards with hiring firms' directors is positively related to the chance of these firms appointing a disciplinary (matching) director; the significant F-test statistic is 11.81.¹¹

For each of the 726 director appointments, we track the five years subsequent to the director appointment for as long as the appointing firm has available data from CRSP, Compustat, Risk Metrics, and Execucomp databases. The sample consists of a panel of 4,051 firm/year observations. Panel D of Table IX summarizes the test results when we repeat the analyses from Table II to V for this sample. The instrumented independent variables are estimated from first stage regressions using fractions of disciplinary (matching) directors in

¹⁰ We also require available data from the Center for Research in Security Prices (CRSP), Compustat, Risk Metrics, and Execucomp databases. In an untabulated t-test, we find no significant difference between the proportion of disciplinary directors who obtain new board seats and the proportion of matching directors who obtain new board seats. An unreported logistic regression also shows that disciplinary directors are neither more nor less likely to obtain new appointments than matching directors.

¹¹ According to the regression in Panel C of Table IX, a 10% increase in the fraction of disciplinary (matching) directors in the hiring firms' network is associated with an 11% (13%) increase in the probability of the firm appointing a disciplinary (matching) director.

board network as instruments.¹² We control for pre-appointment levels of dependent variables in all tests to address the possibility that levels of a firm's risk taking and performance are consistent over time. Consistent with the results in Tables II to V, Panel D of Table IX shows that firms appointing a disciplinary director experience higher performance – turnover sensitivity, lower idiosyncratic risk, lower leverage, and lower R&D compared to those appointing a matching director. The addition of a disciplinary director is also associated with better performance for firms with higher E-index but worse for firms in more innovative industries.

3.5.4. *Alternative interpretations*

In this section, we provide additional alternative interpretations of our results. The evidence in Ellis, Guo, and Mobbs (2016) that directors who have fired a CEO are less likely to gain subsequent directorship may suggest that a more disciplinary board is more likely to appoint a disciplinary director. In addition, a board may seek a disciplinary director's experience in forced managerial turnover when the board's private information suggests an increased probability of such turnover in the future.

Alternatively, some firms might invest more in board monitoring as a substitute for other forms of governance (Agrawal and Knoeber, 1996). In our setting, the appointment of a disciplinary director might be optimal for firms with high CEO entrenchment, less independent board, or with CEO-chairman duality, as suggested in Table IX, Panels C and D.

¹² For example, an instrumented 'disciplinary director' is the fitted value estimated from the regression in Panel C, Table IX; an instrumented interaction 'disciplinary director x three-year stock return below industry median' is estimated from a first stage regression where the dependent variable is equal to one if a firm appoints a disciplinary director and experiences stock returns lower than industry median; we use the interactions between the fractions of disciplinary (matching directors) in board network and the indicator for three-year stock return below industry median as instruments in this first stage regression (see Wooldridge (2000), Section 9.5, page 236-237).

Nevertheless, even if the appointment of a disciplinary director is a proxy for the incumbent directors' willingness to discipline underperforming CEO or is a substitute for other forms of board monitoring, our evidence still points to a significant link between board disciplinary effect and CEO decision making.

4. Conclusion

In this study, we examine how a director's revealed willingness to discipline underperforming CEOs is related to firm risk taking and performance. Specifically, we examine the new appointments of a sample of directors who have previously fired a CEO. We find that after a disciplinary director joins a board, the firm exhibits significantly lower idiosyncratic risk and uses less debt in their capital structure. In addition, these firms invest less in R&D and make fewer acquisitions. Firms less exposed to the disciplining force of the takeover market benefit from improved performance and higher valuation subsequent to the appointment of disciplinary directors, although the termination threat imposed by these directors may hurt well-governed firms or firms in more innovative industries. We acknowledge that with our empirical strategy, we rely on turnover events to identify disciplinary directors. The cumulative evidence of this study, however, suggests a significant link between a director's willingness to discipline underperforming managers and corporate risk taking and performance.

Our findings contribute to the growing literature of corporate governance by illustrating the important role that the threat of punishment -- even in the absence of actual actions -- plays in governance, as well as its consequence for firm policies and shareholder value. The evidence in this study also sheds new light on how director reputation and experience influences CEO decision making.

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Table I: Descriptive statistics

We identify 3,199 CEO turnover events during the period of 1995-2011 from the Compustat ExecuComp database. Following the algorithm of Parrino (1997), we manually search the Factiva news database for detailed information about these CEO turnover events and identify 634 forced turnovers at 534 firms. We then merge these turnover firms with the BoardEx database and identify 3,022 outside directors at the time of CEO turnover, who we label ‘disciplinary director.’ 1,660 of these directors gain new outside directorships within five years after the turnover event. We also require that the appointing firms have data available from the Center for Research in Security Prices (CRSP), Compustat, Risk Metrics, and Execucomp databases. This process results in 575 director appointments. Panel A reports characteristics of the appointing firms at the fiscal year end preceding the director appointments and Panel B reports characteristics of the appointed disciplinary directors at the time of the appointments. All variables are defined in Appendix A.

Panel A: Appointing firm characteristics

	N	Mean	Median	Standard Deviation
Market capitalization (\$ million)	575	22,770	5,733	42,759
Total assets (\$ million)	575	76,174	6,704	233,981
Tobin's Q	575	1.800	1.408	1.176
Leverage (Market)	575	0.165	0.135	0.135
Leverage (Book)	575	0.230	0.220	0.164
R&D	575	0.026	0	0.047
Idiosyncratic Risk (industry benchmark)	575	0.292	0.265	0.132
Idiosyncratic Risk (market benchmark)	575	0.303	0.275	0.136
Stock return	575	0.128	0.091	0.427
ROA	575	0.041	0.042	0.083
Board size	575	10.410	10	2.674
Fraction of independent directors	575	0.750	0.778	0.135
Fraction of incumbent disciplinary directors	575	0.112	0.091	0.114
Busy board (1/0)	575	0.094	0	0.292
Coopted board (1/0)	575	0.419	0	0.494
CEO chairman (1/0)	575	0.584	1	0.493
CEO holdings	575	0.010	0.001	0.031
CEO founder (1/0)	575	0.042	0	0.200
CEO age (years)	575	55.358	56	6.510
CEO tenure (years)	575	5.579	4	5.606
E-index	575	1.899	2	1.304
Number of industry patents (000s)	258	0.965	0.027	1.910
Number of M&A deals	575	0.405	0	1.325
Deal value	575	0.048	0	0.183

Panel B: Disciplinary director characteristics

	N	Mean	Median	Standard Deviation
Age	575	59.680	60	6.599
Female (1/0)	575	0.224	0	0.418
Number of directorships	575	2.256	2	1.415
CEO at other firms (1/0)	575	0.104	0	0.306
Audit committee memberships (1/0)	575	0.553	1	0.498
Compensation committee memberships (1/0)	575	0.619	1	0.486
Nomination committee memberships (1/0)	575	0.483	0	0.500
Number of firings	575	1.282	1	0.554

Table II: Disciplinary directors and subsequent forced CEO turnover

This table presents logistic models where the dependent variable equals one if a firm experiences a forced CEO turnover and zero otherwise. For each of the 575 director appointments in Table I, we track five years before and after the appointment year, as long as appointing firm's data is available. The sample consists of a panel of 3,794 firm/year observations from 1993 to 2015. 'Post' (1/0) is set to one if the year in question is at least one year after the appointing year. All variables are defined in Appendix A. The t-values are reported in parentheses. *, **, and *** denote statistical significance at the 10%, 5% and 1% level, respectively.

	Forced CEO turnover (1/0)		
	(1)	(2)	(3)
Intercept	-24.8674 (-0.77)	-24.8292 (-0.76)	-24.2162 (-0.74)
Post (1/0)	-0.0038 (-0.03)	-0.0061 (-0.05)	0.0314 (0.25)
Post (1/0) x Three-year stock return below industry median (1/0)	0.4557 (1.97)**		
Three-year stock return below industry median (1/0)	0.3644 (1.77)*		
Post (1/0) x Three-year stock return below market (1/0)		0.4676 (2.03)**	
Three-year stock return below market (1/0)		0.3599 (1.74)*	
Post (1/0) x Three-year ROA below industry median (1/0)			0.4617 (1.96)**
Three-year ROA below industry median (1/0)			0.3563 (1.69)*
Assets (log)	0.0537 (1.56)	0.0543 (1.58)	0.0322 (0.93)
Board size	-0.0037 (-0.16)	-0.0043 (-0.19)	0.0084 (0.37)
Fraction of independent directors	0.1033 (0.28)	0.1008 (0.28)	0.0326 (0.09)
Busy board (1/0)	0.2127 (1.33)	0.2099 (1.31)	0.2097 (1.31)
Coopted board (1/0)	0.1514 (1.35)	0.1532 (1.37)	0.1154 (1.03)
CEO chairman (1/0)	-0.2473 (-2.45)**	-0.2431 (-2.40)**	-0.2218 (-2.20)**
CEO holdings	-6.6323 (-4.47)**	-6.7949 (-4.58)**	-6.6727 (-4.50)**
CEO founder (1/0)	-0.3387 (-1.17)	-0.3373 (-1.17)	-0.3343 (-1.17)
CEO age (log)	4.7147 (10.98)**	4.7082 (10.95)**	4.5559 (10.70)**
CEO tenure (log)	0.3581 (4.69)**	0.3558 (4.66)**	0.4012 (5.24)**
E-index	-0.0090 (-0.21)	-0.0111 (-0.26)	-0.0239 (-0.56)
N	3,794	3,794	3,794
Adj R-sq	0.1317	0.1323	0.1324
Firm Fixed Effects	Yes	Yes	Yes
Year Fixed Effects	Yes	Yes	Yes

Table III: Disciplinary directors and risk taking

This table presents regressions of proxies for firm risk taking. For each of the 575 director appointments in Table I, we track five years before and after the appointment year, as long as appointing firm's data is available. The sample consists of a panel of 3,794 firm/year observations from 1993 to 2015. 'Post' (1/0) is set to one if the year in question is at least one year after the appointing year. All variables are defined in Appendix A. The t-values are reported in parentheses. *, **, and *** denote statistical significance at the 10%, 5% and 1% level, respectively.

	Idiosyncratic Risk		Leverage		R&D	M&A	
	(Industry benchmark)	(Market benchmark)	(Market)	(Book)		Number of deals	Deal value
	(1)	(2)	(3)	(4)		(5)	(6)
Intercept	0.4205 (5.68)***	0.4445 (5.86)***	-0.0755 (-1.28)	0.1508 (1.96)*	0.1001 (6.36)***	-4.4675 (-1.37)	-0.1847 (-0.39)
Post (1/0)	-0.0086 (-2.03)**	-0.0081 (-1.87)*	-0.0132 (-3.18)***	-0.0097 (-1.79)*	-0.0025 (-2.21)**	-0.0364 (-2.08)**	-0.0457 (-1.81)*
Assets (log)	-0.0127 (-10.64)***	-0.0147 (-11.97)***	0.0247 (20.23)***	0.0245 (15.42)***	-0.0017 (-5.33)***	0.3880 (5.35)***	0.0108 (1.03)
Board size	-0.0035 (-4.72)***	-0.0041 (-5.38)***	-0.0038 (-4.59)**	-0.0046 (-4.35)***	-0.0013 (-5.76)***	-0.0654 (-1.51)	-0.0138 (-2.21)**
Fraction of independent directors	-0.0984 (-7.76)***	-0.0901 (-6.93)***	0.0085 (0.64)	0.0456 (2.64)**	-0.0027 (-0.75)	-0.3738 (-0.53)	-0.0859 (-0.84)
Busy board (1/0)	-0.0113 (-2.12)**	-0.0114 (-2.08)**	-0.0111 (-1.81)*	-0.0097 (-1.21)	-0.0003 (-0.15)	0.5904 (1.86)*	0.1286 (2.81)***
Coopted board (1/0)	0.0143 (3.91)***	0.0145 (3.85)***	0.0061 (1.49)	0.0051 (0.95)	0.0047 (4.32)***	-0.2074 (-1.04)	-0.0045 (-0.16)
CEO chairman (1/0)	-0.0084 (-2.42)**	-0.0090 (-2.51)**	-0.0228 (-6.42)***	-0.0203 (-4.39)***	-0.0036 (-3.83)***	-0.5165 (-2.89)***	0.0205 (0.79)
CEO holdings	0.1597 (3.94)***	0.1721 (4.15)***	-0.0710 (-1.75)*	0.0056 (0.11)	-0.0598 (-5.51)***	7.7765 (2.35)**	0.3212 (0.67)
CEO founder (1/0)	0.0284 (3.23)***	0.0234 (2.59)**	-0.0049 (-0.54)	0.0050 (0.42)	0.0034 (1.41)	-2.3893 (-3.65)***	-0.1240 (-1.31)
CEO age (log)	-0.0216 (-1.54)	-0.0243 (-1.69)*	0.0194 (1.37)	-0.0188 (-1.01)	-0.0135 (-3.57)***	0.5186 (0.68)	0.0167 (0.15)
CEO tenure (log)	-0.0132 (-5.45)***	-0.0127 (-5.11)***	0.0038 (1.40)	0.0024 (0.67)	-0.0032 (-4.48)***	0.3230 (2.37)**	0.0307 (1.56)
E-index	-0.0043 (-2.85)***	-0.0029 (-1.89)*	0.0030 (1.95)*	-0.0020 (-1.01)	-0.0024 (-5.97)***	-0.3155 (-3.93)***	0.0415 (3.57)***
N	3,794	3,794	3,794	3,794	3,794	3,794	3,794
Adj R-sq	0.6134	0.6201	0.4719	0.4274	0.5860	0.3740	0.2037
Firm Fixed Effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Year Fixed Effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes

Table IV: Disciplinary directors and firm performance in innovative industries

This table presents regressions of firm performance. For each of the 575 director appointments in Table I, we track five years before and after the appointment year, as long as appointing firm's data is available. The sample consists of a panel of 2,980 firm/year observations from 1993 to 2006 (since patent data from NBER is unavailable after 2006). 'Post' (1/0) is set to one if the year in question is at least one year after the appointing year. Number of industry patents is in thousands. All variables are defined in Appendix A. The t-values are reported in parentheses. *, **, and *** denote statistical significance at the 10%, 5% and 1% level, respectively.

	ROA	Tobin's Q
	(1)	(2)
Intercept	0.0176 (0.30)	2.9091 (3.81)***
Post (1/0)	0.0118 (2.78)***	0.1338 (2.39)**
Post (1/0) x Number of industry patents	-0.0035 (-2.73)***	-0.0381 (-2.19)**
Number of industry patents	-0.0001 (-0.14)	0.0615 (4.26)***
Assets (log)	-0.0106 (-8.88)***	-0.1652 (-10.65)***
Board size	0.0007 (1.08)	0.0198 (2.24)**
Fraction of independent directors	0.0298 (2.93)***	0.1896 (1.41)
Busy board (1/0)	0.0158 (3.93)***	0.2975 (5.58)***
Coopted board (1/0)	-0.0240 (-6.84)***	-0.2263 (-4.90)***
CEO chairman (1/0)	0.0066 (1.85)*	0.0299 (0.64)
CEO holdings	-0.0417 (-1.11)	-0.0822 (-0.17)
CEO founder (1/0)	-0.0210 (-1.66)*	0.3909 (2.36)**
CEO age (log)	0.0325 (2.44)**	0.0816 (0.47)
CEO tenure (log)	0.0083 (3.73)***	0.0572 (1.96)*
E-index	-0.0025 (-1.77)*	-0.0275 (-1.48)
N	2,980	2,980
Adj R-sq	0.4551	0.5021
Firm Fixed Effects	Yes	Yes
Year Fixed Effects	Yes	Yes

Table V: Disciplinary directors and monitoring effects

This table presents regressions of firm performance. For each of the 575 director appointments in Table I, we track five years before and after the appointment year, as long as appointing firm's data is available. The sample consists of a panel of 3,794 firm/year observations from 1993 to 2015. 'Post' (1/0) is set to one if the year in question is at least one year after the appointing year. All variables are defined in Appendix A. The t-values are reported in parentheses. *, **, and *** denote statistical significance at the 10%, 5% and 1% level, respectively.

	ROA	Tobin's Q
	(1)	(2)
Intercept	0.0334 (0.92)	5.7446 (11.30)***
Post (1/0)	0.0063 (1.59)	0.0246 (0.44)
Post (1/0) x E-index	0.0045 (2.44)**	0.0507 (1.97)**
Assets (log)	-0.0037 (-5.00)***	-0.1271 (-12.07)***
Board size	0.0016 (3.22)***	-0.0137 (-1.93)*
Fraction of independent directors	-0.0147 (-1.81)*	-0.1461 (-1.28)
Busy board (1/0)	0.0047 (1.24)	0.1575 (2.98)***
Coopted board (1/0)	-0.0078 (-3.10)***	-0.0091 (-0.26)
CEO chairman (1/0)	0.0049 (2.25)**	-0.0402 (-1.31)
CEO holdings	-0.0349 (-1.40)	0.7494 (2.14)**
CEO founder (1/0)	-0.0094 (-1.69)*	0.1127 (1.44)
CEO age (log)	0.0070 (0.81)	-0.6135 (-5.02)***
CEO tenure (log)	0.0060 (3.63)***	0.0236 (1.02)
E-index	-0.0040 (-2.39)**	-0.0950 (-4.08)***
N	3,794	3,794
Adj R-sq	0.2545	0.4503
Firm Fixed Effects	Yes	Yes
Year Fixed Effects	Yes	Yes

Table VI: Subsample analysis

In Panel A, we exclude the directors who leave the turnover firms within two years after the CEO turnover from the pool of disciplinary directors. This restriction results in a sample of 496 new appointments of disciplinary directors and a panel sample of 3,172 firm/year observations. Panel A summarizes the test results when we repeat the analyses from Table II to V for this new sample.

In Panel B, we include three additional characteristics of appointed disciplinary directors and of appointing board. Powerful director (1/0) (Panel B1) is equal to one if the appointed director becomes either the chairman of the board, the lead independent director, or the chairman of an important board committee (namely, audit, compensation, or nomination committee) within the next five years after she joins the appointing firm, and is equal to zero otherwise. Multiple firings (1/0) (Panel B2) is a dummy variable set to one if the disciplinary director has fired more than one CEO before joining the appointing board and zero otherwise. Incumbent disciplinary director (1/0) (Panel B3) takes the value of one if there is at least one incumbent director who had fired a CEO at the time of the new appointment of the disciplinary director. Of the 575 appointments, 178 involve powerful directors, 55 involve directors with more than one firings, and 337 involve appointing firms with an incumbent disciplinary director. Panel B summarizes the test results when we repeat the analyses from Table II to V and incorporate the three new dummy variables.

In all panels, the t-values are reported in parentheses and *, **, and *** denote statistical significance at the 10%, 5% and 1% level, respectively.

Panel A: Excluding directors who leave the turnover firms within two years after the CEO turnover

Dependent variable	Independent Variable	Estimate	t-value	Other control variables as in
Forced CEO turnover (1/0)	Post (1/0) x Three-year stock return below industry median (1/0)	0.4836	(3.69)***	Table II, Model (1)
Idiosyncratic risk (industry benchmark)	Post (1/0)	-0.0106	(-2.27)**	Table III, Model (1)
(Market) Leverage		-0.0109	(-2.43)**	Table III, Model (3)
R&D		-0.0027	(-2.41)**	Table III, Model (5)
Number of M&A deals		-0.3777	(-2.59)***	Table III, Model (6)
ROA	Post (1/0) x Number of industry patents	-0.0041	(-3.02)***	Table IV, Model (1)
Tobin's Q		-0.0372	(-2.02)**	Table IV, Model (2)
ROA	Post (1/0) x E-index	0.0048	(1.90)*	Table V, Model (1)
Tobin's Q		0.0418	(1.98)**	Table V, Model (2)

Panel B: 'Powerful' director, multiple firings, and incumbent disciplinary appointing directors

Panel B1: 'Powerful' director

Dependent variable	Independent Variable	Estimate	t-value	Other control variables as in
Forced CEO turnover (1/0)	Post (1/0) x Three-year stock return below industry median (1/0)	0.4699	(1.82)*	Table II, Model (1)
	Post (1/0) x Three-year stock return below industry median (1/0) x Powerful director (1/0)	0.1587	(0.71)	
Idiosyncratic risk (industry benchmark)	Post (1/0)	-0.0034	(-0.57)	Table III, Model (1)
	Post (1/0) x Powerful director (1/0)	-0.0141	(-2.89)***	
(Market) Leverage	Post (1/0)	-0.0287	(-4.83)***	Table III, Model (3)
	Post (1/0) x Powerful director (1/0)	0.0055	(1.07)	
R&D	Post (1/0)	-0.0006	(-0.37)	Table III, Model (5)
	Post (1/0) x Powerful director (1/0)	-0.0037	(-2.69)**	
Number of M&A deals	Post (1/0)	-0.0609	(-2.12)**	Table III, Model (6)
	Post (1/0) x Powerful director (1/0)	0.0209	(0.71)	
ROA	Post (1/0) x Number of industry patents	-0.0043	(-2.35)**	Table IV, Model (1)
	Post (1/0) x Number of industry patents x Powerful director (1/0)	0.0011	(0.62)	
Tobin's Q	Post (1/0) x Number of industry patents	-0.0495	(-1.98)**	Table IV, Model (2)
	Post (1/0) x Number of industry patents x Powerful director (1/0)	-0.0109	(-0.44)	
ROA	Post (1/0) x E-index	0.0033	(2.12)**	Table V, Model (1)
	Post (1/0) x E-index x Powerful director (1/0)	0.0013	(1.32)	
Tobin's Q	Post (1/0) x E-index	0.0321	(1.83)*	Table V, Model (2)
	Post (1/0) x E-index x Powerful director (1/0)	0.0189	(1.34)	

Panel B2: Multiple firings

Dependent variable	Independent Variable	Estimate	t-value	Other control variables as in
Forced CEO turnover (1/0)	Post (1/0) x Three-year stock return below industry median (1/0)	0.4381	(1.88)*	Table II, Model (1)
	Post (1/0) x Three-year stock return below industry median (1/0) x Multiple firings (1/0)	0.0903	(0.29)	
Idiosyncratic risk (industry benchmark)	Post (1/0)	-0.0092	(-2.15)**	Table III, Model (1)
	Post (1/0) x Multiple firings (1/0)	0.0104	(1.30)	
(Market) Leverage	Post (1/0)	-0.0124	(-2.97)**	Table III, Model (3)
	Post (1/0) x Multiple firings (1/0)	-0.0220	(-2.69)**	
R&D	Post (1/0)	-0.0022	(-2.01)**	Table III, Model (5)
	Post (1/0) x Multiple firings (1/0)	-0.0051	(-2.87)**	
Number of M&A deals	Post (1/0)	-0.0365	(-2.08)**	Table III, Model (6)
	Post (1/0) x Multiple firings (1/0)	0.0021	(0.05)	
ROA	Post (1/0) x Number of industry patents	-0.0035	(-2.74)**	Table IV, Model (1)
	Post (1/0) x Number of industry patents x Multiple firings (1/0)	0.0216	(0.59)	
Tobin's Q	Post (1/0) x Number of industry patents	-0.0381	(-2.19)**	Table IV, Model (2)
	Post (1/0) x Number of industry patents x Multiple firings (1/0)	-0.0134	(-0.03)	
ROA	Post (1/0) x E-index	0.0039	(2.94)**	Table V, Model (1)
	Post (1/0) x E-index x Multiple firings (1/0)	-0.0011	(-0.93)	
Tobin's Q	Post (1/0) x E-index	0.0172	(1.68)*	Table V, Model (2)
	Post (1/0) x E-index x Multiple firings (1/0)	0.0216	(1.78)*	

Panel B3: Incumbent disciplinary appointing directors

Dependent variable	Independent Variable	Estimate	t-value	Other control variables as in
Forced CEO turnover (1/0)	Post (1/0) x Three-year stock return below industry median (1/0)	0.3699	(1.71)*	Table II, Model (1)
	Post (1/0) x Three-year stock return below industry median (1/0) x Incumbent disciplinary director (1/0)	0.2223	(1.83)*	
Idiosyncratic risk (industry benchmark)	Post (1/0)	-0.0088	(-1.85)*	Table III, Model (1)
	Post (1/0) x Incumbent disciplinary director (1/0)	0.0003	(0.09)	
(Market) Leverage	Post (1/0)	-0.0144	(-3.19)***	Table III, Model (3)
	Post (1/0) x Incumbent disciplinary director (1/0)	0.0024	(0.67)	
R&D	Post (1/0)	-0.0024	(-2.16)**	Table III, Model (5)
	Post (1/0) x Incumbent disciplinary director (1/0)	-0.0013	(-0.61)	
Number of M&A deals	Post (1/0)	-0.0285	(-1.75)*	Table III, Model (6)
	Post (1/0) x Incumbent disciplinary director (1/0)	-0.0200	(-1.67)*	
ROA	Post (1/0) x Number of industry patents	-0.0072	(-4.96)***	Table IV, Model (1)
	Post (1/0) x Number of industry patents x Incumbent disciplinary director (1/0)	0.0024	(1.36)	
Tobin's Q	Post (1/0) x Number of industry patents	-0.0680	(-3.44)***	Table IV, Model (2)
	Post (1/0) x Number of industry patents x Incumbent disciplinary director (1/0)	0.0231	(0.98)	
ROA	Post (1/0) x E-index	0.0014	(2.18)**	Table V, Model (1)
	Post (1/0) x E-index x Incumbent disciplinary director (1/0)	0.0006	(0.85)	
Tobin's Q	Post (1/0) x E-index	0.0391	(1.99)**	Table V, Model (2)
	Post (1/0) x E-index x Incumbent disciplinary director (1/0)	0.0084	(0.90)	

Table VII: Director deaths and replacements

The sample consists of 3,660 deceased directors provided by BoardEx database. We then track the 2,787 firms where they hold outside directorships at the time of their deaths and identify 1,094 new appointments of outside directors within the next three years (we keep only the first director appointments after the death events). We classify a deceased (new) director to be a disciplinary director if she has fired a CEO by the time of her death (new appointment). Panel A reports the frequency of disciplinary deceased directors and their replacements. Panel B reports the Pearson correlation coefficient between the two indicators for disciplinary deceased directors and disciplinary new directors. P-value is reported in parentheses.

Panel A: Frequency of deceased directors and new directors

Deceased director is disciplinary	New director is disciplinary	
	0	1
0	993	34
1	63	4

Panel B: Pearson correlation

	New director is disciplinary
Deceased director is disciplinary	0.0148 (0.4498)

Table VIII: Disciplinary incumbent directors and probability of appointing disciplinary new directors

This table presents logistic models where the dependent variable equals one if a firm appoint a disciplinary director and zero otherwise. The sample includes 12,814 outside director appointments from 1996 to 2012 from the BoardEx database. We require appointing firms to have data available from the Center for Research in Security Prices (CRSP), Compustat, Risk Metrics, and Execucomp databases. We classify a new (incumbent) outside director to be a disciplinary director if she has fired a CEO by the time of the new appointment. The t-values are reported in parentheses. *, **, and *** denote statistical significance at the 10%, 5% and 1% level, respectively.

	Appointing a disciplinary director (1/0)
Intercept	-5.6381 (-0.10)
Percent of incumbent disciplinary directors	0.2086 (0.77)
Assets (log)	0.2815 (7.07)***
Board size	-0.0317 (-1.40)
Fraction of independent directors	-0.2794 (-0.71)
Busy board (1/0)	0.5101 (2.51)**
Coopted board (1/0)	0.2213 (1.59)
CEO chairman (1/0)	-0.1186 (-1.01)
CEO holdings	-0.8940 (-0.71)
CEO founder (1/0)	-0.0909 (-0.38)
CEO age (log)	-0.4449 (-1.00)
CEO tenure (log)	-0.0631 (-0.74)
E-index	0.0188 (0.38)
N	12,814
Pseudo R-sq	0.1180
Year fixed effects	Yes
Industry fixed effects	Yes

Table IX: Instrumental variable

For each of the 575 turnover firms, we identify a matching firm that does not experience a forced CEO turnover event. The criteria for choosing a matching firm are described in Appendix B1. Panel A reports size and performance of the turnover firms and matching firms.

The outside directors of the matching firms are classified as matching directors. If a director sits on both a turnover firm board and a matching firm board, she is excluded from the analysis. For each disciplinary and matching director, we search for all their future board appointments in the next five years as outside directors using the BoardEx databases. We also require data available from the Center for Research in Security Prices (CRSP), Compustat, Risk Metrics, and Execucomp databases. The final sample includes 392 board appointments for the disciplinary directors and 334 for the matching directors. Panel B reports characteristics of disciplinary directors and matching directors.

Panel C presents a logistic regression where the dependent variable equals one if a firm appoints a disciplinary director and zero if it appoints a matching director. Characteristics of the appointing firms are measured at the fiscal year end preceding the announcement date of director appointments. We use the fraction of disciplinary (matching) directors in appointing firm's network as instrument. To construct the instrumental variable, we exclude the network of the incumbent directors that are also a disciplinary director. (Details about the instrument are discussed in Appendix B2.)

For each of the 726 director appointments, we track the five years subsequent to the director appointment for as long as the appointing firm has available data from CRSP, Compustat, Risk Metrics, and Execucomp databases. The sample consists of a panel of 4,051 firm/year observations. Panel D summarizes the test results when we repeat the analyses from Table II to V for this sample. The instrumented dependent variables are estimated from a first stage regression using fractions of disciplinary and matching directors in board network as instruments. For example, an instrumented 'disciplinary director' is the fitted value estimated from the regression in Panel C, Table IX; an instrumented interaction 'disciplinary director x three-year stock return below industry median' is estimated from a first stage regression where the dependent variable is equal to one if a firm appoints a disciplinary director and experiences stock returns lower than industry median; we use the interactions between the fractions of disciplinary (matching directors) in board network and the indicator for three-year stock return below industry median as instruments in this first stage regression. Other control variables are similar to those in Table II to V, except that we also control for the pre-appointment levels of dependent variables in all tests.

In panels A and B, the t-value of t-test (difference in means) and z-value of Wilcoxon test (difference in medians) are reported in parentheses. In panels C and D, the t-values are reported in parentheses. In all panels, *, **, and *** denote statistical significance at the 10%, 5% and 1% level, respectively.

Panel A: Firing firms and matching firms

Variable	(1) Turnover firms N = 437		(2) Matching firms N = 437		Difference (1) - (2)	
	Mean	Median	Mean	Median	Mean	Median
Total assets (\$ million)	10,935	1,211	9,803	1,133	(0.42)	(-0.15)
Market capitalization (\$ million)	5,876	1,152	5,360	1,045	(0.50)	(-0.91)
Three year stock return	0.326	0.048	0.292	0.107	(0.49)	(0.80)
Industry adjusted three-year stock return	-0.016	-0.158	-0.013	-0.131	(-0.06)	(0.58)
Stock return year t-1	0.066	-0.006	0.060	-0.014	(0.17)	(-0.26)
Industry adjusted stock return year t-1	0.034	-0.043	0.037	-0.010	(-0.12)	(1.04)
Market adjusted stock return year t-1	-0.026	-0.102	-0.015	-0.060	(-0.33)	(1.16)
ROA year t-1	0.077	0.070	0.085	0.083	(-0.91)	(-1.69)*
ROA industry adjusted year t-1	0.051	0.025	0.064	0.038	(-1.25)	(-1.75)*
ROE year t-1	0.060	0.087	0.037	0.108	(0.82)	(-0.49)
ROE industry adjusted year t-1	0.008	0.019	-0.009	0.026	(0.62)	(-0.15)

Panel B: Appointed director characteristics

	(1) Disciplinary directors N = 392		(2) Matching directors N = 334		Difference (1) - (2)	
	Mean	Median	Mean	Median	Mean	Median
Age	59.528	60.000	58.865	60.000	(1.28)	(1.18)
Female (1/0)	0.181	0.000	0.174	0.000	(0.26)	(0.26)
Number of board seats	2.304	2.000	2.207	2.000	(0.89)	(0.37)
CEO position (1/0)	0.117	0.000	0.132	0.000	(-0.58)	(-0.59)
Audit committee member (1/0)	0.510	1.000	0.581	1.000	(-1.91)*	(-1.90)*
Compensation committee member (1/0)	0.579	1.000	0.608	1.000	(-0.78)	(-0.78)
Nomination committee member (1/0)	0.462	0.000	0.515	1.000	(-1.43)	(-1.43)

Panel C: Which firms appoint disciplinary directors?

	Appointing a disciplinary director (1/0)
Intercept	0.4879 (0.03)
Fraction of disciplinary directors in directors' network	3.6599 (2.64)**
Fraction of matching directors in directors' network	-4.0490 (-3.22)**
Assets (log)	0.0128 (0.30)
Board size	-0.0237 (-0.85)
Fraction of independent directors	-1.2006 (-2.48)**
Busy board (1/0)	-0.0222 (-0.17)
Coopted board (1/0)	0.1058 (0.71)
CEO chairman (1/0)	0.2147 (1.83)*
CEO holdings	-0.5954 (-0.33)
CEO founder (1/0)	0.2668 (0.92)
CEO age (log)	0.0051 (0.55)
CEO tenure (log)	-0.0157 (-1.06)
E-index	0.0990 (1.77)*
N	726
Pseudo R-sq	0.1679
F-stat for relevance of IV	11.81
Year fixed effects	Yes
Industry fixed effects	Yes

Panel D: Disciplinary directors and firms risk taking and performance

Dependent variable	Independent Variable	Estimate	t-value	Other control variables as in
Forced CEO turnover (1/0)	Instrumented interaction 'Disciplinary director x Three-year stock return below industry median (1/0)'	0.3181	(2.00)**	Table II, Model (1)
Idiosyncratic risk (industry benchmark)	Instrumented Disciplinary director	-0.0222	(-2.36)**	Table III, Model (1)
(Market) Leverage		-0.0232	(-1.80)*	Table III, Model (3)
R&D		-0.0070	(-2.60)***	Table III, Model (5)
Number of M&A deals		-0.0409	(-0.63)	Table III, Model (6)
ROA	Instrumented interaction	-0.0003	(-1.68)*	Table IV, Model (1)
Tobin's Q	'Disciplinary director x Number of industry patents'	-0.0098	(-3.41)***	Table IV, Model (2)
ROA	Instrumented interaction	0.0028	(1.88)*	Table V, Model (1)
Tobin's Q	'Disciplinary director x E-index'	0.0843	(4.50)***	Table V, Model (1)

Appendix A: Variable definitions

Board size is the total number of directors in the board.

Busy board (1/0) equals one if at least 50% of the independent directors of a board hold three or more directorships in publicly traded firms, and zero otherwise.

CEO chairman (1/0) equals one if a CEO is also the chairman of the firm and zero otherwise.

CEO founder (1/0) equals one if a CEO is also the founder of the firm and zero otherwise.

CEO holdings (%) equals the number of shares held by the CEO divided by the total number of shares outstanding.

Coopted board (1/0) equals one if at least 50% of board members join the firms after the current CEO and zero otherwise.

Deal value equals the deal value of an acquisition scaled by the acquirer market capitalization in the fiscal year before the merger announcement.

E-index is the entrenchment index based on Bebchuk, Cohen, and Ferrell (2009).

Fraction of disciplinary (matching) directors in appointing firms' director network equals the number of disciplinary (matching) directors that share at least one board with directors of appointing firms divided by the total number of directors that share at least one board with directors of appointing firms.

Fraction of incumbent disciplinary directors equals the number of disciplinary directors divided by the total number of directors of appointing firms, measured at the fiscal year end preceding the new director appointment.

Fraction of independent directors equals the number of independent directors divided by board size.

Idiosyncratic risk (industry benchmark) equals the annualized standard deviation of the residuals from a return regression estimated with daily returns during a firm's fiscal year where the independent variable is the average stock return in the industry, with industry defined by the Fama-French (1997) 48-industry classification.

Idiosyncratic risk (market benchmark) equals the annualized standard deviation of the residuals from a return regression estimated with daily returns during a firm's fiscal year where the independent variable is the CRSP value-weighted market return.

Leverage (market) equals the book value of total debt divided by the market value of assets, where the market value of assets equals the book value of assets subtracted by the book value of equity plus the market value of equity.

Leverage (book) equals the book value of total debt divided by sum of total debt and the book value of equity.

Number of industry patents equals the number of patents granted in an industry classified using Fama-French (1997) 48-industry classification. Patent data is obtained from the National Bureau of Economic Research (NBER).

Return on assets (ROA) equals the income before extraordinary items divided by total assets.

R&D equals the expenses for research and development scaled by total assets.

Stock return is the daily compounded stock returns over a firm's fiscal year.

Three-year stock return (ROA) below industry median is an indicator that equals one if a firm's daily compounded stock return (average annual ROA) in the previous three years is below the industry median, with industry defined by the Fama-French (1997) 48-industry classification.

Three-year stock return below market is an indicator that equals one if a firm's daily compounded stock return in the previous three years is below that of the CRSP value-weighted market return.

Tobin's Q equals the market value of assets divided by the book value of assets, where the market value of assets equals the book value of assets subtracted by the book value of equity plus the market value of equity.

Appendix B: Instrumental variable analysis

B1: Matching criteria

For each of the 575 turnover firms described in Table I, we identify a matching firm that does not experience a forced CEO turnover event and satisfy the following criteria: i) the matching firm belongs to the same Fama-French (1997) 48 industry as the turnover firm, since CEO turnover activities might be different across industries; ii) the matching firm has market capitalization between 50% and 200% of that of the turnover firm to ensure that turnover firms and matching firms have similar size (if we use the 80% - 120% range to identify a matching firm, our sample of matching firms is reduced to only 382 firms); iii) the matching firm does not experience a forced CEO turnover event during the 5-year period from year -2 to year $+2$ where year 0 is when the turnover firm fires its CEO; and iv) the matching firm has the closest three-year industry-adjusted stock return to that of the turnover firm. Using these four criteria, in 15 cases, the same non-event firm is matched to two event firms. In these cases, we select the second best match for one of the event firms so that the overall performance difference between the event firms and the matching firms is minimized. We also require data available from the Center for Research in Security Prices (CRSP), Compustat, Risk Metrics, and Execucomp databases.

B2: Instrumental variable

We use the fractions of disciplinary (matching) directors in the hiring firms' director network as instruments, since firms often appoint candidates from their own directors' network. Cai, Nguyen, and Walkling (2017) document that over 84% of new director appointments in S&P 1500 firms come from the incumbent directors' network; the frequency is over 85% in our sample. Hence, a higher fraction of disciplinary directors in the board network should have a positive correlation with the probability of one such director being appointed. This fraction, therefore, satisfies the 'relevance' condition of being an instrument. The F-statistics of the test for relevance of an IV is 11.81. We exclude the network of the incumbent directors who are also disciplinary directors. This is to address the potential endogeneity issue if the director pool is correlated with the composition of the incumbent disciplinary directors. Our instruments also satisfy exclusion requirement since there is no obvious reason to believe that a firm's corporate policies (such as risk taking) and performances would be influenced by the characteristics of other firms' directors (excluding the overlapping directors). We, however, note that the IV approach does not indicate whether the characteristic of being 'disciplinary' is explicitly sought or not.