Blockholders on Boards and CEO Compensation, Turnover and Firm Valuation

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Comments welcome

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Abstract

There is an intense, ongoing debate on whether the level and composition of CEO pay is an outcome of an efficient arms-length bargaining process or is controlled by powerful CEOs. An independent director who is also a blockholder (IDB) has both a strong incentive and the ability to monitor management. So the presence of an IDB in a firm can lead to arms-length bargaining in setting CEO pay. Alternatively, IDBs may pursue private benefits at the expense of small shareholders. This paper examines three issues. First, we investigate the determinants of an IDB's presence in a firm. Second, we examine the relations between IDB presence and (1) the level and structure of CEO compensation, and (2) CEO turnover-performance sensitivity. Third, we analyze if IDB presence is related to firm valuation. We find that IDB presence is systematically related to firm, CEO and governance characteristics. After controlling for CEO characteristics, governance mechanisms and relevant firm attributes, and accounting for the potential endogeneity of IDB presence, we find that CEOs of firms with IDBs have: (1) lower levels of cash and total compensation, (2) lower proportions of pay via stock and options, and (3) higher turnover-performance sensitivity. Finally, firms with an IDB have higher valuation, as measured by Tobin's q. The magnitudes of these effects are substantial, and are generally bigger when an IDB serves on the compensation committee. These results are robust to a variety of specifications, and are further supported by an analysis of firms that switched to or from having IDB presence. Our findings suggest that the presence of an independent blockholder on the board promotes better incentives and monitoring of the CEO, and consequently leads to higher firm valuation.

JEL classification: G32, G34, J33, M52

Keywords: Corporate Governance, Independent Directors, Boards of Directors, Blockholders, Large Shareholders, Executive Compensation, CEO Compensation, CEO Turnover, Firm Valuation

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"The typical large company has a compensation committee. They don't look for Dobermans on that committee, they look for Chihuahuas..., Chihuahuas that have been sedated."

Warren Buffett, at 2004 annual shareholders' meeting of Berkshire Hathaway,

CNNMoney.com, May 3, 2004

1. Introduction

There are two competing views of the CEO contracting process in the United States. In one view, CEO contracts are determined by arms-length bargaining that leads to efficient outcomes (see, e.g., Holmstrom and Kaplan (2003) and Edmans and Gabaix (2009)). An alternative ('skimming') view holds that powerful CEOs exercise enormous sway over boards, rendering the boards ineffective in setting appropriate CEO contracts (see, e.g., Bebchuk and Fried (2004) and Morse, Nanda and Seru (2008)). Bertrand and Mullainathan (BM, 2001) argue that both views have merit: bargaining takes place in firms with strong governance and skimming in firms with weak governance. Shleifer and Vishny (1986) show that a large shareholder, by overcoming the free-rider problem in monitoring managers, can serve as an effective governance mechanism. BM find that adding a large shareholder to the board substantially reduces what a firm pays its CEO for luck, i.e., changes in firm performance beyond the CEO's control.

As representatives of shareholders, boards of directors are charged with hiring, compensating, monitoring and disciplining CEOs. Given their substantial powers, boards can serve as an important governance mechanism. But boards' ability to monitor CEOs hinges on having strong, motivated and independent directors. A director is truly independent if she is not under undue influence of the CEO, allowing her to challenge the CEO if he pursues his interests at the expense of shareholders. Morck (2008) argues that a powerful CEO can usually subdue nominally independent directors, who often owe their board seats to the CEO. But a CEO's co-option of the board can break down with a strong voice of dissent. Hence, often all that is needed to overcome a CEO's 'rule' over the board is one truly independent director with a significant equity stake in the firm, who has a strong incentive to monitor the CEO and the ability to confront him should the need arise. This requirement is satisfied by an independent director who is a

blockholder (IDB).[1] An IDB has both a strong incentive and the ability to monitor management. The incentive comes from large stockholdings, while the ability comes from several sources. A board seat gives an IDB a regular forum for monitoring managers. Large shareholdings give an IDB direct voting power, the ability to form coalitions with other large shareholders, and greater influence on the board relative to other outside directors, who typically have negligible stockholdings.

Anecdotal evidence suggests that IDBs have a significant say in hiring, compensating, and firing CEOs, and consequently can influence firm performance. Some prominent recent examples of IDBs are Warren Buffett, an IDB of Coke and Gillette (before it was acquired by Proctor and Gamble); Carl Icahn, an IDB of Blockbuster and Yahoo; Kirk Kerkorian, a blockholder of Chrysler and General Motors, who controlled seats on their boards; and Nelson Peltz, a blockholder who controls two board seats in Kraft Foods Inc.[2]

The presence of an independent blockholder (IB) on the compensation committee or the board can lead to arms-length bargaining in setting CEO pay.[3] But whether an IDB indeed stands up to the CEO in the interest of all shareholders, or uses her position to extract private benefits at the expense of other shareholders, is an open question. In this paper, we empirically examine the determinants of IDB presence in a firm, and the relation between IDB presence and the level and composition of CEO pay, the sensitivity of CEO turnover to firm performance, and firm valuation. We define a blockholder as an individual who either controls 1% or more of the equity's voting power or owns 1% or more of the equity's cash flow rights. We define an IDB as an independent director who is (or represents) a blockholder.[4]

[1] Following the literature on boards (see Adams, Hermalin and Weisbach (2009) for an excellent review), we define an independent director as a director who is not a current or past executive of the company and does not has a business relationship with the company, e.g., as a supplier or customer.

[2] Blockholders often hold their equity stakes via investment firms controlled by them. For example, the investment vehicles of Buffett, Icahn, Kerkorian, and Peltz are, respectively, Berkshire Hathaway Inc., Icahn Capital L.P. and Icahn Enterprises L.P., Tracinda Corp., and Trian Fund Management.

[3] A recent example of such bargaining is Valeant Pharmaceuticals International (formerly, ICN Pharmaceuticals Inc.), where G. Mason Morfit, an IDB and hedge fund partner, is actively involved in setting the CEO's contract (see Lublin (2009)).

[4] Proxy statements disclose equity ownership of directors and of holders of 5% or larger blocks. Prior studies typically define blockholders as the latter group. Since we are interested in individual blockholders who are independent directors, we take advantage of data availability and define an IDB as a 1% blockholder to increase the power of our tests. Panel A of Appendix 1 shows that, using a 1% (5%) ownership definition, 15.5% (4.6%) of the firm-years in our sample have an IDB. Given that IDB presence is our main explanatory variable, defining it using a 5% cut-off would cause it to be a column of nearly all zeros, and the variable would have minimal explanatory power. In any case, 1% of a large company's outstanding equity is a block of substantial size.

Several prior studies have analyzed blockholders and independent directors in various contexts, but have not examined the role of IDBs in executive compensation directly. For instance, Becker, Cronqvist and Fahlenbrach (2008) find that the presence of large non-managerial shareholders significantly explains CEO compensation. They conjecture that blockholders may influence CEO compensation via the board, but do not examine whether these blockholders have board seats and whether they exercise their influence via those seats. Cyert, Kang, and Kumar (2002) examine the influence of blockholders and boards on CEO compensation levels. They find that the CEO's equity-based compensation, but not cash compensation, is significantly negatively related to the stock holdings of the largest outside shareholder and of the directors serving on the compensation committee. Chhaochharia and Grinstein (2009) examine CEO compensation levels in companies whose boards were affected by the Sarbanes-Oxley Act, i.e., boards that did not have a majority of independent directors. They find that out of these firms, companies that did not have an outside blockholder on the board pre-SOX reduce CEO compensation substantially post-SOX; there is no significant decrease in CEO compensation for other firms.

Our main explanatory variable of interest, IDB, is likely endogenous: the presence of an IB who holds a board seat in a firm is not a random occurrence. Individuals decide which firms to invest in and whether to try to obtain a board seat. This endogeneity can affect our analysis through either omitted variables or selection bias. We address concerns about endogeneity of IDBs in several ways. First, to mitigate potential endogeneity caused by omitted variables, we include a large number of covariates that can explain the relevant dependent variables (the level and composition of CEO pay, CEO turnover, and firm valuation). Doing this reduces the possibility of omitting variables correlated with our main explanatory variable, IDB. But if omitted variables are unobservable and not orthogonal to the other regressors, including many relevant variables as covariates would still not remove the bias. So, we next use an instrumental variables (IV) approach to account for potential endogeneity caused by unobservable omitted variables. We use the densities of IDBs in the state of a company's headquarters and in its industry as instruments for IDB. Third, to account for possible sample selection bias, we use Heckman's (1979) two-stage treatment effect model. This model corrects the self-selection bias due to unobservable variables and computes the average treatment effect on the treated (ATT) relying on exclusion criteria. We also use maximum likelihood estimation (MLE) to estimate the selection and main equations simultaneously. Fourth, we use covariate matching (CM) and propensity score matching (PSM) to estimate ATT. Both CM and PSM methods attenuate the selection bias based on observables.

We find that IDBs are more prevalent in smaller firms and firms that have higher growth rates, worse prior performance, less powerful CEOs, bigger and more independent boards, more shareholder rights, and lower institutional ownership. These findings indicate that an IDB's presence in a firm is not a

random occurrence. After controlling for CEO characteristics, governance mechanisms and relevant firm attributes, we find that CEOs of firms with IDBs have: (1) lower levels of cash and total compensation, and (2) lower proportions of pay via stock and options. These results hold up across different methods that account for potential endogeneity of an IDB's presence in a firm. While CEO turnover-performance sensitivity is unrelated to the presence of an IDB in OLS and probit regressions, this relation is significantly positive after accounting for endogeneity. Finally, firms with an IDB have higher valuation, as measured by Tobin's q. The magnitudes of these effects are substantial, and are generally stronger when an IDB serves on the board's compensation committee. Our results on the level and structure of CEO pay and on firm valuation are robust to several alternative definitions of IDB presence in a firm, changes in disclosure rules on executive pay, the adoption of Sarbanes-Oxley Act, and an alternate method of computing industry-adjusted Tobin's q. Our results are also generally robust to controlling for the presence of an outside blockholder or a majority independent board. Finally, an analysis of firms that switched to or from having IDB presence further supports these results. Our findings suggest that the presence of an independent blockholder on the board promotes better incentives and monitoring of the CEO, and consequently leads to better firm performance.

The paper is organized as follows. Section 2 briefly reviews the related literature on independent directors and blockholders. Section 3 develops our testable hypotheses. Section 4 details the data and methodology. Section 5 investigates the determinants of IDB presence in a firm. Section 6 examines the level and structure of CEO compensation. Sections 7 and 8 analyze CEO turnover-performance sensitivity and firm valuation, respectively. Section 9 presents the results of several robustness checks and an analysis of firms that switch to or from having IDB presence. Section 10 concludes.

2. Prior Studies

2.1 Independent directors

Board independence is a key mechanism of corporate governance because independent directors face fewer constraints in monitoring managers. Rosenstein and Wyatt (1990) find that stock prices go up at the announcement of outside director appointments. Core, Holthausen and Larcker (1999) find a positive relation between the level of CEO pay and the percentage of the board composed of outside directors. Mehran (1995) finds that the proportion of executives' equity-based compensation is positively related to the proportion of outside directors on a board. Weisbach (1988) finds that CEO turnover-performance sensitivity is significantly higher in companies with boards that are outsider-dominated than those that are insider-dominated. Our paper addresses similar issues in relation to IDB presence in a company.

Although outside directors are generally viewed as independent, the independence of some outside directors is questionable. So in defining independent directors, it is common to exclude 'grey' outside directors, i.e., directors who are former employees, have any family relationship with the top management or a business relationship with the firm. A new stream of the literature on boards further refines the notion of board independence from various perspectives. For instance, Hwang and Kim (2009) define an independent director as socially independent if he has no social ties with the CEO. They find that firms whose boards are both conventionally and socially independent award a significantly lower level of CEO compensation and exhibit stronger CEO turnover-performance sensitivity than firms whose boards are only conventionally independent. Similarly, Masulis and Mobbs (2009) view inside directors holding outside directorships as less dependent on the CEO and argue that such directors can facilitate better informed, more independent boards, and consequently reduce managerial entrenchment and lower agency costs. Our paper is similar in spirit to this strand of the literature, as we argue that an IDB epitomizes director independence, as a director who is not beholden to the CEO, and who has significant incentives to monitor the CEO and the ability to confront him should the need arise.

Several recent studies examine firms' use of directors with specific professional backgrounds and their impact on firm policies and performance. For example, Agrawal and Knoeber (2001) examine firms' use of outside directors with backgrounds in politics, government and the law and find that firms that depend more on government are more likely to appoint them. Kroszner and Strahan (2001) analyze the trade-offs firms face in having a banker on their boards. Güner, Malmendier, and Tate (2008) examine directors with financial expertise. They find that directors' financial expertise does not affect firms' CEO compensation policies. Fahlenbrach, Low and Stulz (2009) and Faleye (2008) examine directors who are CEOs of other firms (i.e., outside CEO-directors). Fahlenbrach et al. find that appointing such directors certifies firm quality to the market; other than that, once appointed, these directors have no discernable impact on the firm. Faleye (2008) finds that CEOs of firms with more outside CEO-directors have higher compensation, lower turnover and lower turnover-performance sensitivity. We extend this literature by examining another type of outside director, namely an IDB.

An IDB may be an activist-director who agitates for changes in the firm (e.g., Carl Icahn or Kirk Kerkorian) or a long-term investor-director who works quietly behind the scenes (e.g., Warren Buffett). This distinction is a matter of an IDB's operating style, and different styles can work in different situations. For instance, Hotchkiss and Mooradian (1997) examine the role of vulture investors in financially distressed firms and find that (similar to activist-directors) they often sit on the board and add value to the firm by actively monitoring and disciplining managers. Klein (1998) finds that firms with IBs on the board's investment or finance committee (similar to long-term investor directors) have better

performance. Therefore, regardless of their *modus operandi*, both types of IDBs have the incentives and the ability to be truly independent directors.

2.2 Blockholders

Dispersed shareholdings lead to the separation of control and ownership (see, e.g., Berle and Means (1932) and Jensen and Meckling (1976)). Atomistic shareholders lack the incentive to monitor managers, resulting in free-rider problems. On the contrary, large shareholders have strong incentives to monitor and contract with managers to reduce agency problems (see, e.g., Demsetz and Lehn (1985), Shleifer and Vishny (1986) and Holderness (2003)). However, blockholder interests may not always coincide with those of atomistic shareholders.

McConnell and Servaes (1990) find no significant relation between firm valuation (i.e., Tobin's q) and the presence or holdings of an outside blockholder. Mehran (1995) examines the relation between outside blockholdings and CEO compensation or firm performance. He finds that the use of incentive compensation declines with outside blockholdings. He interprets this as evidence of blockholder monitoring substituting for incentive compensation. But he finds no relation between Tobin's q and outside blockholdings. Denis, Denis, and Sarin (1997) find that CEO turnover-performance sensitivity is higher in the presence of an unaffiliated blockholder. Core, Holthausen and Larcker (1999) find lower CEO compensation in firms with large outside blockholders.

Bertrand and Mullainathan (BM, 2001) examine whether CEO compensation increases for reasons that are beyond a CEO's control. They report that the magnitude of this pay-for-luck is lower when a non-CEO blockholder sits on the board. They also find that there tends to be greater pay-for-luck as a manager's tenure with the firm increases, except when a blockholder sits on the board. BM interpret these findings as evidence of monitoring by outside blockholders. Our paper differs from BM in two important respects. First, they focus on the pay-for-luck aspect of CEO compensation, while we examine the level and structure of CEO pay, among other issues. Second, they examine non-CEO blockholder-directors (a group that includes inside and grey directors), while we examine IDBs. The former group is much bigger than the latter. For example, our sample has 5,187 firm-years with a non-CEO blockholder-director, but only 1,790 firm-years with IDBs. Cyert, Kang, and Kumar (2002) find that a CEO's equity-based compensation is significantly negatively related to the equity holdings of the largest outside shareholder and of the board of directors.

Another stream of the literature examines the relation between stockholdings of other large investors, such as institutions and activist hedge funds, and executive compensation and firm performance. These

investors have incentives to monitor and they often pressure managers to adopt better corporate governance. Activism by institutional investors, such as mutual funds and pension funds, does not improve firm performance (see, e.g., Black (1998), Karpoff (2001) and Gillan and Starks (2007)). This inability is often attributed to regulatory and institutional constraints. But institutional holdings appear to influence firms' governance. For instance, Hartzell and Starks (2003) find that institutional ownership concentration is negatively related to the level of executive compensation. Activist hedge funds, on the other hand, are more successful in influencing corporate boards and managements, yielding better returns and performance (see, e.g., Brav et al. (2008), Clifford (2008), and Klein and Zur (2009)).

Studies examining the relation between independent individual blockholders and CEO incentives, monitoring, and firm valuation are scarce. Becker, Cronqvist and Fahlenbrach (2008) find that firms with large non-managerial individual shareholders have lower CEO compensation and a lower proportion of CEO pay in the form of stock or options. To our knowledge, no prior study examines the determinants and consequences of the presence of an IB on the board or the compensation committee. This paper is an attempt at filling this gap in the literature.

3. Hypotheses

There are two competing views of the CEO contracting process in the United States. In one view, CEO contracts are determined by arms-length bargaining that leads to efficient outcomes (see, e.g., Holmstrom and Kaplan (2003)). An alternative view holds that CEOs exercise enormous sway over boards, rendering the boards ineffective in setting appropriate CEO contracts (see, e.g., Bebchuk and Fried (2004)). If CEO power renders the board ineffective in arms-length bargaining despite the presence of an IDB, there should be no relation between IDB presence and key aspects of CEO contracts such as pay level, pay structure (e.g., proportion of equity-based pay in the pay package), and turnover-performance sensitivity. In addition, if an IDB is unable to influence CEO contracts and other major firm policies, then IDB presence should be unrelated to firm valuation. We call this the 'CEO power hypothesis.'

Alternatively, an IDB can counter-balance the CEO's power over the board. Although a CEO may generally wield considerable influence over the board, an IDB has, given his large equity stake and board seat, a strong incentive and the ability to monitor and bargain effectively with the CEO. This implies that after controlling for other factors, firms with an IDB should have lower levels of CEO pay and higher CEO turnover-performance sensitivity. IDB monitoring and better contracting with the CEO should also result in higher firm valuation. We call this the 'IDB monitoring hypothesis'.

Jensen and Murphy (1990) argue that compensation via stock and options provides a powerful incentive to CEOs to maximize stockholder wealth. Since IDB monitoring can either substitute for equity incentives or complement it, the predicted relation between IDB presence and CEO pay structure can be either negative or positive under the 'IDB monitoring hypothesis.' If IDB monitoring is a substitute for CEO equity incentives, firms with an IDB should have lower (higher) proportions of option and equity-based (salary and cash) pay in the CEO pay package. We call this the 'IDB monitoring – substitutes hypothesis.' If IDB monitoring complements the CEO's equity incentives, these relations should be the opposite. We refer to this as the 'IDB monitoring – complements hypothesis'.

A third possibility is that an IDB can use his position to pursue private benefits at the expense of other shareholders and collude with the CEO to that end. In this case, we would expect firms with an IDB to have higher levels of CEO pay and lower CEO turnover-performance sensitivity. In addition, skimming by both the CEO and the IDB should result in lower firm valuation. We call this the 'IDB private benefits hypothesis'. Table 1 summarizes the predictions of these hypotheses.

4. Sample, Data and Methodology

The purpose of this paper is to examine the relation between IDB presence in a firm and the level and structure of CEO compensation, CEO turnover-performance sensitivity, and firm valuation. Doing this requires data on CEO compensation; characteristics of CEOs, directors, and corporate governance; and firms' accounting and stock price information. Therefore, our largest possible sample (11,547 firm-years) consists of firm-years that are common in four databases—RiskMetrics[5] Directors (RM Directors), Center for Research in Securities Prices (CRSP), Compustat, and ExecuComp—over fiscal years 1998-2006 and meet our data requirements. Our main sample of IDBs comes from RM Directors database, which compiles its data from corporate proxy statements. In addition, we use RiskMetrics Governance (RM Governance), Thomson Reuters Institutional Ownership Data (TFN Institutional), corporate proxy statements (via Livedgar), news stories (from Factiva), Wikipedia, and other Internet sources. Firms in our sample belong to the S&P 1500.

4.1 Main variables and sample construction

We define a blockholder as an individual who either controls 1% or more of the equity's voting power or owns 1% or more of the equity cash flow rights. We define independent directors as directors classified as

[5] Formerly named Investor Responsibility Research Center (IRRC).

independent or designated in RM Directors.[6] So an IDB is an independent director who is (or represents) a blockholder.[7] We define two main variables of interest for our analysis: 1) *IDB*, which is a binary variable that equals one if there is at least one IDB in a given firm-year, and equals zero otherwise; 2) *IDB_CC*, which is a binary variable that equals one if there is at least one IDB who sits on the board's compensation committee[8] in a given firm-year, and equals zero otherwise.

Table 2 explains the construction of our sample. RM Directors obtains its data from proxy statements for shareholder meeting dates starting in 1996. Some of the key variables needed to compute a director's shareholdings are missing in the database for 1996. Also, some variables required for our analysis were not available after 2006. Hence, our analysis makes use of data for 1997-2006.

During 1997-2006, there are 15,967 distinct firm-calendar years in RM Directors.[9] We find all 15,967 firm-calendar years on CRSP. Since we use a fiscal year as the unit of time, we match each annual shareholder meeting date for a firm with the fiscal year in which the meeting is held. We obtain the fiscal year ending month for each firm from Compustat. We next match these 15,967 firm-fiscal years (henceforth, firm-years) with Compustat, and find 15,477 matches. After matching the annual meeting dates to the appropriate fiscal year, 83 firm-years fall under the 2007 fiscal year. Due to data limitations, we drop these observations. That leaves us with 15,394 RM Directors-CRSP-Compustat matched firm-years. Out of these, we find 13,929 firm-years with non-missing CEO data in ExecuComp. Our main analysis omits observations for the 1997 fiscal year because, as discussed in section 4.2 below, we use

[6] RM Directors defines as independent a director who is neither a current company employee nor is 'affiliated'. An affiliated director is a director who is a former employee of the company or of a majority-owned subsidiary; a provider of professional services — such as legal, consulting or financial — to the company or an executive of the service provider; a customer of or supplier to the company; a designee (i.e., a designated director) under a documented agreement between the company and a group, such as a significant shareholder; a director who controls more than 50% of the company's voting power; a family member of an employee; an interlocking director or an employee of an organization or institution that receives charitable gifts from the company.

[7] Our blockholder dataset differs substantially from Dlugosz et al.'s (2006) Blockholders database. We construct our dataset from RM Directors database for S&P 1500 firms by extracting data on individual blockholders who are independent directors during 1997-2006. Dlugosz et al.'s database contains all types of blockholders (e.g., individuals, mutual funds, pension funds, etc.) using 1996-2001 Compact Disclosure CDs for S&P 1500 firms. We define blockholders as individuals who own or control 1% or more of a firm's outstanding equity (i.e., higher of cashflow rights or voting rights). They define blockholders as owners of 5% or more of the voting rights where reported; otherwise, higher of voting or cashflow rights, as per SEC Rule 13d-3 definition for proxy reporting. Dlugosz et al. find problems in blockholdings data mostly in cases where reported blockholdings are very large, mainly due to double-counting. We avoid the potential problem of double-counting by using a dummy variable to indicate the presence of a blockholder.

[8] If the firm has no compensation committee, the entire board serves as the compensation committee.

[9] A single firm-calendar year often includes data from multiple proxy statements. Since directors are usually elected at the annual general meeting of shareholders, typically held three months after the end of a fiscal year, we use the list of directors from the proxy statement for this meeting.

instrumental variables that are lagged by one year. In addition, we exclude dual-class firms because they tend to be family-controlled (see, e.g., DeAngelo and DeAngelo (1985)). Thus, our final sample for the main analysis consists of 11,547 firm-years over 1998-2006.

Appendix 1 provides an overview of our sample. Panel A reports the distribution of the number of firm-years by IDB count. Although we define blockholdings at 1% or more ownership of voting or cash flow rights, for comparison, we also show the corresponding distribution for 5% or more ownership, as often used by prior papers. Of the 11,547 firm-years in our sample, 1,790 or 15.5% (532 or 4.6%) of the firm-years have an IDB defined at 1% (5%) blockholding. Panel B reports the breakdown of firm-years with and without an IDB_CC, at both ≥ 1% and ≥ 5% ownership levels. Based on 1% (5%) blockholding level, of the 11,453 firm-years for which we have board committee membership information,[10] 1,042 or 9.1% (380 or 3.3%) of the firm-years have an IDB on the compensation committee. Panel C reports the distribution of the number of fiscal years a firm is present in our sample. Over the 1998-2006 period, our S&P 1500 sample contains 2,056 unique firms. Of these, there are 700 firms that are present in all nine years during 1998-2006 and 1,536 firms that are present in at least three years. Panel D shows the distribution of the proportion of a given firm's fiscal years that have an IDB. For example, 1,477 firms have no IDB for all the fiscal years that they are present in our sample. Panel E presents the number of firm-years in each fiscal year for IDB, non-IDB, and all firms in the sample. The sample size ranges from 1,212 in 2006 to 1,340 in 2001. The percentage of firms with IDBs ranges from 8.2 in 2006 to 13.1 in 2001.

4.2 Instrumental variables and empirical methodology

Our main variable of interest, IDB, is likely endogenous. As discussed in the introduction, the presence of an IB who has a board seat in a firm is not a random occurrence. Individuals decide which firms to invest in and whether to try to obtain a board seat. This endogeneity can affect our analysis through either omitted variables or selection bias. We employ five different approaches to mitigate concerns about the endogeneity of IDB presence in a firm. First, we use the two-stage least squares (2SLS) estimation to account for potential endogeneity caused by unobservable omitted variables. Although the potential endogenous variable is binary, we use the linear probability model (LPM) in the first stage.[11] Using LPM

[10] We do not have board committee membership data for 94 firm-years in our sample because their annual shareholder meeting took place in 1997 and RM Directors database reports this data starting in 1998.

[11] Using a non-linear model, such as the probit model, for the first stage would be a forbidden regression. An alternative to using LPM in the first stage is to use the predicted value of the potential endogenous variable using a non-linear model and use it as the instrument. The non-linear fitted value as an instrument (generated IV) provides a 'back-door' identification. But we avoid using this approach because IDB and our main dependent variables in

for the first-stage regression generates consistent second-stage estimates even with a binary endogenous variable (Angrist and Krueger (2001)).

We develop instruments for IDB based on the fact that there are significant variations in IDB density by geographic location and industry. Becker, Cronqvist and Fahlenbrach (2008) find that wealthy individuals tend to cluster more in certain geographic areas and invest in public companies located nearby, either due to better monitoring ability or lower asymmetric information.[12] Similarly, wealthy investors may tend to congregate in certain industries, either because they have specific industry-expertise or have skills that are more useful to certain industries. These factors can give rise to variations in blockholder and IDB presence by state and industry. While state- and industry-level densities of IDBs can explain IDB presence in a firm, these factors would not explain our main dependent variables (the level and composition of CEO pay, CEO turnover and firm valuation) except via their effects on IDB presence in a firm.

We compute the state-level density of IDBs (denoted as IDB state-density) as the average value of the IDB dummy for all the public companies in our sample headquartered in a state in a given fiscal year. For instance, an IDB density of 0.05 in California for fiscal year 2008 means that 5% of the public companies headquartered there in that year had an IB on their boards. We define the industry density of IDBs (denoted as IDB industry-density) for each of the 48 Fama and French (1997) industries similarly. Appendix 2 provides a sense for the variations in IDB densities across states and industries.[13] We use these variations to develop instrumental variables for identification. Similar variables have been employed in other contexts by Villalonga (2004) and John and Kadyrzhanova (2009).[14]

We use lagged IDB state-density and lagged IDB industry-density as instruments for both IDB and IDB_CC. By design, these instrumental variables (IVs) are highly correlated with IDB and IDB_CC.

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sections 6 through 8 share many determinants in common, causing the generated IV to be highly correlated with the main dependent variables.

[12] The tendency of wealthy individuals to invest locally is consistent with the literature on local bias in investing (see, e.g., Lerner (1995), Coval and Moskowitz (1999), and Bailey, Kumar and Ng (2008)).

[13] Panel A of Appendix 2 shows the IDB industry-density over our entire sample period, 1997-2006. Industries are ranked in descending order based on the column value of (B*(D-F)). Column (D-F) shows the difference in the relative frequency of IDB firm-years in a given industry compared to non-IDB firm-years in the industry. Column (B*(D-F)) shows weighted value of (D-F) based on the weight of that industry in our sample. Columns (D-F), (B*(D-F)) and (C/A) show the variation in IDB-density across industries in three different ways. The IDB industry-density IV is computed as in the last column, (C/A), except that it is computed on a yearly basis. Panel B shows the IDB state-density in a similar format.

[14] Villalonga uses the fraction of diversified firms in an industry to explain a firm's propensity to diversify, in matching models such as propensity score matching. John and Kadyrzhanova use the incidence of dictatorship firms (i.e., firms with fewer shareholder rights) near a firm's headquarters in a probit model of a firm's likelihood of being a dictatorship firm.

Using lagged IDB-state and lagged IDB-industry densities as instruments helps us to remove any look-ahead bias in creating IVs and further reduces the possibility of the IVs being related to our main dependent variables. We calculate these instruments for fiscal years 1997-2006. The use of lagged densities forces us to exclude the 1997 data from our main analysis.

While the 2SLS estimator is not unbiased, it is consistent; and having a large sample makes the 2SLS results more reliable. We test for exogeneity using the Durbin-Wu-Hausman test, which examines the statistical difference between OLS and 2SLS coefficient estimates of the suspect endogenous variable. With two different IVs, we are also able to conduct an over-identification test. We use Wooldridge's (1995) over-identification test since we compute robust standard errors clustered at either the firm-level or the CEO-firm-level.[15] In addition, Bound, Jeager and Baker (1995) caution about weak instruments and suggest that one should not rely solely on the over-identifying restriction. Staiger and Stock (1997) suggest that the F-statistic of the IVs used in the first-stage regression should be reasonably high (more than 10). In all of our 2SLS estimations, this F-statistic is higher than 10.

Some of our main dependent variables in sections 6 through 8 below take on a limited range of values. Given that our main explanatory variable, IDB, is potentially endogenous, we use IV-probit or IV-Tobit methodology in those regressions. When the dependent variable is censored (as in the case of the proportion of option or equity-based compensation), we use the IV-Tobit maximum likelihood estimator (MLE). In this framework, the main set of equations has a typical Tobit structure (i.e., the structural equation and the selection equation). In addition, we regress a linear equation for the endogenous variable on all exogenous variables from the structural equation and the IVs. We also conduct a Wald test for the exogeneity of the instrumented variable. When the dependent variable is binary (as in the case of CEO turnover regressions), we use the MLE of the probit model with an endogenous explanatory variable, namely IV-probit (see Wooldridge (2002, p. 476)).

Second, the binary nature of the IDB variable also allows us to use treatment effect models. Heckman's (1979) two-stage treatment effect model is appropriate for estimating the average treatment affect and correcting for sample selection bias. In this model, the inverse Mill's ratio (Lambda), computed from the first-stage probit regression, is added as a covariate in the second-stage regression to account for any selection bias. Standard errors of the two-stage treatment effect model are estimated using 1,000 bootstrap replications. Third, we use a MLE treatment effect model to estimate the selection and main equations

[15] We compute robust standard errors clustered at the CEO-firm level because each CEO brings in distinct skills, strategy, and corporate culture to a firm. Bertrand and Schoar (2003) find that there are systematic differences in corporate decision-making across CEOs, which are related to differences in firm performance.

simultaneously. We use the Wald test for the correlation between the error terms of the two equations to check for endogeneity.

The fourth and fifth methods we use are propensity score matching (PSM) and covariate matching (CM) to reduce the selection bias based on observables and estimate the average treatment effect for the treated (ATT). With the assumption of conditional independence, an appropriate control group of untreated observations can be the proxy for unobserved potential outcomes without any resulting bias. To achieve this end, Rosenbaum and Rubin (1983) suggest using a balancing score computed as a function of observable covariates, X, such that the conditional distribution of X given the balancing score is independent. PSM, the probability of participating in the treatment given observable variables X, is one such balancing score. Similarly, Abadie and Imbens (2006a, 2007) develop a simple and a bias-corrected CM estimator, where assignment to the treatment is exogenous, conditional on a set of control variables.

Potential IDBs likely decide to invest in the firm and seek board seats based on some observable firm and CEO characteristics. This makes both CM and PSM approaches appropriate methods for estimating ATT and controlling for selection bias. ATT is estimated from the difference between the actual mean of the treated and its counterfactual mean. We estimate the counterfactual mean using either CM or PSM, and use the following methods: 1) Simple matching, 2) Bias-corrected matching, 3) Radius caliper matching, and 4) Kernel matching. The first two are based on the CM method and the last two are based on the PSM method (see Imbens (2004) and Caliendo and Kopeinig (2008) for discussions of these methods).

Çolak and Whited (2006) provide an excellent exposition of the simple and bias-corrected CM estimators developed in Abadie and Imbens (2006a, 2007). Abadie and Imbens (2006b) argue that because standard bootstrapping is invalid for the standard nearest-neighbor matching estimator with replacement, the simple matching estimator is a better alternative. However, an asymptotic bias may be present in simple matching estimators. This bias can arise if the control and treated groups are insufficiently comparable. This implies that there is an incomplete overlap between the distributions of control variables between the treated and control groups. Bias-corrected matching corrects for this asymptotic bias. For both CM methods, we match the treated observation with a maximum of four nearest neighbors from untreated observations, and match with replacement. We use the procedure suggested by Abadie et al. (2004) to estimate the ATT for both simple matching and bias-corrected matching.

Using a tolerance level on the maximum propensity score distance (caliper), radius caliper matching matches all the observations in the control group within the caliper. This helps avoid the risk of bad matches when the nearest neighbor is not too near, and at the same time, uses as many matches as the caliper allows. We use a caliper of 0.02. Kernel matching, on the other hand, uses weighted averages of

all observations in the control group to estimate counterfactual outcomes. The weight is calculated by the propensity score distance between a treatment case and all control cases. We set the bandwidth at 0.06 and use Epanechnikov kernel for matching. For both of these methods, we impose common support restriction and estimate standard errors using 100 bootstrapped replications. Matching is done with replacement. We use Leuven and Sianesi's (2003) procedures to estimate the ATT for both radius caliper and kernel matching.

4.3 Dependent variables

We use two different measures of the level of compensation: total compensation and cash compensation. Total compensation is the sum of salary, bonus, the value of stock options and restricted stock granted during the year, long-term incentive payouts, and other miscellaneous compensation. Cash compensation is the sum of salary and bonus. Since both compensation variables are highly skewed, we normalize them by taking the natural log of one plus the variable. We obtain all CEO compensation data from ExecuComp, convert it to constant year 2000 dollars[16] and express it in thousands.

To analyze CEO pay structure, we use four different ratios: salary, cash compensation, option compensation, and equity compensation, each divided by total compensation. Cash compensation equals salary plus bonus. Option compensation is the aggregate Black-Scholes value of stock options granted to the executive during the year. Equity-based compensation is the value of stock options and restricted stock granted during the year.

We use ExecuComp to identify a change in CEO. We record a CEO turnover for a given fiscal year, if the CEO for the year differs from the prior year's CEO. We measure firm valuation using Tobin's q, computed as V/A, where A equals the book value of total assets, and V is an estimate of the market value of total assets computed as A plus the market value of equity minus the book value of equity. We use both unadjusted and industry-adjusted Tobin's q. The latter is measured as firm Tobin's q minus median industry Tobin's q, using Fama and French (1997) 48-industry classification. We reduce the influence of outliers by winsorizing the top and bottom one-half percent of Tobin's q values in the sample.

Appendix 3 provides descriptive statistics of these variables. The CEO's median total compensation in our sample is about $2.7 million in constant 2000 dollars. The median salary, cash, option, and equity compensation ratios are about 0.22, 0.41, 0.30, and 0.42. A CEO turnover occurs in about 12.4% of our

[16] We use the CPI – All Urban Consumer series from the US Department of Labor for inflation-adjustment.

firm-years. The median value of our unadjusted (industry-adjusted) Tobin's q measure is 1.47 (0.06). There is substantial variation in all of our dependent variables across the firm-years.

4.4 Independent variables

In addition to the binary IDB and IDB_CC variables, the independent variables in our analysis consist of several financial ratios and characteristics of boards, CEOs, and firms. We also include year dummies as well as Fama-French 12 industry dummies.[17] We winsorize the top and bottom one-half percent of the observations of all financial ratios, CEO and institutional ownership variables, firm size variables, sales growth, Tobin's q, market adjusted stock return, and standard deviation of stock returns. Appendix 3 provides definitions and descriptive statistics of these variables.

The median board size in our sample is 9 members. The median proportion of independent directors is 0.7. Following Coles, Daniel and Naveen (2007), several of our tests also control for CEO co-option, defined as the proportion of directors who joined a board after the current CEO's appointment to the CEO position. This is a measure of a CEO's influence on the board, since the CEO may have been influential in the appointment of some of these directors to the board. The median CEO co-option in our sample is 0.33. The CEO chairs the board in about 64% of the firms in our sample, is the only insider on the board in 49% of the firms, and serves on the board's nomination or corporate governance committee in about 30% of the firms. The last four variables measure aspects of CEO power.

The median age of the CEOs in our sample is 55 years and they have held the CEO position for a median of 5 years. The median stock ownership of the CEO is 0.31%. The median age of the firms in our sample is 22 years. The typical firm in the sample is fairly large, with a median market cap of about $1.6 billion in constant year 2000 dollars and a median institutional ownership of 64%.

5. Determinants of IDB Presence

We begin by examining whether the presence of an IB on a firm's board is systematically related to firm and governance characteristics that are related to an investor's decision to acquire a large equity stake in a firm and to seek and be able to obtain a board seat. If an IDB's presence in a firm is merely a random

[17] We obtain the Fama-French 12 industry classification from Ken French's website: http://mba.tuck.dartmouth.edu/pages/faculty/ken.french/data_library.html. Also, finer classifications, such as Fama and French (1997) 48 industries, result in partitions with many industries having only one or two firms in our sample. Since many of the board characteristics variables (e.g., classified board, CEO is chairman) are highly persistent over time, using industry dummies based on finer industry classifications would be tantamount to including firm-specific dummies.

occurrence, we should not expect it to be related to such characteristics. This analysis serves a dual purpose. First, it contributes to the recent literature on firms' use of outside directors with different professional backgrounds such as corporate CEOs and directors with experience in banking, finance, politics, government and the law (see, e.g., Agrawal and Knoeber (2001), Kroszner and Strahan (2001), Güner, Malmendier, and Tate (2008), and Fahlenbrach, Low and Stulz (2009)). We extend this literature by analyzing firms' use of another type of outside director, namely an independent blockholder. Second, this analysis helps us to identify the characteristics of firms with IDBs that can be used to deal with possible endogenous relations between IDB presence and the other variables of interest in sections 6 through 8 below.

First, we expect IDB presence to be related to measures of CEO power. There are two opposing forces at work here, so we should observe their net effect. Since IBs have strong incentives and the ability to monitor the CEO, powerful CEOs are likely to resist IBs' appointment to the board, making IDB presence less likely in firms with powerful CEOs. But firms with strong (and perhaps entrenched) CEOs are precisely the ones that stand to benefit more from IDB presence, increasing an investor's incentive to acquire a large block and seek a board seat. We use several measures aimed at capturing different aspects of CEO power, such as whether the CEO chairs the board, whether he is the only insider on the board (see Adams, Almeida and Ferreira (2005)), his tenure on the board or as CEO, whether he picks directors (by serving on the board's nominating or corporate governance committee; see Shivdasani and Yermack (1999)), and the proportion of directors possibly co-opted by him (i.e., who joined the board after the CEO; see Coles, Daniel and Naveen (2007)).

Second, if IB presence on the board increases firm value, CEOs with greater stock ownership have an incentive to support them in their bids for board seats. This implies a positive relation between IDB presence and CEO stock ownership. Third, since firms with classified or staggered boards have fewer board seats open in a given year, it is harder for anyone, including IBs, to get board seats in such firms. This implies a negative relation between IDB presence and a dummy variable for classified boards. Fourth, it is easier for a large shareholder to get a board seat in a firm where shareholders have more rights. We measure the number of anti-shareholder rights governing a company by Gompers, Ishii and Metrick's (2003) Governance (G) index or Bebchuk, Cohen and Farrell's (2009) Entrenchment (E) index.[18] Since both indices include the classified board provision, which we use as a separate explanatory variable, we exclude this provision from the indices and denote the resulting indices 'Net G-index' or 'Net E-index.' We expect both indices to be negatively related to IDB presence in a firm. Fifth, IDB

[18] We follow these studies and replace missing values of G- or E-index in a given year by its value in the prior year.

presence is more likely in firms with bigger and more independent boards. It should be easier for a blockholder to get a seat on a bigger board simply because it has more seats, and on a more independent board because independent directors are more likely to support an independent blockholder's bid for a board seat than insiders or affiliated directors. Sixth, since institutional investors act as a substitute for blockholders as a monitoring force, we expect IDB presence to be negatively related to the percentage of institutional ownership in a firm.

Seventh, a blockholder has a stronger reason for seeking and getting a board seat in a poorly performing firm. So we expect IDB presence to be negatively related to measures of firm performance such as the prior year's industry-adjusted operating performance to sales (OPS), market-adjusted stock return, or Tobin's q. Eighth, since a block holding of a given percentage of the outstanding equity is obviously more expensive in a larger firm, in the face of risk-aversion and wealth constraints, we expect the presence of individual blockholders and thus IDBs to be negatively related to measures of firm size. Ninth, blockholders may be more attracted to firms with better growth opportunities because such firms have more room for managerial discretion. So IDB monitoring may be more productive in such firms. We control for growth opportunities via lagged R&D to sales, and sales growth rate. Tenth, Jensen (1986) argues that managers like to pay out low dividends and hoard cash to extract private benefits from firms. Since such firms face greater agency problems, we expect IDB presence to be more useful in such firms. Accordingly, we control for the prior year's dividend yield and cash holdings (i.e., the ratio of cash and short-term investments to total assets). We expect IDB presence to be negatively related to dividend yield and positively related to cash holdings. Eleventh, we expect IDB presence in a firm to be positively related to the proportion of firms among its peers (e.g., firms in the same industry or location) that have IDBs. We measure peer-density of IDBs as IDB industry-density, the average value of the IDB dummy for a firm's Fama and French (1997) 48-industry group, and IDB state-density, the average value of the IDB dummy for all public companies headquartered in the state of a firm's headquarters. Finally, we control for year dummies and Fama-French 12 industry-sector dummies to allow for the possibility that IDB presence can vary over time and across broad sectors of the economy. Accordingly, we estimate the following equation:

IDB = f (CEO power, CEO stock ownership %, classified board dummy, Net G-index or Net E-index, board size, board independence, institutional ownership %, firm performance, firm size, growth opportunities, dividend yield, cash holdings %, IDB industry-density, IDB state-density, year dummies, Fama-French 12 industry-sector dummies) (1)

We expect the potential determinants of IDB_CC to be similar to the determinants of IDB, as approximately two-thirds of IDB firm-years are also IDB_CC firm-years.

5.1 Univariate statistics and correlations

Table 3 presents univariate statistics of our main variables for firm-years with and without IDBs, and the Pearson product-moment correlations and Spearman rank correlations of these variables with IDB. Panel A deals with the dependent variables we analyze in sections 6 through 8 below; these are discussed in the relevant sections. Panel B deals with the independent variables used in this and the following sections.

Panel B shows that firms with IDBs are smaller and younger than firms without IDBs. For example, the median total assets of IDB (non-IDB) firms is about $1.1 (1.8) billion. The CEO of an IDB firm owns more stock, serves on the nominating committee more often, but chairs the board less often, and is less frequently the only insider on the board than the CEO of a non-IDB firm. The boards of IDB firms are slightly larger, less independent, less likely to be classified, and have lower proportions of outside directors who are CEOs than boards of non-IDB firms. IDB firms have fewer anti-shareholder provisions (as measured by G- or E-index) than non-IDB firms. Compared to non-IDB firms, IDB firms tend to have higher growth rates and stock volatility; lower cash holdings, R&D spending and dividend yield; lower institutional ownership; and worse performance. State and industry peers of IDB firms are more often IDB firms themselves than peers of non-IDB firms. The signs and statistical significance of the correlations of these variables with IDB are generally consistent with the inferences based on univariate comparisons. These results suggest that the presence of IDBs is not randomly distributed across firm-years in our sample.

Appendix 4 shows the Pearson (bottom left corner) and Spearman (top right corner, italicized) correlations among select variables measuring firm age, firm size, CEO power, board characteristics and shareholder rights. To save space, we do not include all the variables in this table. Correlations with large absolute values (0.25 or higher) are indicated in bold face. The various measures of firm size (natural logarithms of market cap, total assets and sales) are correlated positively with each other and with firm age and board size, and negatively with the log of CEO stock ownership. The latter is positively correlated with CEO tenure (i.e., higher of tenure as CEO and tenure on board). Older, established firms tend to have larger, more independent boards, but more restrictions on shareholder rights. CEO stock ownership is correlated positively with his tenure and presence on the nominating committee, and negatively with board independence. CEO co-option is positively (and mechanically) correlated with CEO tenure.

5.2 Regressions

To examine whether these relations hold in a multiple regression framework, we estimate regressions of equation (1) above, where the dependent variable is IDB or IDB_CC. Since the dependent variable is binary (0, 1), we use the probit model. Columns (2) through (6) in Table 4 show estimated marginal effects (labeled 'dy/dx') and p-values of probit models of IDB. For comparison, column (1) shows estimated coefficients and p-values of a linear probability model of IDB. Column (7) shows estimates of a probit model of IDB_CC.

The table yields several insights about the incidence of an IDB in a firm. First, IDBs are more likely in firms where CEOs are less powerful (i.e., where the CEO does not chair the board, and boards with smaller proportions of other firms' CEOs, who may be more likely to support the CEO); where boards are bigger, more independent and non-classified; and where shareholders have more rights. Second, IDBs are more likely in smaller firms, where blocks are less expensive, and firms with worse operating performance, where there is more need for IDB monitoring. Third, IDBs are more likely in high (sales) growth firms, where there is more room for managerial discretion, suggesting that IDB presence is more useful. Fourth, IDB presence is more likely in firms that hold less cash, spend less on R&D, pay lower dividends, and have lower stock volatility. Fifth, IDBs are more likely in firms with lower institutional ownership, consistent with the idea that institutional investors and blockholders act as substitute monitoring mechanisms. Finally, IDB presence is more likely in firms whose industry and local peers have greater IDB presence.

The magnitudes of several of the effects are non-trivial. For example, based on estimates of model (2), an increase in firm size (log of sales) from the first to the third quartile of the sample results in a decrease of about 0.097 (= 2.03 x .0476) in the probability of IDB presence. Compared to the unconditional probability of 0.155, this represents a decrease of about 63%. Similarly, an increase in board size equal to the inter-quartile range results in an increase of about .054 (= 4 x .0136) in the probability of IDB presence, or about 35% of the unconditional probability. Firms with CEO chairs are about .022 (about 14% of the unconditional probability) less likely to have an IDB.

6. IDB Presence and CEO Compensation

This section examines the relation between IDB presence and the level (in section 6.1) and composition (in section 6.2) of CEO pay. Panel A of Table 3 shows that both total and cash pay of the CEO is substantially lower in firms with an IDB than in firms without an IDB. The CEO's median total

compensation in IDB (non-IDB) firms is $1.8 ($2.9) million; her cash compensation is $0.8 ($1) million. Relative to their counterparts in non-IDB firms, CEOs of IDB firms receive more of their pay in salary or cash than in options or equity-based components. For example, the median proportion of their cash pay is about 0.5 (0.4) in IDB (non-IDB) firms, while the proportion of equity-based pay is about 0.36 (0.43). All of these differences are statistically significant. Correlations of the level or composition of CEO pay with IDB tell a similar story. The lower level of CEO pay in firms with IDBs is consistent with the IDB monitoring hypothesis that IDB monitoring curbs excessive levels of CEO pay. The lower proportion of equity-based pay in firms with IDBs is consistent with the IDB monitoring-substitutes hypothesis that IDB monitoring is a substitute for CEO equity incentives. But this evidence is preliminary because it does not control for other variables and does not account for the endogeneity of IDB presence in a firm, a task that we turn to next.

6.1 CEO compensation level

In this section, we estimate regressions of CEOs' total and cash compensation. As discussed in section 4.3 above, since both variables are highly skewed, we normalize them by taking the natural logarithm of one plus the variable. The main explanatory variable of interest is IDB or IDB_CC. The IDB monitoring hypothesis predicts that the coefficient of IDB or IDB_CC is negative. The CEO power hypothesis predicts that this coefficient equals zero.

The regressions control for other determinants of the level of CEO pay. Prior studies find that these determinants include measures of CEO power, and CEO, board, governance and other firm characteristics. An increase in CEO power over the board increases the CEO's ability to negotiate a bigger pay package. For instance, CEO pay is higher when the CEO chairs the board (see, e.g., Cyert, Kang and Kumar (2002), and Core, Holthausen and Larcker (1999)), has more influence over director selection (see, e.g., Core, Holthausen and Larker (1999), Coles, Daniel and Naveen (2007)), has longer tenure (see, e.g., Bebchuk, Grinstein and Peyer (2009)), and when the board has a higher fraction of outside CEOs (Faleye (2008)). We control for CEO power and other CEO characteristics via the following variables: CEO age, log of CEO stock ownership, max (CEO's board tenure, tenure as CEO), CEO is chairman, CEO co-option, fraction of outside CEO-directors, CEO is the only insider, and CEO on nominating committee.

A firm's board and governance characteristics also influence the level of CEO pay. Prior studies find that CEO compensation is positively related to board size and the proportion of outside directors on the board (see, e.g., Core, Holthausen and Larker (1999), and Cyert et al. (2002)) We control for both board size and the proportion of outside directors. Hartzell and Starks (2003) find that CEO pay is negatively related

to the concentration of institutional ownership. We control for institutional ownership. Agrawal and Knoeber's (1998) findings suggest that CEO pay is negatively related to the level of takeover protection in a firm. We control for Gompers, Ishii and Metrick's (2003) G-index as a measure of the level of takeover protection in a firm.

The level of CEO compensation is positively related to firm size, performance, growth opportunities and complexity (see, e.g., Murphy (1999), Smith and Watts (1992), and Core, Holthausen and Larker (1999)). We control for firm size via log of lagged total assets; performance via lagged market-adjusted stock return, and lagged industry-adjusted ROA; growth opportunities via lagged Tobin's q, lagged R&D to sales, and sales growth rate; and firm complexity via lagged standard deviation of stock returns. The regressions include year dummies and Fama-French 12 industry dummies. Since both total and cash compensation variables are highly skewed, we use the natural logarithm of one plus compensation as the dependent variable. To save space, we do not tabulate the coefficients of the control variables.

Panel A of Table 5 reports marginal or treatment effects of IDB and IDB_CC on both total and cash compensation of the CEO, using different regression-based methodologies. In OLS regressions, both total and cash compensation are negatively related to IDB presence. In firms with IDB, total (cash) compensation is 12.89% [= $e^{-0.138} - 1$] (9.61% [= $e^{-0.101} - 1$]) lower than the compensation in non-IDB firms, after controlling for the other determinants of compensation. In untabulated results, total compensation is negatively related to the CEO's stock ownership, tenure, and membership on the nominating committee; positively related to other measures of CEO power, such as CEO is chairman and CEO co-option; and positively related to G-index, institutional ownership, and measures of firm size, performance, growth opportunities and complexity. All of these relations are statistically significant. The results are qualitatively similar in regressions of cash compensation, except that CEO tenure and stock volatility are insignificant.

Next, we use five different methodologies, discussed in section 4.2 above, to account for the potential endogeneity of IDB presence. First, we employ 2SLS regressions using IDB state-density and IDB industry-density as IVs, as discussed in section 4.2 above. In the total compensation regression, Table 5 shows that the test for exogeneity of IDB has a p-value of less than 0.05, indicating that IDB is endogenous; but in the cash compensation regression, the test is insignificant, consistent with IDB being exogenous. The results from over-identification tests and the F-tests for the IVs in the first-stage regressions mitigate the concern about weak IVs. After accounting for endogeneity, IDB presence appears to have a much larger effect on the CEO's total and cash compensation than that seen in OLS regressions.

The CEO's abnormal total (cash) compensation is as much as 36.81% [= $e^{-0.459}$ – 1] (30.23% [= $e^{-0.36}$ – 1]) lower in firms with an IDB than in firms without an IDB.

Second, we estimate Heckman's two-stage treatment effects model, where the first-stage probit regression is model (2) in Table 4.[19] Panel A of Table 5 shows that the inverse Mills ratio (Lambda) is significantly positive in regressions of both total compensation and cash compensation, consistent with endogenous selection of IDBs. Positive coefficient estimates of Lambda imply that factors that induce IDBs to self-select into particular firm-years are related to higher total and cash compensation for CEOs. Treatment effects of IDB imply that IDB presence reduces a CEO's total (cash) compensation by –45.12% [=$e^{-0.6}$ – 1] (–45.94% [=$e^{-0.615}$ – 1]). Third, we jointly estimate the treatment effect model using MLE. Here, the treatment effects of IDB imply that IDB presence reduces a CEO's abnormal total (cash) compensation by as much as -51.23% [= $e^{-0.718}$ – 1] (–66.28% [= $e^{-1.087}$ – 1]).

Finally, we use two covariate matching methods (simple and bias-adjusted) and two propensity score matching methods (radius caliper and kernel) using model (2) of Table 4.[20] Panel B of Table 5 shows that the ATTs estimated by these four different methods are all negative and statistically significant; they range between -0.282 to -0.114 for the log of total compensation, and -0.218 to -0.093 for the log of cash compensation. This suggests that the presence of IDBs reduces abnormal total (cash) compensation on average by 10.77% [= $e^{-0.114}$ - 1] to 24.57% [= $e^{-0.282}$ - 1] (8.88% to 19.59%).

We next repeat the above analysis by replacing IDB by IDB_CC. Table 5 shows that the presence of an IDB on the compensation committee reduces the CEO's abnormal total and cash compensation even more than the presence of an IDB. Strikingly, this effect is consistent across all the methodologies that we use. Tests for exogeneity in 2SLS regressions, the significance of Lambdas in the two-stage treatment effect model, and the Wald tests for rho in the MLE treatment effect model suggest that the IDB_CC variable is endogenous in both total and cash compensation regressions. Overall, the evidence presented here strongly favors the IDB monitoring hypothesis that the presence of an IB on the board or the compensation committee limits excessive CEO pay.

6.2 CEO compensation structure

We next examine the relation between IDB presence and the composition of CEO pay. We estimate regressions of four components of CEO pay: the proportions of salary, cash, option and equity-based

[19] The results are similar when we use model (3) of Table 4 as the first-stage probit model.

[20] The results are similar using model (3) of Table 4.

compensation. The main explanatory variable of interest is IDB or IDB_CC. The IDB monitoring-substitutes hypothesis predicts that the coefficient of IDB or IDB_CC is negative (positive) in the regression of the proportion of option or equity-based (salary or cash) compensation. The IDB monitoring-complements hypothesis has the opposite predictions for the signs of these coefficients. The CEO power hypothesis predicts that this coefficient equals zero.

To do this, we need to control for other determinants of CEO compensation structure. First, as Aggarwal and Samwick (1999) point out, one of the main predictions of principal-agent models of incentive contracting is that riskier firms will tie less of their executives' pay to firm performance (as measured, for example, by stock price). This implies that the proportion of a CEO's option and equity-based (salary and cash) compensation should be negatively (positively) related to the standard deviation of stock returns. We control for lagged standard deviation of stock returns in regressions of compensation structure. Second, Smith and Watts (1992) argue that managers' actions are less observable in firms with higher growth opportunities, so such firms will tie a higher proportion of CEO pay to stock price. This implies that the proportion of option and equity-based (salary and cash) compensation should be positively (negatively) related to measures of a firm's growth opportunities. We control for growth opportunities via lagged Tobin's q, lagged R&D to sales, and sales growth rate. Third, Mehran (1995) finds that the proportion of a CEO's equity-based pay is positively related to the proportion of outside directors on the board and negatively related to the CEO's stock ownership; we control for both of these variables. Fourth, CEOs of larger firms are expected to have higher dollar incentives from equity, but these incentives increase at a decreasing rate with firm size (see Baker and Hall (2004)). Fifth, Hartzell and Starks (2003) find a positive relation between institutional ownership and the use of incentive compensation. Our regressions control for firm size (log of lagged total assets) and institutional ownership. The regressions also include year dummies and Fama-French 12 industry dummies. To save space, we do not tabulate the coefficient estimates of these control variables, but briefly discuss the results.

As discussed in section 4.3 above, the dependent variables in these regressions are the ratios of salary, cash (i.e., salary plus bonus) compensation, option compensation, and equity (i.e., the value of stock options and restricted stock granted during the year) compensation, each divided by total compensation. Panel A (B) of Table 6 reports the regression and matching results for the salary or cash compensation ratio (option or equity compensation ratio). Part 1 of each panel reports the regression results and part 2 shows the matching results on ATT. All four compensation ratios are non-negative. While less than 1% of the observations equal zero for the salary or cash compensation ratio, about 31% (27%) of the observations equal zero for the option (equity) compensation ratio. In other words, while salary and cash compensation ratios display essentially no data censoring, option and equity compensation ratios exhibit

substantial censoring. Therefore, we estimate OLS regressions of salary and cash compensation ratios, and Tobit regressions of option and equity compensation ratios.

In Panel A.1 of Table 6, the estimated coefficient of IDB is highly significant and positive in OLS regressions of both salary and cash compensation ratios. The proportion of salary or cash compensation in the CEO pay package is about 3.3% higher in the presence of an IDB in a firm. On the contrary, Panel B.1 shows that the coefficient estimate of IDB is significantly negative in Tobit regressions of option and equity compensation ratios. The proportion of option (equity) compensation in the CEO pay package is about 3.5% (2.6%) lower in the presence of an IDB in a firm. In untabulated results, the proportion of a CEO's option or equity-based pay (salary or cash pay) is negatively (positively) related to the CEO's stock ownership, and positively (negatively) related to board independence, institutional holdings, and measures of firm size, growth opportunities and risk. All of these relations are highly statistically significant.

As in section 6.1 above, we next use several methodologies to deal with the potential endogeneity of IDB presence in a firm. First, we use 2SLS instead of OLS, and maximum likelihood Tobit regression with an endogenous variable (IV-Tobit) instead of Tobit regressions. For identification, we use IDB state-density and IDB industry-density as IVs. Using the over-identification test and the F-test for weak IVs, we find both these IVs to be appropriate. Use of these IVs in IV-Tobit models is justified based on exclusion criteria. But the test for exogeneity suggests that IDB presence is exogenous in all the regressions, suggesting that the OLS and Tobit results are unbiased. Given that OLS and Tobit regressions are more efficient, those results appear to be preferable to 2SLS and IV-Tobit, respectively.

We also estimate Heckman's two-stage treatment effects and MLE treatment effects models for salary and cash compensation. As in section 6.1 above, we use model (2) of Table 3 as the first-stage probit regression for the two-stage model and as the selection equation for the MLE model. The coefficients of IDB continue to be significantly positive, but are much larger than the OLS estimates. The Lambdas of both two-stage treatment effects models are significantly negative, indicating that the factors that induce IDBs to self-select into particular firm-years are negatively related to the proportion of salary or cash in CEO pay packages.

Panels A.2 and B.2 of Table 6 report estimated ATTs based on four different matching methods. Almost all the estimates of ATTs are highly significant, and they all have the same signs as in the corresponding OLS or Tobit regressions. Estimates of the effect of an IDB's presence on the proportion of cash (equity-based) compensation in a CEO's pay package range between +2.1% to +4.7% (-3.4% to -1%). All the results in Table 6 are consistently stronger for an IDB's presence on the compensation committee. The

presence of an IDB generally leads to the CEO being paid slightly less via stock and options and slightly more via salary and bonus. These results are consistent with the IDB monitoring-substitutes hypothesis. IDB monitoring appears to be a substitute for CEO incentives.

7. IDB Presence and CEO Turnover-Performance Sensitivity

This section examines the relation between IDB presence and CEO turnover-performance sensitivity. We do this by estimating an empirical model of the likelihood of CEO turnover. The dependent variable in this model is *CEO turnover*, a binary variable that equals 1 if the CEO changed in the current year, and equals zero otherwise. Prior studies find that the likelihood of CEO turnover is negatively related to prior stock performance (see, e.g., Warner, Watts, and Wruck (1988)). We control for *market-adjusted stock return*$_{t-1}$, computed as daily average of the stock return for a firm over the prior year minus the corresponding return on the CRSP equal-weighted market index. The coefficient of this variable measures the CEO turnover-performance sensitivity. To examine whether this sensitivity differs in the presence of an IDB, we add an interaction term, *IDB*market-adjusted stock return*$_{t-1}$, as an explanatory variable in the regression.[21] The IDB monitoring hypothesis predicts that the coefficient of this interaction variable is negative, while the CEO power hypothesis predicts that it equals zero.

The regression controls for other determinants of the probability of CEO turnover. First, DeFond and Park (1999) find that the probability of CEO turnover increases with stock price volatility, so we control for the standard deviation of daily stock returns over the previous year. Second, a significant part of CEO turnover is likely due to normal retirement. To control for normal retirement, we follow Murphy and Zimmerman (1993) and use a dummy variable *CEO Age64*, which equals 1 if the CEO's age is 64 years or more, and equals zero otherwise. Third, the probability of normal retirement increases as the CEO's tenure increases; we control for CEO's tenure as max (CEO's tenure on the board, tenure as CEO).

Fourth, following Yermack's (1996) finding that CEO turnover is negatively related to board size and CEO ownership, we control for both these variables. Fifth, Goyal and Park (2002) find that the probability of CEO turnover is significantly lower when the CEO chairs the board. We control for a dummy variable *CEO is chairman*. Sixth, Weisbach (1988) finds that CEO turnover is negatively related to board independence; we control for the proportion of independent directors on the board. Seventh, Huson, Parrino and Starks (2001) find that CEO turnover is positively related to firm size; we control for the log of sales as a measure of firm size. All explanatory variables (except for IDB, the fraction of

[21] We do not include IDB as a separate explanatory variable in the regression because unlike CEO turnover-performance sensitivity, there is no reason to expect CEO turnover per se to depend on IDB presence.

independent directors and board size) are lagged by one year to ensure that they relate to the departing CEO.

We start with our analysis with the simple linear probability model (LPM) using OLS. The columns labeled *OLS* in Table 7 show the coefficient estimates and p-values for this model. The probability of CEO turnover is negatively related to the market-adjusted stock return. In other words, the turnover-performance sensitivity is negative. But this sensitivity is unrelated to the presence of an IDB. The probability of CEO turnover is negatively related to CEO ownership and positively related to stock volatility, CEO is chairman, CEO tenure, CEO age and firm size. All these relations are statistically significant and generally consistent with prior studies. The columns labeled *Probit* show that the results of probit regressions are quite similar to the LPM results. But these results do not take into account the potential endogeneity of the interaction variable, *IDB*market-adjusted stock return*$_{t-1}$.

To account for the endogeneity of the interaction term, we use two different models: 1) Two-stage linear probability model (2SLS-LPM), and 2) Instrumented probit regression (IV-probit). Since the endogeneity of the interaction variable arises from the endogeneity of IDB, we use our two IVs for IDB as the IVs for the interaction term. We instrument the interaction variable by IDB state-density and IDB industry-density. There is no *a priori* reason to believe that CEO turnover should be related to the two IVs. The correlations between the interaction variable and the two IVs are significantly negative. These correlations (their p-values) are -0.028 (0.003) and -0.032 (0.001) for IDB state-density and IDB industry-density, respectively. As diagnostic checks for 2SLS, we find that the overidentifying restriction of both IVs holds (p-value of the over-identification test is 0.776), and the F-statistic for the joint significance of the two IVs in the first stage is 10.91, above the cut-off value of 10 suggested by Staiger and Stock (1997). These findings indicate that we do not have weak IVs. The test for exogeneity in the 2SLS regression indicates that the interaction variable is endogenous.

After accounting for the endogeneity of the interaction term, the 2SLS regression reverses our main finding in the LPM regression. The estimated coefficient of the interaction variable is now significantly negative. The magnitude of the effect of IDB presence on CEO turnover-performance sensitivity is quite large. Since the second stage regression is LPM, the marginal effect of the interaction variable simply equals its coefficient estimate. So a decrease in the market-adjusted stock return of 5% per year or 0.02% (= 5/250) per day results in an increase of 0.059 (= 0.02 x 2.948) in the probability of CEO turnover in IDB presence relative to IDB absence. Relative to the unconditional probability of CEO turnover of 0.1239 in our sample (see Appendix 3), this represents an increase of about 47.6%. The signs and statistical significance of the remaining coefficient estimates are similar to the LPM and probit models.

Finally, the results of the IV-probit model are similar to the 2SLS results. The estimated coefficient of the interaction variable is significantly negative. The Wald test for exogeneity for the IV-probit regression also indicates that the interaction variable is endogenous. Here a decrease in market-adjusted stock return of 0.02% per day from its mean value of -0.0142% (see Appendix 3) results in an increase of 0.0471 in the probability of CEO turnover in IDB presence relative to IDB absence.[22] Relative to the unconditional probability of CEO turnover of 0.1239 in our sample (see Appendix 3), this represents an increase of about 38%. Thus, after accounting for the endogeneity of IDB presence, the presence of an IDB substantially increases the CEO turnover-performance sensitivity. This finding strongly supports the IDB monitoring hypothesis.

8. IDB Presence and Firm Valuation

This section examines the relation between firm valuation, as measured by Tobin's q, and the presence of an IB on the board or compensation committee (i.e., IDB or IDB_CC). We measure Tobin's q as (the book value of total assets plus the market value of equity minus the book values of equity) divided by the book value of total assets. Chung and Pruitt (1994) find that this simple measure of q explains more than 95% of the variation in more complicated q measures. As an additional measure of firm performance, we use industry-adjusted Tobin's q, which equals q minus the median q for the firm's Fama-French (1997) 48 industry.

Panel A of Table 3 shows that while the mean Tobin's q is insignificantly different in IDB and non-IDB firm-years, the median q is lower in IDB firms. But both the mean and median values of the industry-adjusted q are significantly higher in IDB firm-years. In untabulated results, both mean and median values of industry-adjusted or unadjusted q are significantly higher in IDB_CC firm-years than in non- IDB_CC firm-years. While these univariate results are generally consistent with the IDB monitoring hypothesis, they do not control for other determinants of Tobin's q and do not account for the endogeneity of IDB presence, a task we turn to next.

Panel A of Table 8 shows estimates of regressions of q and industry-adjusted q on either IDB or IDB_CC and other covariates. We use contemporaneous and lagged market-adjusted stock return and contemporaneous standard deviation of stock return to control for stock performance and volatility. Following Yermack (1996), we also control for contemporaneous and lagged industry-adjusted ROA,

[22] Since the main equation here is a probit model, we compute this change in p, the probability of CEO turnover, as [p(IDB = 1, r = -0.0342) - p(IDB = 1, r = -0.0142)] - [p(IDB = 0, r = -0.0342) - p(IDB = 0, r = -0.0142)], where r is the market-adjusted stock return and other variables take their sample mean values.

firm size (measured by log of market capitalization), CEO ownership, the proportion of independent directors, and board size. Since Tobin's q also reflects growth opportunities, we control for R&D to sales, advertising expenses to sales, and sales growth rate. We control for anti-shareholder rights by Gompers, Ishii and Metrick's (2003) G-index. In addition, regressions of q include year dummies and Fama-French 12 industry dummies, and the regressions of industry-adjusted Tobin's q include year dummies.

Using OLS, we find that IDB is significantly and positively related to Tobin's q. The adjusted-R^2 of the regression is 0.463. Coefficient estimates of the other explanatory variables (not reported in the table to save space) are generally consistent with prior studies; except for G-index, all are highly significant. The proportion of independent directors is negatively related to q, consistent with the findings of Yermack (1996) and Agrawal and Knoeber (1996). Board size is also negatively related to Tobin's q, a finding consistent with Yermack (1996). The remaining significant explanatory variables are positively related to q, consistent with the findings of recent studies (e.g., Coles, Daniel and Naveen (2007)). The results are quite similar for the OLS regression of industry-adjusted q. Both OLS regressions suggest that after controlling for its other determinants, q is about 0.20 higher in firms with an IDB than in firms without an IDB. The results are quite similar for OLS regressions where we replace IDB by IDB_CC.

To account for the potential endogeneity of IDB or IDB_CC presence in a firm, we estimate 2SLS regressions using IDB state-density and IDB industry-density as instruments. In all of the 2SLS regressions, we find that the over-identifying restriction holds, and the F-statistics for the joint significance of the IVs in the first-stage regressions are quite large; both results indicate that the IVs are not weak. But the test for exogeneity is insignificant in three out of the four 2SLS regressions, suggesting that IDB is not endogenous. This implies that OLS estimates are preferable to 2SLS, as the former estimates are unbiased and more efficient. The test for exogeneity in the regression of industry-adjusted q on IDB_CC is significant. In all four regressions, the 2SLS results are qualitatively similar to the OLS regressions, except that the coefficient estimate of IDB or IDB_CC is much higher in the 2SLS regressions.

We next employ Heckman's treatment effect model to account for a possible selection bias. The identification of this model is mainly derived from the exclusion criteria, especially from the two IVs: IDB state-density and IDB industry-density. Using the two-stage treatment effect model, we find that all of the estimated coefficients on the inverse Mills ratio (Lambda) are negative, and are significant at the 1% level. This result indicates that self-selection is important here. That is, characteristics that cause an IDB to be present in a firm-year are negatively related to firm value. The coefficients of both IDB and IDB_CC are highly significant and positive. This is similar to the OLS results, except that the coefficients

are substantially larger. The sign and significance of the coefficients of IDB, IDB_CC and Lambda strongly suggest that IDBs play an important monitoring role. We also use joint estimation of the main and selection equation using MLE and get similar results.

We also measure ATTs of both IDB and IDB_CC for industry-adjusted and unadjusted Tobin's q. As discussed in Section 5.2, models (2) and (7) in Table 4 perform well in estimating propensity scores that ensure random assignment based on observables. We use the same set of variables for estimating ATTs using both covariate and propensity score matching methods. Panel B of Table 8 shows that in almost all the cases, the estimated ATTs are significantly positive, suggesting that the presence of an IDB increases firm valuation. The estimated ATTs are quite similar across the four matching methods. For IDBs, the ATT ranges between 0.053 and 0.08 for unadjusted q, and between 0.072 and 0.078 for adjusted q. Compared to IDB presence, the ATTs are substantially larger when an IDB sits on the compensation committee.

In other words, these results suggest that the presence of an IB on the board or the compensation committee leads to higher firm valuation. This finding is consistent with the IDB monitoring hypothesis, i.e., IDB monitoring adds value to a firm and on the net, IDB presence benefits all shareholders. A larger magnitude of Tobin's q when the IDB sits on the compensation committee suggests that part of the value added by an IDB comes from arms-length bargaining in setting CEO compensation contracts.

9. Robustness Checks

In this section, we examine whether our results on the level and composition of CEO pay and on firm valuation are sensitive to several alternate definitions of our main explanatory variable, IDB; changes in disclosure rules on executive pay; the adoption of Sarbanes-Oxley Act; and an alternate method of computing industry-adjusted Tobin's q. We take advantage of the fact that the OLS results in Tables 5 and 8 and the Tobit results in Panel B.1 of Table 6 are qualitatively similar to the results from more sophisticated and involved methodologies. So for the purpose of these robustness checks, we use OLS regressions of CEO pay level and Tobin's q, and Tobit regressions of the percentage of a CEO's option and equity-based compensation. In addition, we examine whether the effects of IDB presence persist after controlling for the presence of an outside blockholder or a majority independent board. Finally, we examine changes in the level and composition of CEO pay and in Tobin's q when a firm switches from IDB = 0 to 1, or from 1 to 0.

9.1 IDB defined by dollar holdings

In the analysis so far, we have defined an IDB as an independent director who owns 1% of a firm's outstanding equity. Consider two firms, A and B, which have market caps of $10 billion and $100 million, respectively. Then an IDB owns an equity stake of at least $100 million in firm A, but only $1 million in firm B. These substantial differences in an IDB's dollar stakes can have different incentive effects. So we next consider an alternate definition of an IDB based on dollar, rather than percentage, holdings. We define IDB$15m as an independent director who owns an equity stake of at least $15 million in constant 2000 dollars, which represents about 1% of the median market cap of the firm-years in our sample (see Appendix 3).[23] About 14.9% of the firm-years in the sample have an IDB by this definition. We then estimate OLS regressions of CEO pay level (Log total compensation and Log cash compensation) corresponding to columns 1 and 5 in Panel A of Table 5, Tobit regressions of CEO pay composition (option compensation ratio and equity compensation ratio) similar to columns 1 and 3 in Panel B.1 of Table 6, and OLS regressions of Tobin's q and industry-adjusted Tobin's q similar to columns 1 and 5 in Panel A of Table 8, after replacing the IDB variable by IDB$15m. Column 1 of Panel A in Table 9 shows these results. The results are quite similar to our baseline results in Tables 5, 6 and 8. After controlling for other factors, IDB presence results in the CEO having lower total pay, cash pay, and proportion of pay via options, and the firm having substantially higher Tobin's q (unadjusted or industry-adjusted).

9.2 IDB defined by percentage holdings based on firm size

We next consider another alternate definition of an IDB to account for differences in firm size. We define a binary variable IDB%Variable that equals one if a firm-year has an independent director who owns at least 1% (3%) [5%] of the outstanding equity and the firm is in the top (middle) [bottom] tercile of all the firm-years in the sample, based on market capitalization in constant 2000 dollars; it equals zero otherwise. About 9.9% of the firm-years in the sample have an IDB by this definition. Column 2 in Panel A of Table 9 shows that the results generally mirror those described in section 9.1 above.

9.3 Changes in disclosure rules on executive pay

There was a major change in SEC disclosure rules on executive compensation for fiscal years ending after December 2005, which has changed the format and content of executive compensation reporting in proxy statements. In response to these changes, Execucomp changed the definition of its total compensation

[23] The results are similar using IDB$20m, defined using an equity stake of $20 million.

(TDC1) variable starting in fiscal 2006. For example, Execucomp replaced its Black-Scholes valuation of option grants by company-reported option values under FAS 123R. These changes have shifted the reported levels of compensation somewhat. To examine whether these changes in compensation reporting affect our results, we re-estimate our baseline results on the level and composition of CEO pay in Tables 5 and 6 after omitting the 2006 fiscal year. The results, reported in the last column of Panel A in Table 9, are essentially unchanged.

9.4 Adoption of the Sarbanes-Oxley Act

The adoption of Sarbanes-Oxley Act in 2002 and concurrent changes in listing requirements of NYSE, AMEX and Nasdaq have changed the structure of many corporate boards. The literature (e.g., Chhaochharia and Grinstein (2009)) has also documented a structural break in CEO compensation around that time. So we next examine whether IDBs are as important post-SOX as they were before it. We estimate regressions similar to those in section 9.1 above, except that we replace IDB and year dummy variables by IDB*Pre-SOX and IDB*Post-SOX. Pre-SOX (Post-SOX) is a binary variable that equals one for an observation from fiscal years 1998-2002 (2003-2006); it equals zero otherwise. Panel B of Table 9 shows the coefficient estimates and p-values of IDB*Pre-SOX and IDB*Post-SOX from these regressions, followed by the p-value of the F-test for the equality of the two coefficients. The results are quite interesting. First, after controlling for other determinants, CEOs' total compensation is substantially and significantly lower in the presence of IDBs both pre- and post-SOX, and there is no significant difference in the magnitude of this effect between the two periods. Second, pre-SOX, the proportion of CEO pay via options is about 3.7% higher in the presence of an IDB; post-SOX, this proportion is about 12.5% lower with IDB presence. The difference is statistically significant. A similar pattern holds with the proportion of equity-based pay. Third, Tobin's q (both unadjusted and industry-adjusted) is significantly higher in the presence of an IDB both pre- and post-SOX. The magnitude of this effect is significantly lower post-SOX for industry-adjusted q. All these results support the IDB monitoring hypothesis. The second result supports the IDB monitoring-complements hypothesis pre-SOX and IDB monitoring-substitutes hypothesis post-SOX. Pre-SOX, IDB monitoring appears to complement CEO incentives. With the tightening of governance rules under SOX, IDB monitoring appears to have become a substitute for CEO equity incentives.

9.5 Alternate method of computing industry-adjusted Tobin's q

In section 8 and Table 8, we compute industry-adjusted Tobin's q as Tobin's q of a firm-year minus the median Tobin's q of the firm's Fama-French 48 industry among all firms on Compustat in that year.

Since firms in our sample (S&P 1500) are generally larger than firms on Compustat, the median Tobin's q of firms in an industry on Compustat may differ from Tobin's q of the median firm in the industry within our sample. To account for this possibility, we recompute industry-adjusted Tobin's q using the median q in each industry for each year within the set of S&P 1500 firms. We then reestimate the regressions in the last four columns of Panel A of Table 8. The results are essentially unchanged.

9.6 Controlling for outside blockholder presence

We next examine whether our results on IDB presence hold after controlling for the presence of an outside blockholder in the firm. There is no disclosure requirement for 1% blockholdings for non-directors and reliable data on 5% blockholdings, reported in corporate proxy statements, is not available in machine-readable form. But Dlugosz, et al. (2006) have compiled and cleaned the data on 5% blockholdings for S&P 1500 firms for annual meeting dates during 1996-2001. We use their database to obtain data on the presence of an outside blockholder (OBH) for the subset of our sample that overlaps with their database.[24] After matching annual meeting dates with fiscal years, we have data on OBH presence for 4,743 firm-years in our sample during 1998-2002.[25] We estimate two sets of regressions for this sub-sample. First, we estimate regressions similar to those in Tables 5 through 8 to examine whether our main results hold for this sub-sample. Second, we add a binary variable for OBH presence (or OBH*Market-adjusted stock return in Table 7) as an explanatory variable in the regressions.

Our results on the level of CEO pay, CEO turnover-performance sensitivity and firm valuation for this sub-sample are quite similar to the results for our full sample reported in Panel A of Tables 5 and 8, and in Table 7. When we add the OBH (or OBH*Market-adjusted stock return in Table 7) variable to these regressions, the coefficient of the added variable is statistically insignificant in all cases, except in regressions of log total compensation (Table 5), where it is significantly positive in OLS and both treatment effects models. Importantly, the addition of the OBH variable leaves the signs, significance and magnitudes of the IDB (or IDB*Market-adjusted stock return in Table 7) variable essentially unchanged. In regressions similar to Panel B.1 of Table 6 (option or equity compensation ratio), the coefficient of IDB is statistically insignificant for this sub-sample. The addition of the OBH variable does not change this result; the coefficient of OBH is significantly positive in the Tobit model of option compensation ratio and significantly negative (positive) in the ML Tobit model of option (equity) compensation ratio.

[24] We are grateful to Andrew Metrick for sharing this database.

[25] This sample includes 76 firms for the 2002 fiscal year whose annual meeting took place in 2001.

9.7 Controlling for majority independent board

We next examine whether our main result in Table 7, that CEO turnover-performance sensitivity is greater in the presence of an IDB, holds after controlling for the existence of a majority independent board. To the regressions in Table 7, we add an interaction term, MIB*Market-adjusted stock return, where MIB is a binary variable that equals one for a majority independent board and equals zero otherwise. The coefficient of this interaction term is insignificant in all four models. The sign, significance and magnitude of our IDB*Market-adjusted stock return variable is essentially unchanged.

9.8 Switches to and from IDB presence

Our sample of 11,547 firm-years over 1998-2006 contains 247 firm-years that switched from having no IDB to having an IDB (0 → 1 switch), and 334 firm-years that experienced an opposite (1 → 0) switch. We take advantage of these switches to examine whether the level and composition of CEO pay and Tobin's q change in the year of the switch in a manner consistent with our main results. In untabulated results, we find that the CEO's median total pay reduces by 1% in the year of a 0 → 1 switch, while it increases by about 8% in the year of an opposite switch. The former change is statistically insignificant, but the latter is highly significant. The difference between the two changes is significant at the 5% level based on the Mann-Whitney U-test. The mean percentage of option compensation reduces by a statistically significant 4.7% in the year of a 0 → 1 switch, and by an insignificant 1.7% in the year of the opposite switch, although the difference between the two changes is insignificant. Finally, the mean industry-adjusted Tobin's q reduces by a statistically insignificant 0.035 in the year of a 0 → 1 switch, while it reduces by a highly significant -0.204 in the year of an opposite switch. The difference between the two changes has a p-value of 0.06. These results are generally consistent with the substitute version of the IDB monitoring hypothesis and add to our evidence that IDB presence leads to lower CEO pay, lower equity incentives for the CEO and higher firm valuation.

10. Summary and Conclusions

While numerous studies examine the relation between board independence or outside blockholdings on CEO compensation, turnover or firm valuation, no prior study has examined these issues in the presence of an independent director who is a blockholder (i.e., an IDB). An IDB has strong incentives and the ability to monitor the CEO. But whether the IDB uses his position to pursue the interests of all shareholders or to extract private benefits from the firm is an empirical question. Moreover, the presence of an IDB is likely endogenous, as blockholders decide which firm to invest in and whether to try to

obtain a board seat. Therefore, to answer questions like whether the presence of an IDB influence CEO compensation, turnover, or firm performance requires analytical frameworks that account for endogeneity of an IDB's presence in a firm. In this paper, we address these questions using a variety of methods that account for different sources of endogeneity.

We find that IDBs are more prevalent in smaller firms and firms that have higher growth rates, worse prior performance, less powerful CEOs, bigger and more independent boards, more shareholder rights, and lower institutional ownership. These findings indicate that an IDB's presence in a firm is not a random occurrence. After controlling for CEO characteristics, other governance mechanisms and relevant firm attributes, we find that CEOs of firms with IDBs have: (1) lower levels of cash and total compensation, and (2) lower proportions of pay via stock and options. These results are robust across several methodologies that account for the potential endogeneity of IDB presence. While CEO turnover-performance sensitivity is unrelated to the presence of an IDB in OLS and probit regressions, this relation is significantly positive after accounting for endogeneity. Finally, firms with an IDB have higher valuation, as measured by Tobin's q. The magnitudes of these effects are substantial, and are generally stronger when an IDB serves on the board's compensation committee. Our results on the level and structure of CEO pay and on firm valuation are robust to several alternative definitions of IDB presence in a firm, changes in disclosure rules on executive pay, the adoption of Sarbanes-Oxley Act, and an alternate method of computing industry-adjusted Tobin's q. Our results are also generally robust to controlling for the presence of an outside blockholder or a majority independent board. Finally, an analysis of firms that switched to or from having IDB presence further lends credence to these results. Our findings suggest that the presence of an independent blockholder on the board promotes better incentives and monitoring of the CEO, and consequently leads to higher firm valuation.

Finally, our findings inform the current policy debate on director elections (see, e.g., Bebchuk (2007) and Virginia Law Review (2007); see Cai, Garner, and Walkling (2009) for related empirical work). The SEC recently proposed proxy access rules that would allow holders of 1% of a large company's shares for one year to place a director-nominee on the corporate proxy statement (see McCracken and Scannell (2009) and SEC (2009)). Our findings that the presence of an independent blockholder on the board is beneficial for shareholders imply that this rule can improve corporate governance. Finally, the newly proposed rules omit the requirement in the 2003 rule proposal that the shareholder nominee be independent of the nominating shareholder. Our findings support the SEC's decision to omit this requirement from the newly proposed rules.

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Table 1: Hypotheses and predictions

Hypothesis	Relation between IDB monitoring and			
	CEO pay level	% of CEO's equity-based pay	CEO turnover-performance sensitivity	Firm valuation
1. CEO power hypothesis	Unrelated	Unrelated	Unrelated	Unrelated
2. IDB monitoring hypotheses:	Lower		Higher	Higher
2A. IDB monitoring-complements hypothesis		Higher		
2B. IDB monitoring-substitutes hypothesis		Lower		
3. IDB private benefits hypothesis	Higher	-	Lower	Lower

Table 2: Sample construction

This table shows the steps in obtaining the base sample for our analysis from S&P 1500 firms for the period 1998-2006.

Number of firm-year in the sample *Reason for dropping firm-years from the sample*	Number of firm-years dropped	Number of firm-years remaining
Firm-years available in RM Directors during calendar years 1997-2006		15,967
Firm-years missing in CRSP	0	
		15,967
Firm-years missing in Compustat	490	
		15,477
After conversion to fiscal year, number of firms-years that belongs to fiscal year 2007	83	
		15,394
Firm-years missing in ExecuComp	1,465	
		13,929
Exclude dual-class firms based on RM Governance	1,158	
Exclude additional dual-class firms based on CRSP data	65	
		12,706
Exclude fiscal year 1997	1,159	
Number of firm-years in the final sample		11,547

Table 3: Univariate tests and correlations

Panel A (B) shows univariate comparisons of mean and median values of dependent (independent) variables, followed by t-statistics for differences in means and z-statistics of the Wilcoxon test for differences in distributions, between non-IDB and IDB firms. Statistical significance at the 1%, 5%, and 10% levels in two-tailed tests is indicated by ***, **, and *, respectively. The last four columns report the Pearson product-moment correlation and Spearman rank correlation, and their p-values in two-tailed tests, between IDB and each variable. The sample consists of non-dual class S&P 1500 firms during the period 1998-2006 with relevant non-missing data. Option compensation is the Black-Scholes value of stock options granted to the executive during the year. Equity based compensation is option compensation plus the value of restricted stock granted during the year. All CEO compensation data are obtained from ExecuComp, converted to constant 2000 dollars and expressed in thousands. CEO turnover is a dummy variable that equals 1, if the CEO in year *t* differs from the CEO in year *t*-1; 0 otherwise. Net G-index is G-index minus classified board. IDB state-density is computed as the average value of the IDB dummy for all public companies headquartered in a state in fiscal year *t*-1. IDB industry-density is computed as the average value of the IDB dummy for each of the 48 Fama and French (1997) industries in fiscal year *t*-1. All other variables are defined in Appendix 3, which also indicates the variables winsorized at the top and bottom 0.5% of the sample.

	Non-IDB firm-years				IDB firm-years				t-test	z-value	Pearson's correlation		Spearman's correlation	
	N	Mean	S.D.	Median	N	Mean	S.D.	Median			ρ	p-value	ρ	p-value
Panel A: Dependent variables														
Total compensation (in $000)	9,757	5,893	23,977	2,884	1,790	3,899	11,144	1,808	3.451 ***	15.151 ***	-0.032	0.001	-0.141	0.000
Cash compensation (in $000)	9,757	1,492	1,774	1,009	1,790	1,083	962	803	9.485 ***	11.507 ***	-0.088	0.000	-0.107	0.000
Option compensation (in $000)	9,757	2,675	10,778	689	1,790	1,880	9,996	349	2.900 **	8.738 ***	-0.027	0.004	-0.081	0.000
Equity based compensation (in $000)	9,757	3,311	13,229	989	1,790	2,322	10,389	562	2.997 ***	8.950 ***	-0.028	0.003	-0.083	0.000
Salary compensation ratio	9,749	0.282	0.229	0.213	1,789	0.353	0.251	0.293	-11.843 ***	-12.732 ***	0.110	0.000	0.119	0.000
Cash compensation ratio	9,749	0.455	0.277	0.401	1,789	0.530	0.288	0.498	-10.376 ***	-10.411 ***	0.096	0.000	0.097	0.000
Option compensation ratio	9,749	0.330	0.298	0.306	1,789	0.295	0.289	0.253	4.700 ***	4.582 ***	-0.044	0.000	-0.043	0.000
Equity compensation ratio	9,749	0.401	0.306	0.431	1,789	0.362	0.302	0.365	4.978 ***	4.978 ***	-0.046	0.000	-0.046	0.000
CEO turnover (1/0)	9,754	0.121			1,790	0.122			-0.143		0.001	0.886		
Tobin's q_t	9,743	1.961	1.435	1.473	1,790	1.951	1.490	1.429	0.264	2.449 **	-0.003	0.792	-0.023	0.014
Industry adjusted Tobin's q_t	9,743	0.421	1.294	0.056	1,790	0.486	1.343	0.089	-1.940 *	-3.466 ***	0.018	0.053	0.032	0.000
Panel B: Independent variables														
Firm age	9,757	29.037	20.262	23	1,790	24.753	17.251	19	8.404 ***	7.422 ***	-0.078	0.000	-0.069	0.000
Market cap$_{t-1}$ (in $000,000)	9,743	7,858	21,318	1,750	1,790	4,089	11,882	1,034	7.274 ***	13.642 ***	-0.068	0.000	-0.127	0.000
Total assets$_{t-1}$ (in $000,000)	9,755	12,205	43,812	1,779	1,790	6,266	24,054	1,087	5.583 ***	11.009 ***	-0.052	0.000	-0.103	0.000
Sales$_{t-1}$ (in $000,000)	9,754	4,833	9,923	1,401	1,788	2,661	6,318	724	8.931 ***	15.907 ***	-0.083	0.000	-0.148	0.000
CEO stock ownership %	9,377	2.157	5.665	0.283	1,711	2.662	5.961	0.551	-3.362 ***	-10.615 ***	0.032	0.001	0.101	0.000
Tenure as CEO	9,396	7.506	7.058	5	1,673	7.741	7.230	6	-1.253	-0.719	0.012	0.210	0.007	0.472
CEO's board tenure	9,732	9.756	8.684	7	1,786	10.274	8.649	8	-2.317 **	-2.598 ***	0.022	0.021	0.024	0.009
Max (CEO's board tenure, tenure as CEO)	9,755	10.337	8.632	8	1,788	10.796	8.539	9	-2.072 **	-2.476 **	0.019	0.038	0.023	0.013

Table 3 (cont.)

	Non-IDB firm-years				IDB firm-years				t-test	z-value	Pearson's correlation		Spearman's correlation	
	N	Mean	S.D.	Median	N	Mean	S.D.	Median			ρ	p-value	ρ	p-value
Panel B (cont.): Independent variables														
Board size	9,757	9.412	2.804	9	1,790	9.725	3.156	9	-4.253 ***	-2.870 ***	0.040	0.000	0.027	0.004
Fraction of independent directors	9,757	0.674	0.170	0.700	1,790	0.656	0.162	0.670	4.059 ***	5.269 ***	-0.038	0.000	-0.049	0.000
CEO co-option	9,643	0.387	0.322	0.333	1,763	0.387	0.333	0.333	-0.005	0.484	0.000	0.996	-0.005	0.628
Outside CEO-directors	9,757	0.147	0.136	0.125	1,790	0.131	0.124	0.111	4.779 ***	4.222 ***	-0.044	0.000	-0.039	0.000
CEO is chairman (1/0)	9,757	0.649			1,790	0.566			6.696 ***		-0.062	0.000		
CEO is the only insider (1/0)	9,532	0.492			1,735	0.451			3.146 ***		-0.030	0.002		
CEO on nominating committee (1/0)	9,680	0.279			1,773	0.395			-9.837 ***		0.092	0.000		
Classified board (1/0)	9,189	0.624			1,586	0.592			2.437 **		-0.024	0.015		
G-index	9,189	9.464	2.589	9	1,586	8.973	2.748	9	6.910 ***	6.982 ***	-0.066	0.000	-0.067	0.000
Net G-index	9,189	8.840	2.392	9	1,586	8.381	2.518	8	6.998 ***	6.923 ***	-0.067	0.000	-0.067	0.000
E-index	9,189	2.347	1.122	2	1,586	2.175	1.322	2	4.982 ***	5.159 ***	-0.048	0.000	-0.050	0.000
Net E-index	9,189	1.722	1.023	2	1,586	1.583	1.083	2	4.964 ***	5.017 ***	-0.067	0.000	-0.067	0.000
Sales growth %	9,749	12.159	15.932	9.489	1,789	15.553	19.761	11.220	-7.956 ***	-5.962 ***	0.074	0.000	0.056	0.000
Market adjusted stock return$_{t-1}$ %	9,619	-0.014	0.177	-0.024	1,766	-0.015	0.176	-0.022	0.097	-0.357	-0.001	0.921	0.003	0.721
Standard deviation of stock retun$_{t-1}$ %	9,619	2.761	1.339	2.437	1,766	2.814	1.321	2.514	-1.524	-2.200 **	0.014	0.128	0.021	0.028
Total institutional ownership$_{t-1}$	9,757	59.820	26.543	65.185	1,790	53.610	25.220	57.264	9.168 ***	11.361 ***	-0.085	0.000	-0.106	0.000
Tobin's q_{t-1}	9,740	2.070	1.655	1.505	1,790	2.040	1.716	1.453	0.697	2.869 ***	-0.007	0.486	-0.027	0.004
Industry adjusted ROA$_{t-1}$	9,755	0.047	0.113	0.028	1,790	0.035	0.110	0.022	3.944 ***	2.707 ***	-0.037	0.000	-0.025	0.007
Industry adjusted OPS$_{t-1}$	9,644	0.084	0.602	0.052	1,750	-0.275	9.031	0.049	3.856 ***	2.101 **	-0.036	0.000	-0.020	0.036
Cash holding$_{t-1}$	9,754	0.135	0.168	0.059	1,790	0.114	0.161	0.043	4.807 ***	6.694 ***	-0.045	0.000	-0.062	0.000
Cash flow$_{t-1}$	9,754	0.109	0.172	0.105	1,788	0.105	0.190	0.108	0.941	-0.023	-0.009	0.347	0.000	0.982
R&D to sales$_{t-1}$	9,754	0.043	0.110	0	1,788	0.036	0.107	0	2.815 ***	4.721 ***	-0.026	0.005	-0.045	0.000
Advertising expenses to sales$_{t-1}$	9,754	0.009	0.021	0	1,788	0.010	0.026	0	-1.830 *	1.215	0.017	0.067	-0.011	0.225
Capital expenditure to total assets$_{t-1}$	9,754	0.075	0.117	0.041	1,788	0.078	0.142	0.038	-1.024	4.138 ***	0.010	0.306	-0.039	0.000
Dividend yield %	9,743	1.260	1.692	0.520	1.790	1.138	1.540	0.525	2.849 ***	2.163 **	-0.027	0.004	-0.020	0.031
IDB state-density$_{t-1}$	9,756	0.151	0.072	0.146	1,786	0.193	0.123	0.171	-19.797 ***	-16.311 ***	0.181	0.000	0.152	0.000
IDB industry-density$_{t-1}$	9,755	0.151	0.085	0.143	1,790	0.199	0.100	0.188	-21.245 ***	-20.197 ***	0.194	0.000	0.188	0.000

Table 4: Determinants of IDB

The table shows estimates of the linear probability model and probit regressions of IDB (Models 1-6) and probit regression of IDB_CC (Model 7). The sample consists of non-dual class S&P 1500 firms during the period 1998-2006 with non-missing data. IDB is a binary variable that equals one if there is at least one IDB in a given firm-year; it equals zero otherwise. IDB_CC is a binary variable that equals one if there is at least one IDB who sits on the board's compensation committee in a given firm-year (if the firm has no compensation committee, the entire board serves as the compensation committee); zero otherwise. IDB state-density is computed as the average value of the IDB dummy for all public companies headquartered in a state in fiscal year *t*-1. IDB industry-density is computed as the average value of the IDB dummy for each of the 48 Fama and French (1997) industries in fiscal year *t*-1. All other variables are defined in Appendix 3. To reduce the influence of outliers, some variables, indicated in Appendix 3, are winsorized at the top and bottom 0.5% of the sample. The regressions include year dummies and Fama-French 12 industry dummies. P-values of the regression coefficients and marginal effects are computed using robust standard errors clustered at the CEO-firm level.

	IDB												IDB_CC	
	OLS (1)		Probit (2)		Probit (3)		Probit (4)		Probit (5)		Probit (6)		Probit (7)	
	Coeff.	p-value	*dy/dx*	p-value	*dy/dx*	p-value	*dy/dx*	p-value	*dy/dx*	p-value	*dy/dx*	p-value	*dy/dx*	p-value
Log CEO stock ownership	0.0080	0.079	0.0065	0.121	0.0048	0.188	0.0058	0.108	0.0047	0.214			0.0045	0.129
Max (CEO's board tenure, tenure as CEO)	-0.0008	0.376	-0.0006	0.440									-0.0001	0.799
CEO is chairman (1/0)	-0.0261	0.042	-0.0221	0.067	-0.0234	0.049	-0.0263	0.027	-0.0262	0.034			-0.0160	0.077
CEO on nominating committee (1/0)	0.0221	0.124	0.0169	0.195	0.0165	0.205	0.0189	0.149	0.0190	0.162			0.0253	0.011
Ratio of other firms' CEO on the board	-0.0952	0.016	-0.0897	0.024	-0.0860	0.031	-0.0848	0.033	-0.0780	0.060			-0.0633	0.042
Fraction of independent directors	0.1235	0.001	0.0950	0.007	0.0987	0.005	0.0882	0.010	0.0969	0.007			-0.0005	0.986
Board size	0.0153	0.000	0.0136	0.000	0.0135	0.000	0.0130	0.000	0.0154	0.000			0.0032	0.104
Classified board (1/0)	-0.0219	0.099	-0.0193	0.134	-0.0198	0.123	-0.0278	0.028	-0.0224	0.094			-0.0150	0.116
Net E-index	-0.0158	0.022	-0.0141	0.030	-0.0140	0.031			-0.0144	0.033			-0.0126	0.008
Firm age	0.0003	0.380	0.0002	0.578									0.0004	0.162
Log sales$_{t-1}$	-0.0491	0.000	-0.0476	0.000	-0.0468	0.000	-0.0453	0.000	-0.0526	0.000			-0.0244	0.000
Cash holding$_{t-1}$	-0.1449	0.002	-0.1529	0.002	-0.1524	0.001	-0.1385	0.003	-0.1938	0.000			-0.0480	0.211
Industry-adjusted OPS$_{t-1}$	-0.0030	0.000	-0.0056	0.063	-0.0056	0.066	-0.0055	0.066	-0.0092	0.098			0.0004	0.282
Dividend yield$_{t-1}$ %	-0.0089	0.035	-0.0094	0.030	-0.0088	0.046	-0.0089	0.043	-0.0093	0.042			-0.0053	0.125
R&D to sales$_{t-1}$	-0.0901	0.078	-0.1193	0.041	-0.1152	0.046	-0.1117	0.054	-0.1636	0.009			-0.0665	0.131
Tobin's q_{t-1}	-0.0004	0.929	0.0007	0.866									0.0032	0.300
Sales growth	0.0014	0.000	0.0013	0.000	0.0012	0.000	0.0013	0.000	0.0013	0.000			0.0006	0.029
Market adjusted stock return$_{t-1}$ %	-0.0060	0.758	-0.0097	0.613									-0.0129	0.368
Standard deviation of stock return$_{t-1}$ %	-0.0127	0.022	-0.0115	0.037	-0.0117	0.037	-0.0123	0.028	-0.0135	0.020			-0.0134	0.001
Total institutional ownership$_{t-1}$ %	-0.0008	0.000	-0.0007	0.002	-0.0007	0.001	-0.0007	0.001	-0.0008	0.000			-0.0003	0.030
IDB state-density	0.6535	0.000	0.5366	0.000	0.5383	0.000	0.5367	0.000			0.6194	0.000	0.2108	0.000
IDB industry-density	0.5609	0.000	0.4418	0.000	0.4452	0.000	0.4483	0.000			0.5503	0.000	0.2362	0.000
N	10,057		10,057		10,063		10,063		10,066		11,540		10,057	
Adjusted or pseudo R-squared	0.1117		0.1347		0.1343		0.1324		0.0926		0.0707		0.1038	

Table 5: CEO's total and cash compensation level

Panel A shows estimates of OLS, 2SLS instrumental variable, Heckman 2-stage treatment effect, and MLE treatment effect regressions of log total compensation or log cash compensation. The sample consists of non-dual class S&P 1500 firms during the period 1998-2006 with relevant non-missing data. The covariates in the OLS regression are: IDB or IDB_CC, CEO age, Log CEO stock ownership, Max (CEO's board tenure, tenure as CEO), CEO is chairman, CEO co-option, Outside CEO-directors, CEO is the only insider, CEO on nominating committee, Fraction of independent directors, Board size, G-index, Total assets$_{t-1}$, Industry-adjusted ROA$_{t-1}$, Market adjusted stock return$_{t-1}$, Standard deviation of stock return$_{t-1}$, Tobin's q$_{t-1}$, R&D to sales $_{t-1}$, Sales growth, Total institutional holdings$_t$, year dummies, and Fama-French 12 industry dummies. IDB is a binary variable that equals one if there is at least one IDB in a given firm-year; it equals zero otherwise. IDB_CC is a dummy variable that equals one if there is at least one IDB who sits on the board's compensation committee in a given firm-year (if the firm has no compensation committee, the entire board serves on the compensation committee); zero otherwise. All other variables are defined in Appendix 3. To reduce the influence of outliers, some variables, indicated in Appendix 3, are winsorized at the top and bottom 0.5% of the sample. We use robust standard errors clustered at the CEO-firm level. The second stage of the 2SLS instrumental variable estimation uses the same covariates as the OLS, but instruments IDB (or IDB_CC) by lagged IDB state-density and lagged IDB industry-density. Lagged IDB state-density is computed as the average value of the IDB dummy for all public companies headquartered in a state in fiscal year *t*-1. Lagged IDB industry-density is computed as the average value of the IDB dummy for each of the 48 Fama and French (1997) industries in fiscal year *t*-1. The table reports the p-value of Wooldridge's (1995) over-identification test, the p-value of Durbin-Wu-Hausman test for exogeniety, and the F-test for the IVs of the first stage estimation; standard errors are clustered at the CEO-firm level. The second stage of Heckman's 2-stage treatment effect model uses the same covariates as the OLS and the inverse Mill's ratio (Lambda). Lambda is computed in the first stage by regressing IDB (IDB_CC) on the variables in Model #2 (#7) in Table 4. Standard errors of the Heckman 2-stage treatment effect model are estimated using 1,000 bootstrap replications. The MLE treatment effect model estimates the main and selection equations simultaneously. The main equation is the same as the OLS and the selection equation is for IDB (IDB_CC) with the variables in Model #2 (#7) in Table 4. The table reports the p-value of Wald test for rho (correlation between first and second stage error terms); standard errors are clustered at the CEO-firm level. Panel B reports the average treatment effect for the treated (i.e., ATT) of log total compensation or log cash compensation on IDB (or IDB_CC) using four different methods. We estimate ATTs based on simple matching and bias-corrected matching using Abadie et al.'s (2004) method for covariate matching (CM), and radius caliper matching and kernel matching using Leuven and Sianesi's (2003) method for propensity score matching (PSM). For CM and PSM, we use all variables in Model #2 (#7) as covariates for estimating the ATT of IDB (IDB_CC); we use the same set of variables for bias-correction in CM. We use a maximum of four nearest neighbors for CM. We impose common support and estimate standard errors using 100 bootstrap replications for PSM. We set the caliper at 0.02 for radius caliper matching. We set the bandwidth at 0.06 and use the Epanechnikov kernel for kernel matching.

Table 5 (cont.)

Panel A: Regression results

	Log total compensation								Log cash compensation							
	OLS		Instrumental variable 2SLS		Treatment effects 2-Stage		Treatment effects MLE		OLS		Instrumental variable 2SLS		Treatment effects 2-Stage		Treatment effects MLE	
	coeff.	p-value	coeff.	p-value	coeff.	p-value	coeff.	p-value	coeff.	p-value	coeff.	p-value	coeff.	p-value	coeff.	p-value
IDB (1/0)	-0.138	0.017	-0.459	0.006	-0.600	0.000	-0.718	0.087	-0.101	0.061	-0.360	0.046	-0.615	0.000	-1.087	0.000
N	9,881		9,878		9,773		9,773		9,881		9,878		9,773		9,773	
Adjusted R-square / [chi-square p-value]	0.4329		0.4235		[0.000]		[0.000]		0.2808		0.2723		[0.000]		[0.000]	
Over-identification test (p-value)			0.4439								0.4130					
Test for exogeneity (p-value)			0.0379								0.1142					
F-statistic for first-stage IVs			86.60								86.60					
Lambda					0.270	0.000							0.301	0.000		
Wald test for rho (p-value)							0.000								0.000	
IDB_CC (1/0)	-0.155	0.002	-0.870	0.009	-1.078	0.000	-1.238	0.000	-0.087	0.086	-0.712	0.052	-0.937	0.000	-1.256	0.000
N	9,881		9,878		9,773		9,773		9,881		9,878		9,773		9,773	
Adjusted R-square / [chi-square p-value]	0.4325		0.4031		[0.000]		[0.000]		0.2801		0.2489		[0.000]		[0.000]	
Over-identification test (p-value)			0.2601								0.6044					
Test for exogeneity (p-value)			0.0250								0.0619					
F-statistic for first-stage IVs			23.03								23.03					
Lambda					0.491	0.000							0.452	0.000		
Wald test for rho (p-value)							0.000								0.000	

Panel B: Matching results on average treatment effect for the treated (ATT)

	Log total compensation								Log cash compensation							
	Simple matching		Biases adjusted matching		Radius caliper matching		Kernel matching		Simple matching		Biases adjusted matching		Caliper matching		Kernel matching	
	coeff.	p-value	coeff.	p-value	coeff.	p-value	coeff.	p-value	coeff.	p-value	coeff.	p-value	coeff.	p-value	coeff.	p-value
IDB (1/0)	-0.282	0.000	-0.116	0.000	-0.114	0.000	-0.126	0.000	-0.218	0.000	-0.117	0.000	-0.093	0.000	-0.099	0.000
IDB_CC (1/0)	-0.299	0.000	-0.136	0.000	-0.167	0.000	-0.195	0.000	-0.227	0.000	-0.117	0.000	-0.123	0.000	-0.138	0.000

Table 6: CEO pay structure

Panel A.1 shows estimates of OLS, 2SLS instrumental variable, Heckman 2-stage treatment effect, and MLE treatment effect regressions of salary compensation ratio or cash compensation ratio. The sample consists of non-dual class S&P 1500 firms during the period 1998-2006 with relevant non-missing data. The covariates in the OLS regression are: IDB or IDB_CC, Standard deviation of stock return$_{t-1}$, Tobin's q$_{t-1}$, R&D to sales$_{t-1}$, Sales growth rate, Fraction of independent directors, Log CEO stock ownership, Total assets$_{t-1}$, Total institutional holdings$_{t}$, year dummies, and Fama-French 12 industry dummies. IDB is a binary variable that equals one if there is at least one IDB in a given firm-year; it equals zero otherwise. IDB_CC is a dummy variable that equals one if there is at least one IDB who sits on the board's compensation committee in a given firm-year (if the firm has no compensation committee, the entire board serves on the compensation committee); zero otherwise. All other variables are defined in Appendix 3. To reduce the influence of outliers, some variables, indicated in Appendix 3, are winsorized at the top and bottom 0.5% of the sample. We use robust standard errors clustered at the CEO-firm level. The second stage of the 2SLS instrumental variable estimation uses the same covariates as the OLS, but instruments IDB (or IDB_CC) by lagged IDB state-density and lagged IDB industry-density. Lagged IDB state-density is computed as the average value of the IDB dummy for all public companies headquartered in a state in fiscal year *t*-1. Lagged IDB industry-density is computed as the average value of the IDB dummy for each of the 48 Fama and French (1997) industries in fiscal year *t*-1. The table reports the p-value of Wooldridge's (1995) over-identification test, the p-value of Durbin-Wu-Hausman test for exogeniety, and the F-test for the IVs of the first stage estimation; standard errors are clustered at the CEO-firm level. The second stage of Heckman's 2-stage treatment effect model uses the same covariates as the OLS and the inverse Mill's ratio (Lambda). Lambda is computed in the first stage by regressing IDB (IDB_CC) on the variables in Model #2 (#7) in Table 4. Standard errors of the Heckman 2-stage treatment effect model are estimated using 1,000 bootstrap replications. The MLE treatment effect model estimates the main and selection equations simultaneously. The main equation is the same as the OLS and the selection equation is for IDB (IDB_CC) with the variables in Model #2 (#7) in Table 4. The table reports the p-value of Wald test for rho (correlation between first and second stage error terms); standard errors are clustered at the CEO-firm level. Panel A.2 reports the average treatment effect for the treated (i.e., ATT) of salary compensation ratio or cash compensation ratio on IDB (or IDB_CC) using four different methods. We estimate ATTs based on simple matching and bias-corrected matching using Abadie et al.'s (2004) method for covariate matching (CM), and radius caliper matching and kernel matching using Leuven and Sianesi's (2003) method for propensity score matching (PSM). For CM and PSM, we use all variables in Model #2 (#7) as covariates for estimating the ATT of IDB (IDB_CC); we use the same set of variables for bias-correction in CM. We use a maximum of four nearest neighbors for CM. We impose common support and estimate standard errors using 100 bootstrap replications for PSM. We set the caliper at 0.02 for radius caliper matching. We set the bandwidth at 0.06 and use the Epanechnikov kernel for kernel matching. Panel B.1 shows estimates of Tobit and ML endogenous Tobit regressions of option compensation ratio or equity compensation ratio. The Tobit regressions use the same covariates as the OLS regressions in Panel A.1. The ML endogenous Tobit regressions use the same IVs as the 2SLS regressions in Panel A.1, and report the Wald test for endogeneity. For both types of regressions, robust standard errors are clustered at the CEO-firm level. Panel B.2 reports ATTs for option compensation ratio or equity compensation ratio using same methods as in Panel A.2.

Table 6: CEO's pay structure

Panel A: Regression and matching results for salary and cash compensation ratios

Panel A.1: Regression results

	Salary compensation ratio								Cash compensation ratio							
	OLS		Instrumental variable 2SLS		Treatment effects 2-Stage		Treatment effects MLE		OLS		Instrumental variable 2SLS		Treatment effects 2-Stage		Treatment effects MLE	
	coeff.	p-value	coeff.	p-value	coeff.	p-value	coeff.	p-value	coeff.	p-value	coeff.	p-value	coeff.	p-value	coeff.	p-value
IDB (1/0)	0.033	0.001	0.087	0.021	0.119	0.000	0.191	0.279	0.033	0.001	0.072	0.082	0.096	0.000	0.116	0.115
N	10,921		10,915		10,052		10,052		10,921		10,915		10,052		10,052	
Adjusted R-square / [chi-square p-value]	0.2150		0.2083		[0.000]		[0.000]		0.1871		0.1847		[0.000]		[0.000]	
Over-identification test (p-value)			0.7804								0.9429					
Test for exogeneity (p-value)			0.1306								0.3295					
F-statistic for first-stage IVs			113.30								113.30					
Lambda					-0.053	0.000							-0.041	0.007		
Wald test for rho (p-value)							0.000								0.001	
IDB_CC (1/0)	0.040	0.002	0.161	0.023	0.241	0.000	0.283	0.000	0.047	0.000	0.130	0.082	0.239	0.000	0.297	0.000
N	10,834		10,915		10,052		10,052		10,834		10,828		10,052		10,052	
Adjusted R-square / [chi-square p-value]	0.2156		0.1847		[0.000]		[0.000]		0.1880		0.1809		[0.000]		[0.000]	
Over-identification test (p-value)			0.5751								0.7401					
Test for exogeneity (p-value)			0.0751								0.2661					
F-statistic for first-stage IVs			30.22								30.22					
Lambda					-0.109	0.000							-0.105	0.000		
Wald test for rho (p-value)							0.000								0.000	

Panel A.2: Matching results on average treatment effect for the treated (ATT)

	Salary compensation ratio								Cash compensation ratio							
	Simple matching		Bias-adjusted matching		Radius caliper matching		Kernel matching		Simple matching		Bias-adjusted matching		Radius caliper matching		Kernel matching	
	coeff.	p-value	coeff.	p-value	coeff.	p-value	coeff.	p-value	coeff.	p-value	coeff.	p-value	coeff.	p-value	coeff.	p-value
IDB (1/0)	0.050	0.000	0.025	0.000	0.019	0.009	0.021	0.002	0.047	0.000	0.026	0.002	0.021	0.009	0.022	0.003
IDB_CC (1/0)	0.053	0.000	0.030	0.001	0.032	0.001	0.036	0.000	0.058	0.000	0.034	0.001	0.037	0.000	0.043	0.000

Table 6 (cont.)

Panel B: Regression and matching results for option and equity compensation ratios

Panel B.1: Regression results

	Option compensation ratio				Equity compensation ratio			
	Tobit		ML Tobit with endogenous variable		Tobit		ML Tobit with endogenous variable	
	coefficient	p-value	coefficient	p-value	coefficient	p-value	coefficient	p-value
IDB (1/0)	-0.035	0.013	-0.044	0.452	-0.026	0.049	-0.060	0.305
N	10,921		10,915		10,921		10,915	
Pseudo R-square / [chi-square p-value]	0.2907		[0.000]		0.2977		[0.000]	
Test for exogeneity (p-value)			0.8616				0.5400	
IDB_CC (1/0)	-0.050	0.004	-0.080	0.479	-0.042	0.013	-0.106	0.341
N	10,834		10,828		10,834		10,828	
Pseudo R-square / [chi-square p-value]	0.2935		[0.000]		0.3004		[0.000]	
Test for exogeneity (p-value)			0.7884				0.5577	

Panel B.2: Matching results on average treatment effect for the treated (ATT)

	Option compensation ratio								Equity compensation ratio							
	Simple matching		Bias-adjusted matching		Radius caliper matching		Kernel matching		Simple matching		Bias-adjusted matching		Radius caliper matching		Kernel matching	
	coeff.	p-value	coeff.	p-value	coeff.	p-value	coeff.	p-value	coeff.	p-value	coeff.	p-value	coeff.	p-value	coeff.	p-value
IDB (1/0)	-0.031	0.000	-0.019	0.019	-0.015	0.041	-0.015	0.047	-0.034	0.000	-0.019	0.026	-0.010	0.235	-0.011	0.201
IDB_CC (1/0)	-0.039	0.000	-0.033	0.001	-0.028	0.002	-0.030	0.001	-0.041	0.000	-0.028	0.008	-0.024	0.011	-0.026	0.010

Table 7: CEO turnover-performance sensitivity

The table shows estimates of OLS, probit, 2SLS instrumental variable, and IV-probit regressions of CEO turnover on the interaction between IDB and market adjusted stock return$_{t-1}$ and control variables. The sample consists of non-dual class S&P 1500 firms during the period 1998-2006 with relevant non-missing data. CEO turnover is a dummy variable that equals one if the CEO in year *t* differs from the CEO in year *t*-1; it equals zero otherwise. IDB is a binary variable that equals one if there is at least one IDB in a given firm-year; it equals zero otherwise. All other variables are defined in Appendix 3. To reduce the influence of outliers, some variables, indicated in Appendix 3, are winsorized at the top and bottom 0.5% of the sample. Both the second stage of the 2SLS instrumental variables estimation and the MLE IV-probit model use the same covariates as the OLS, but instrument for possible endogeneity of IDB by lagged IDB state-density and lagged IDB industry-density. Lagged IDB state-density is computed as the average value of the IDB dummy for all public companies headquartered in a state in fiscal year *t*-1. Lagged IDB industry-density is computed as the average value of the IDB dummy for each of the 48 Fama and French (1997) industries in fiscal year *t*-1. The 2SLS regression reports p-value of Wooldridge's (1995) over-identification test, the p-value of Durbin-Wu-Hausman test for exogeniety, and the F-test for the IVs of the first stage estimation; standard errors are clustered at the CEO-firm level. The IV-probit regression reports the Wald test for exogeneity. Each regression includes year and Fama-French 12 industry dummies; robust standard errors are clustered at the firm level.

Variables	OLS		Probit		2SLS		IV- Probit	
	coeff.	p-value	coeff.	p-value	coeff.	p-value	coeff.	p-value
IDB* Market adjusted stock return$_{t-1}$ %	0.020	0.728	0.089	0.755	-2.948	0.055	-10.543	0.003
Market adjusted stock return$_{t-1}$ %	-0.111	0.000	-0.536	0.000	0.326	0.155	1.147	0.068
Standard deviation of stock return$_{t-1}$ %	0.016	0.000	0.078	0.000	0.016	0.000	0.060	0.004
Log CEO's stock ownership$_{t-1}$	-0.038	0.000	-0.188	0.000	-0.042	0.000	-0.160	0.000
CEO is chairman$_{t-1}$ (0/1)	0.022	0.001	0.118	0.002	0.017	0.034	0.075	0.074
Max (CEO's board tenure, tenure as CEO)$_{t-1}$	0.003	0.000	0.012	0.000	0.003	0.000	0.010	0.000
CEO Age64$_{t-1}$ (0/1)	0.153	0.000	0.602	0.000	0.163	0.000	0.499	0.000
Log sales$_{t-1}$	0.005	0.062	0.024	0.071	0.008	0.016	0.029	0.011
Fraction of independent directors	-0.018	0.378	-0.096	0.358	-0.004	0.852	-0.024	0.798
Board size	0.001	0.330	0.007	0.356	0.000	0.897	0.000	0.957
Intercept	0.027	0.363	-1.638	0.000	0.015	0.660	-1.303	0.000
N	10,090		10,090		10,089		10,089	
Adjusted or pseudo R^2 / [chi-square p-value]	0.036		0.047		[0.000]		[0.000]	
Over-identification test (p-value)					0.7725			
Test for exogeneity (p-value)					0.0366			
F-statistic for first-stage IVs					10.40			
Wald test for exogeneity (p-value)							0.036	

Table 8: Firm valuation

Panel A shows estimates of OLS, 2SLS instrumental variable, Heckman 2-stage treatment effect, and MLE treatment effect regressions of Tobin's q or industry-adjusted Tobin's q. The sample consists of non-dual class S&P 1500 firms during the period 1998-2006 with relevant non-missing data. IDB_CC is a dummy variable that equals one if there is at least one IDB who sits on the board's compensation committee in a given firm-year (if the firm has no compensation committee, the entire board serves on the compensation committee); zero otherwise. Covariates in the OLS regression are: IDB or IDB_CC, Market-adjusted stock return$_{t-1}$, Market adjusted stock return$_t$, ROA$_{t-1}$, ROA$_t$,, Standard deviation of stock return$_t$, Log market cap$_t$, R&D to sales$_t$, Advertising expenses to sales$_t$, Sales growth, Fraction of independent directors, Board size, G-index and Log CEO stock ownership. Regressions of Tobin's q include year dummies and Fama-French 12 industry dummies. All other variables are defined in Appendix 3. To reduce the influence of outliers, some variables, indicated in Appendix 3, are winsorized at the top and bottom 0.5% of the sample. Robust standard errors are clustered by the CEO-firm level. The second stage of the 2SLS instrumental variables estimation uses the same covariates as the OLS, but instruments IDB (or IDB_CC) by IDB state-density and IDB industry-density. IDB state-density is computed as the average value of the IDB dummy for all public companies headquartered in a state in fiscal year *t*-1. IDB industry-density is computed as the average value of the IDB dummy for each of the 48 Fama and French (1997) industries in fiscal year *t*-1. The table reports the p-value of Wooldridge's (1995) over-identification test, the p-value of Durbin-Wu-Hausman test for exogeniety, and the F-test for the IVs of the first stage estimation; standard errors are clustered at the CEO-firm level. The second stage of Heckman 2-stage treatment effects regression uses the same covariates as the OLS and the inverse Mill's ratio (Lambda). Lambda is computed in the first stage by regressing IDB (IDB_CC) by the variables shown in Model #2 (#7) in Table 3. Standard errors of the Heckman 2-stage treatment effect model are estimated using 1,000 bootstrap replications. The MLE treatment effect model estimates the main and selection equations simultaneously. The main equation is the same as the OLS and the selection is for IDB (IDB_CC) with the variables shown in Model #2 (#7) in Table 3. It reports the p-value of Wald test for rho (correlation between first and second stage error terms); standard errors are clustered at the CEO-firm level. Panel B of the table reports the average treatment effect for the treated (i.e., ATT) of either Tobin's q or industry-adjusted Tobin's q of IDB (or IDB_CC) using four different methods. ATTs are estimated based on simple matching and bias-corrected matching using Abadie et al.'s (2004) method for covariate matching (CM), and radius caliper matching and kernel matching using Leuven and Sianesi's (2003) method for propensity score matching (PSM). For CM and PSM, all variables in Model #2 (#7) are used as covariates for estimating the ATT of IDB (IDB_CC); the same set of variables is also used for bias-correction in CM. A maximum of four nearest neighbors are used for CM. Common support is imposed and standard errors are estimated using 100 bootstrap replications for PSM. Caliper is set at 0.02 for radius caliper matching. Bandwidth is set at 0.06 and Epanechnikov kernel is used for kernel matching.

Table 8 (cont.)

Panel A: Regression results

	Tobin's q								Industry adjusted Tobin's q							
	OLS		Instrumental variable 2SLS		Treatment effects 2-Stage		Treatment effects MLE		OLS		Instrumental variable 2SLS		Treatment effects 2-Stage		Treatment effects MLE	
	coeff.	p-value	coeff.	p-value	coeff.	p-value	coeff.	p-value	coeff.	p-value	coeff.	p-value	coeff.	p-value	coeff.	p-value
IDB (1/0)	0.196	0.000	0.363	0.044	1.130	0.000	1.590	0.000	0.202	0.000	0.474	0.005	1.034	0.000	1.645	0.000
N	10,264		10,261		10,054		10,054		10,264		10,261		10,054		10,054	
Adjusted R-square / [chi-square p-value]	0.4626		0.4609		[0.000]		[0.000]		0.2977		0.2919		[0.000]		[0.000]	
Over-identification test (p-value)			0.9479								0.4750					
Test for exogeneity (p-value)			0.3472								0.1053					
F-statistic for first-stage IVs			91.99								102.09					
Lambda					-0.561	0.000							-0.507	0.000		
Wald test for rho (p-value)							0.000								0.000	
IDB_CC (1/0)	0.206	0.001	0.677	0.054	2.166	0.000	1.669	0.000	0.205	0.001	0.896	0.009	1.885	0.000	1.726	0.000
N	10,177		10,174		10,054		10,054		10,177		10,174		10,054		10,054	
Adjusted R-square / [chi-square p-value]	0.4637		0.4545		[0.000]		[0.000]		0.2955		0.2710		[0.000]		[0.000]	
Over-identification test (p-value)			0.9718								0.5993					
Test for exogeneity (p-value)			0.1728								0.0365					
F-statistic for first-stage IVs			26.38								29.77					
Lambda					-1.051	0.000							-0.905	0.000		
Wald test for rho (p-value)							0.000								0.000	

Panel B: Matching results on average treatment effect for the treated

	Tobin's q								Industry adjusted Tobin's q							
	Simple matching		Bias-adjusted matching		Radius caliper matching		Kernel matching		Simple matching		Bias-adjusted matching		Radius caliper matching		Kernel matching	
	coeff.	p-value	coeff.	p-value	coeff.	p-value	coeff.	p-value	coeff.	p-value	coeff.	p-value	coeff.	p-value	coeff.	p-value
IDB (1/0)	0.053	0.136	0.060	0.096	0.080	0.000	0.073	0.001	0.077	0.028	0.072	0.046	0.076	0.002	0.078	0.001
IDB_CC (1/0)	0.186	0.000	0.218	0.000	0.122	0.000	0.122	0.000	0.210	0.000	0.223	0.000	0.105	0.002	0.111	0.000

Table 9: Robustness checks

Panel A reports the regression coefficient and p-value of IDB using two alternate definitions of IDB (i.e., IDB$15m and IDB%Variable) or after omitting the 2006 fiscal year (i.e., 1998-2005) from regressions in Table 5 (OLS regressions of Log total compensation and Log cash compensation), Table 6 (Tobit regressions of Option compensation ratio and Equity compensation ratio) and Table 8 (OLS regressions of Tobin's q and industry-adjusted Tobin's q). IDB$15m is a binary variable that equals one if a firm-year has an independent director whose equity holdings equal $15 million or more in constant 2000 dollars; it equals zero otherwise. IDB%Variable is a binary variable that equals one if a firm-year has an independent director who owns at least 1%, 3% or 5% of the outstanding equity of a firm in the top, middle or bottom tercile of all the firm-years in the sample, respectively, based on market capitalization in constant 2000 dollars; it equals zero otherwise. The last two rows report the maximum sample size among the six regressions for a given column, and the number of firm-years with IDB=1 in this regression. Panel B reports the coefficient estimates and p-values from regressions similar to those in Panel A, where IDB and year dummy variables are replaced by IDB*Pre-SOX and IDB*Post-SOX. Pre-SOX (Post-SOX) is a binary variable that equals one for an observation from fiscal years 1998-2002 (2003-2006); it equals zero otherwise. The last column of Panel B reports the p-value of the F-test for the equality of the coefficients of IDB*Pre-SOX and IDB*Post-SOX.

Panel A: Alternate definitions of IDB and omission of 2006 fiscal year

	IDB$15m		IDB%Variable		1998-2005	
	coeff.	p-value	coeff.	p-value	coeff.	p-value
Log total compensation	-0.098	0.034	-0.117	0.002	-0.131	0.021
Log cash compensation	-0.104	0.053	-0.065	0.046	-0.105	0.053
Option compensation ratio	-0.025	0.059	-0.028	0.061	-0.036	0.011
Equity compensation ratio	-0.018	0.151	-0.023	0.101	-0.026	0.050
Tobin's q	0.212	0.000	0.164	0.001		
Industry adjusted Tobin's q	0.231	0.000	0.160	0.002		
Maximum sample size (firm-years)	10,921		10,921		9,735	
Firm-years with IDB=1	1,627		1,084		1,545	

Panel B: Pre- and post-Sarbanes Oxley Act

	IDB*Pre-Sox		IDB*Post-Sox		p-value of F-test
	coeff.	p-value	coeff.	p-value	
Log total compensation	-0.107	0.054	-0.194	0.009	0.123
Log cash compensation	-0.088	0.098	-0.105	0.116	0.731
Option compensation ratio	0.037	0.028	-0.125	0.000	0.000
Equity compensation ratio	0.025	0.113	-0.079	0.000	0.000
Tobin's q	0.169	0.002	0.235	0.000	0.312
Industry adjusted Tobin's q	0.280	0.000	0.107	0.060	0.011
Maximum sample size	10,921				
Firm-years with IDB=1	915		664		

Appendix 1: Firm, year, and firm-year distributions

Panel A: Number of IDBs with either at least 1% or 5% ownership of voting or cash flow rights

Count	1% ownership of voting or cash flow right		5% ownership of voting or cash flow right	
	Firm-year frequency	Percentage	Firm-year frequency	Percentage
0	9,757	84.50	11,015	95.39
1	1,309	11.34	295	2.55
2	362	3.14	176	1.52
3	79	0.68	32	0.28
4	17	0.15	11	0.10
5	20	0.17	16	0.14
6	2	0.02	1	0.01
7	1	0.01	1	0.01
> 0	1,790	15.50	532	4.61

Panel B: Number of IDBs on compensation committee with either at least 1% or 5% ownership of voting or cash flow right

Count	IDBs (1% ownership) on compensation committee		IDBs (5% ownership) on compensation committee	
	Firm-year frequency	Percentage	Firm-year frequency	Percentage
0	10,411	90.90	11,073	96.68
> 0	1,042	9.10	380	3.32

Panel C: Number of years a firm is present in the sample

Number of years	Number of firms	Percentage
1	275	13.38
2	245	11.92
3	139	6.76
4	171	8.32
5	150	7.30
6	128	6.23
7	121	5.89
8	127	6.18
9	700	34.05
Total	2,056	100

Panel D: Percentage of firm-years of a firm that has IDBs

Percentage of firm-years (pct)	Number of firms	Percentage
pct = 0	1,477	71.84
0.00 < pct <=12.5	53	2.58
12.5 < pct <= 25.0	76	3.70
25.0 < pct <= 37.5	49	2.38
37.5 < pct <= 50.0	80	3.89
50.0 < pct <= 62.5	28	1.36
62.5 < pct <= 75.0	44	2.14
75.0 < pct <= 87.5	34	1.65
87.5 < pct < 100	12	0.58
pct = 100	203	9.87
Total	2,056	100

Panel E: Year distribution

Year	Full sample		IDB firm-years		Non-IDB firm-years		Proportion	
	Number of firm-years	Percentage	Number of firm-years	Percentage	Number of firm-years	Percentage	IDB	Non-IDB
1998	1,317	11.41	220	12.29	1,097	11.24	16.70	83.30
1999	1,297	11.23	215	12.01	1,082	11.09	16.58	83.42
2000	1,293	11.20	220	12.29	1,073	11.00	17.01	82.99
2001	1,340	11.60	234	13.07	1,106	11.34	17.46	82.54
2002	1,282	11.10	216	12.07	1,066	10.93	16.85	83.15
2003	1,305	11.30	203	11.34	1,102	11.29	15.56	84.44
2004	1,272	11.02	177	9.89	1,095	11.22	13.92	86.08
2005	1,229	10.64	158	8.83	1,071	10.98	12.86	87.14
2006	1,212	10.50	147	8.21	1,065	10.92	12.13	87.87
Total	11,547	100	1,790	100	9,757	100	15.50	84.50

Appendix 2: Industry distribution and geographic distribution of headquarters

Panel A: Industry distribution

Fama-French 48 industry classification	Full sample		IDB firm-years		Non-IDB firm-years		(D-F)	B*(D-F)	(C)/(A) in %
	Freq. (A)	Pct. (B)	Freq. (C)	Pct. (D)	Freq. (E)	Pct. (F)			
44. Banking	900	7.08	221	11.25	679	6.32	4.93	34.93	24.56
34. Business services	1165	9.17	200	10.18	965	8.98	1.20	11.00	17.17
40. Transportation	378	2.98	82	4.18	296	2.76	1.42	4.22	21.69
2. Food products	212	1.67	69	3.51	143	1.33	2.18	3.64	32.55
17. Construction materials	276	2.17	65	3.31	211	1.96	1.35	2.92	23.55
12. Medical equipment	293	2.31	60	3.06	233	2.17	0.89	2.04	20.48
9. Consumer goods	249	1.96	51	2.60	198	1.84	0.75	1.48	20.48
37. Measuring and control equipment	242	1.91	49	2.50	193	1.80	0.70	1.33	20.25
41. Wholesale	431	3.39	73	3.72	358	3.33	0.38	1.30	16.94
47. Trading	339	2.67	60	3.06	279	2.60	0.46	1.22	17.70
43. Restaurants, hotels, motels	268	2.11	50	2.55	218	2.03	0.52	1.09	18.66
19. Steel works etc.	291	2.29	51	2.60	240	2.23	0.36	0.83	17.53
11. Healthcare	182	1.43	35	1.78	147	1.37	0.41	0.59	19.23
7. Entertainment	85	0.67	25	1.27	60	0.56	0.71	0.48	29.41
38. Business supplies	268	2.11	45	2.29	223	2.08	0.22	0.45	16.79
10. Apparel	175	1.38	32	1.63	143	1.33	0.30	0.41	18.29
28. Non-metallic and industrial metal mining	55	0.43	22	1.12	33	0.31	0.81	0.35	40.00
32. Communications	139	1.09	26	1.32	113	1.05	0.27	0.30	18.71
20. Fabricated products	41	0.32	19	0.97	22	0.21	0.76	0.25	46.34
16. Textiles	52	0.41	18	0.92	34	0.32	0.60	0.25	34.62
39. Shipping containers	59	0.46	14	0.71	45	0.42	0.29	0.14	23.73
48. Almost nothing	61	0.48	14	0.71	47	0.44	0.28	0.13	22.95
33. Personal services	123	0.97	21	1.07	102	0.95	0.12	0.12	17.07
4. Beer and liquor	26	0.21	8	0.41	18	0.17	0.24	0.05	30.77
25. Shipbuilding, railroad equipment	29	0.23	8	0.41	21	0.20	0.21	0.05	27.59
6. Recreation	74	0.58	12	0.61	62	0.58	0.03	0.02	16.22
3. Candy and soda	23	0.18	5	0.26	18	0.17	0.09	0.02	21.74
46. Real estate	3	0.02	1	0.05	2	0.02	0.03	0.00	33.33
29. Coal	16	0.13	2	0.10	14	0.13	-0.03	0.00	12.50
1. Agriculture	24	0.19	3	0.15	21	0.20	-0.04	-0.01	12.50
27. Precious metals	25	0.20	3	0.15	22	0.21	-0.05	-0.01	12.00
26. Defense	27	0.21	3	0.15	24	0.22	-0.07	-0.02	11.11
24. Aircraft	57	0.45	8	0.41	49	0.46	-0.05	-0.02	14.04
15. Rubber and plastic products	73	0.58	10	0.51	63	0.59	-0.08	-0.04	13.70
5. Tobacco products	26	0.21	0	0.00	26	0.24	-0.24	-0.05	0.00
8. Printing and publishing	77	0.61	3	0.15	74	0.69	-0.54	-0.33	3.90
22. Electrical equipment	157	1.24	16	0.82	141	1.31	-0.50	-0.62	10.19
18. Constructions	162	1.28	8	0.41	154	1.43	-1.03	-1.31	4.94
30. Petroleum and natural gas	489	3.85	68	3.46	421	3.92	-0.46	-1.76	13.91
21. Machinery	532	4.19	75	3.82	457	4.25	-0.44	-1.82	14.10
45. Insurance	599	4.71	85	4.33	514	4.79	-0.46	-2.15	14.19
23. Automobile and trucks	220	1.73	12	0.61	208	1.94	-1.33	-2.29	5.45
14. Chemicals	376	2.96	42	2.14	334	3.11	-0.97	-2.87	11.17
35. Computers	406	3.20	44	2.24	362	3.37	-1.13	-3.61	10.84
13. Pharmaceutical products	449	3.53	28	1.43	421	3.92	-2.49	-8.81	6.24
36. Electronic equipments	784	6.17	84	4.28	700	6.52	-2.24	-13.82	10.71
42. Retail	868	6.83	78	3.97	790	7.35	-3.38	-23.11	8.99
31. Utilities	900	7.08	56	2.85	844	7.86	-5.01	-35.46	6.22
Total	12,706	100	1,964	100	10,742	100			15.46

Appendix 2 (cont.)

Panel B: Geographic distribution of headquarters

State	Full sample		IDB firm-years		Non-IDB firm-years		(D-F)	B*(D-F)	(C)/(A) in %
	Freq. (A)	Pct. (B)	Freq. (C)	Pct. (D)	Freq. (E)	Pct. (F)			
Texas	1228	9.66	251	12.78	977	9.10	3.68	35.60	20.44
Illinois	723	5.69	154	7.84	569	5.30	2.54	14.48	21.30
Georgia	342	2.69	81	4.12	261	2.43	1.69	4.56	23.68
North Carolina	264	2.08	59	3.00	205	1.91	1.10	2.28	22.35
Indiana	179	1.41	45	2.29	134	1.25	1.04	1.47	25.14
Washington	236	1.86	49	2.49	187	1.74	0.75	1.40	20.76
Tennessee	257	2.02	49	2.49	208	1.94	0.56	1.13	19.07
Iowa	67	0.53	23	1.17	44	0.41	0.76	0.40	34.33
Arkansas	85	0.67	23	1.17	62	0.58	0.59	0.40	27.06
Louisiana	83	0.65	20	1.02	63	0.59	0.43	0.28	24.10
Oregon	125	0.98	23	1.17	102	0.95	0.22	0.22	18.40
Nebraska	59	0.46	16	0.81	43	0.40	0.41	0.19	27.12
Colorado	194	1.53	32	1.63	162	1.51	0.12	0.19	16.49
South Carolina	65	0.51	16	0.81	49	0.46	0.36	0.18	24.62
New Hampshire	38	0.30	13	0.66	25	0.23	0.43	0.13	34.21
Delaware	49	0.39	12	0.61	37	0.34	0.27	0.10	24.49
Oklahoma	90	0.71	16	0.81	74	0.69	0.13	0.09	17.78
Hawaii	33	0.26	10	0.51	23	0.21	0.30	0.08	30.30
North Dakota	15	0.12	12	0.61	3	0.03	0.58	0.07	80.00
Kentucky	74	0.58	13	0.66	61	0.57	0.09	0.05	17.57
Utah	60	0.47	11	0.56	49	0.46	0.10	0.05	18.33
Puerto Rico	12	0.09	9	0.46	3	0.03	0.43	0.04	75.00
Nevada	85	0.67	14	0.71	71	0.66	0.05	0.03	16.47
West Virginia	8	0.06	8	0.41	0	0.00	0.41	0.02	100.00
Montana	8	0.06	2	0.10	6	0.06	0.05	0.00	25.00
Alaska	1	0.01	1	0.05	0	0.00	0.05	0.00	100.00
New Mexico	13	0.10	0	0.00	13	0.12	-0.12	-0.01	0.00
South Dakota	20	0.16	0	0.00	20	0.19	-0.19	-0.03	0.00
Maine	34	0.27	3	0.15	31	0.29	-0.14	-0.04	8.82
Mississippi	28	0.22	1	0.05	27	0.25	-0.20	-0.04	3.57
Vermont	26	0.20	0	0.00	26	0.24	-0.24	-0.05	0.00
Non US (Bermuda and Quebec)	48	0.38	4	0.20	44	0.41	-0.21	-0.08	8.33
Alabama	138	1.09	20	1.02	118	1.10	-0.08	-0.09	14.49
Idaho	42	0.33	0	0.00	42	0.39	-0.39	-0.13	0.00
Kansas	59	0.46	4	0.20	55	0.51	-0.31	-0.14	6.78
Maryland	138	1.09	19	0.97	119	1.11	-0.14	-0.15	13.77
Rhode Island	47	0.37	0	0.00	47	0.44	-0.44	-0.16	0.00
District of Columbia	55	0.43	0	0.00	55	0.51	-0.51	-0.22	0.00
Arizona	170	1.34	20	1.02	150	1.40	-0.38	-0.51	11.76
Missouri	311	2.45	41	2.09	270	2.51	-0.43	-1.04	13.18
Michigan	272	2.14	30	1.53	242	2.25	-0.73	-1.55	11.03
Florida	432	3.40	57	2.90	375	3.49	-0.59	-2.00	13.19
Connecticut	324	2.55	36	1.83	288	2.68	-0.85	-2.16	11.11
Wisconsin	263	2.07	22	1.12	241	2.24	-1.12	-2.33	8.37
New Jersey	489	3.85	63	3.21	426	3.97	-0.76	-2.92	12.88
Virginia	302	2.38	19	0.97	283	2.63	-1.67	-3.97	6.29
Minnesota	445	3.50	43	2.19	402	3.74	-1.55	-5.44	9.66
Pennsylvania	573	4.51	68	3.46	505	4.70	-1.24	-5.59	11.87
Massachusetts	545	4.29	60	3.05	485	4.51	-1.46	-6.26	11.01
Ohio	657	5.17	78	3.97	579	5.39	-1.42	-7.33	11.87
California	1910	15.03	284	14.46	1626	15.14	-0.68	-10.17	14.87
New York	985	7.75	130	6.62	855	7.96	-1.34	-10.39	13.20
Total	12,706	100	1,964	100	10,742	100			15.46

Appendix 3: Descriptive statistics and variable definitions

Variable: Definition and explanations	Obs.	Mean	Q1	Median	Q3	Std.
Dependent variables						
Total compensation: ExecuComp data item TDC1 that includes sum of salary, bonus, the value of stock options and restricted stock granted during the year, long-term incentive payouts, and other miscellaneous compensation; converted to 2000 constant dollars and expressed in thousands.	11,547	5,584	1,285	2,695	5,669	22,484
Cash compensation: ExecuComp data item TOTAL_CURR that includes sum of salary and bonus; converted to 2000 constant dollars and expressed in thousands.	11,547	1,428	606	972	1,686	1,681
Log total compensation: Log (total compensation + 1)	11,547	7.908	7.159	7.899	8.643	1.166
Log cash compensation: Log (cash compensation + 1)	11,547	6.883	6.408	6.881	7.431	1.000
Option compensation ratio: Option compensation / Total compensation; in %. Data obtained from ExecuComp	11,538	0.3249	0	0.2969	0.5578	0.2966
Equity compensation ratio: Equity based compensation / Total compensation; in %. Data obtained from ExecuComp	11,538	0.3953	0	0.4196	0.6479	0.3060
Cash compensation ratio: Salary and bonus / Total compensation; in %. Data obtained from ExecuComp	11,538	0.4669	0.2467	0.4129	0.6539	0.2797
Salary compensation ratio: Salary / Total compensation; in %. Data obtained from ExecuComp	11,538	0.2929	0.1262	0.2245	0.3895	0.2336
CEO turnover: A change of CEO as shown in ExecuComp (0/1)	11,547	0.1239				
Tobin's q: (Book value of total assets + Market value of equity - Book value of equity) / Book value of total assets; from Compustat. †	11,533	1.959	1.146	1.467	2.154	1.444
Industry adjusted Tobin's q: Tobin's q - median Tobin's q for the firm's Fama-French 48 industry; from Compustat. †	11,533	0.4312	-0.1514	0.0633	0.5606	1.3019
Independent variables: Board characteristics						
Board size: Number of directors on the board; calculated from RM Directors	11,547	9.46	7	9	11	2.86
Fraction of independent directors: Fraction of independent directors on the board; calculated from RM Directors	11,547	0.671	0.570	0.700	0.800	0.169
CEO co-option: Fraction of directors joined the board after the CEO appointment; calculated from RM Director and Execucomp	11,406	0.387	0.091	0.333	0.667	0.324
Outside CEO-directors: Fraction of non-employee directors that are active CEOs; calculated from RM Director	11,547	0.145	0	0.125	0.222	0.134
CEO is chairman: CEO is also the chairman of the board; obtained from ExecuComp (1/0)	11,547	0.6359				
CEO is the only insider: CEO is the only employee-director; based on RM Director and Execucomp (1/0)	11,267	0.4860				
CEO on nominating committee: CEO is on the nominating committee or on the corporate governance committee when there is no nominating committee; based on RM Director and Execucomp (1/0)	11,453	0.2972				
Independent variables: CEO characteristics						
CEO age: CEO's age on fiscal year *t*; based on Execucomp data	11,519	54.71	50	55	59	7.24
CEO ag64: (0/1) CEO's age is 64 or above based on Execucomp data	11,519	0.0951				
Tenure as CEO: Number of years as CEO; calculated from Execucomp data	11,069	7.54	3	5	10	7.08
CEO's board tenure: Number of years as on the board; calculated from RM Directors	11,518	9.84	3	7	14	8.68
Max (CEO's board tenure, tenure as CEO): Higher of the number of years as CEO (calculated from Execucomp) and the number of years as on the board (calculated from RM Directors)	11,543	10.41	4	8	15	8.62
CEO stock ownership %: CEO ownership percentage as the ratio of shares held by CEO and the number of shares outstanding; based on ExecuComp data. †	11,088	2.234	0.094	0.306	1.130	5.714
Log CEO stock ownership: Log ((CEO stock ownership*100) +1) †	11,088	3.649	2.338	3.454	4.182	1.874

Appendix 3 (cont.)

Variable: Definition and explanations	Obs.	Mean	Q1	Median	Q3	Std.
Independent variables: Firm characteristics						
Firm age: Max(CRSP listing age, Compustat listing age)	11,547	28.37	12	22	41	19.88
Market cap$_{t-1}$: Market value of equity, in millions of constant 2000 dollars; obtained from Compustat. †	11,533	7,272	626	1,570	4,975	20,190
Total assets$_{t-1}$: in millions of constant 2000 dollars; obtained from Compustat. †	11,545	11,284	574	1,649	6,010	41,426
Sales$_{t-1}$: in millions of constant 2000 dollars; obtained from Compustat. †	11,542	4,497	504	1,276	3,881	9,487
Log market cap$_{t-1}$: Log (market cap$_{t-1}$ + 1) †	11,533	7.53	6.44	7.36	8.51	1.54
Log total assets$_{t-1}$: Log (total assets$_{t-1}$ + 1) †	11,545	7.62	6.35	7.41	8.70	1.68
Log sales$_{t-1}$: Log (sales$_{t-1}$ + 1) †	11,542	7.27	6.23	7.15	8.26	1.49
G-index: Governance Index equals the number of anti-takeover provisions in a firm out of 24 different bylaw, charter provisions, and state laws from Gompers, Ishii, and Metrick (2003); original data from RM Governance	10,775	9.39	8	9	11	2.62
E-index: Entrenchment Index consists of 6 different anti-takeover provisions from bylaws and charter amendments, from Bebchuk, Cohen, and Ferrell (2009) ; original data from RM Governance	10,775	2.32	1	2	3	1.27
Classified board: Firm has a classified or staggered board; original data from RM Governance (1/0)	10,775	0.6195				
Net E-index: E-index excluding classified board; original data from RM Governance	10,775	1.70	1	2	2	1.03
Total institutional ownership$_{t-1}$ %: Percentage of the total shares outstanding held by institutional investors; data from TFN Institutional. †	11,547	58.86	45.82	64.00	78.02	26.44
Sales growth % : It is the mean of yearly sales growth rate of the past 3 year (i.e., sales growth is computed as $\frac{1}{3}\sum_{s=1}^{3} log\left(\frac{sales_{t-s}}{sales_{t-s-1}}\right)$ and expressed in percentage); from Compustat. †	11,538	12.69	3.13	9.74	18.91	16.63
Tobin's q$_{t-1}$: (Book value of total assets + Market value of equity - Book value of equity) / Book value of total assets; from Compustat.†	11,530	2.07	1.16	1.50	2.24	1.66
Market-adjusted stock return$_{t-1}$ % : The average market-adjusted daily stock returns. Adjusted by subtracting the daily return on the CRSP (NYSE, AMEX and Nasdaq) equal-weighted market index. †	11,385	-0.0142	-0.1178	-0.0241	0.0715	0.1764
Standard deviation of stock retuns$_{t-1}$ % : Standard deviation of daily stock returns over the fiscal year *t-1*. We require that at least two thirds of the daily stock returns over this period be available on CRSP. †	11,385	2.7694	1.8237	2.4501	3.3966	1.3366
Independent variables: Financial ratios						
ROA$_{t-1}$: Net income / Total assets; from Compustat. †	11,545	0.0393	0.0130	0.0422	0.0823	0.0966
Industry adjusted ROA$_{t-1}$: ROA$_{t-1}$ minus Fama-French 48 industry median ROA$_{t-1}$ †	11,545	0.0449	-0.0004	0.0267	0.0809	0.1122
OPS$_{t-1}$: Earnings before depreciation, interest, and tax / Sales; from Compustat. †	11,394	0.1808	0.0948	0.1566	0.2580	0.1722
Industry adjusted OPS$_{t-1}$: OPS$_{t-1}$ minus Fama-French 48 industry median OPS$_{t-1}$ †	11,394	0.0288	-0.0010	0.0512	0.1298	3.5838
Cash holding$_{t-1}$: Cash and short term investment / Total assets; form Compustat. †	11,544	0.1314	0.0192	0.0561	0.1810	0.1674
Cash flow$_{t-1}$: (Income before extraordinary items + Depreciation and amortization) / Sales; from Compustat. †	11,542	0.1082	0.0595	0.1059	0.1685	0.1747
R&D to sales$_{t-1}$: R&D expense / Sales; form Compustat. Any missing value of R&D expenditure is replaces with zero. †	11,542	0.0422	0	0	0.0330	0.1093
Advertising expenses to sales$_{t-1}$: Advertising expenses / Sales; form Compustat. †	11,542	0.0088	0	0	0.0065	0.0219
Capital expenditure to total assets$_{t-1}$: Capital expenditure / Total assets; from Compustat. †	11,542	0.0752	0.0196	0.0403	0.0810	0.1216
Dividend yield$_{t-1}$ % : Common dividend / Market value of common stock; from Compustat. †	11,533	1.2414	0	0.5200	1.9800	1.6702

† Top and bottom half percent values of the variables are winsorized.

Appendix 4: Correlations

The table presents Pearson product moment correlations (bottom left corner) and Spearman rank correlations (top right corner, *italicized*) among variables that measure firm age, firm size, CEO power, board characteristics and shareholder rights. The sample size is 9,970 firm-years. Correlations with absolute values of 0.25 or higher (unrelated to statistical significance) are indicated in bold face.

Spearman's correlations Pearson's product moment correlations	Firm age	Log market cap$_{t-1}$	Log total assets$_{t-1}$	Log sales$_{t-1}$	Log CEO stock ownership	Max (CEO's board tenure, tenure as CEO)	Board size	Fraction of independent directors	CEO co-option	Fraction of outside CEO-directors	CEO is chairman (0/1)	CEO is the only insider (0/1)	CEO on the nominating committee (0/1)	Classified board (0/1)	G-index	Net E-index
Firm age		***0.292***	***0.417***	***0.456***	***-0.255***	*-0.062*	***0.406***	*0.244*	*-0.145*	*0.199*	*0.166*	*0.081*	*-0.236*	*0.001*	***0.335***	*0.116*
Log market cap$_{t-1}$	**0.326**		***0.818***	***0.759***	***-0.325***	*-0.018*	***0.458***	*0.129*	*-0.014*	*0.168*	*0.165*	*-0.055*	*-0.196*	*-0.044*	*0.114*	*-0.037*
Log total assets$_{t-1}$	**0.408**	**0.818**		***0.833***	***-0.305***	*-0.037*	***0.596***	*0.190*	*-0.031*	*0.183*	*0.198*	*-0.047*	*-0.241*	*0.017*	*0.218*	*0.068*
Log sales$_{t-1}$	**0.480**	**0.777**	**0.835**		***-0.298***	*-0.071*	***0.528***	*0.180*	*-0.064*	*0.210*	*0.206*	*-0.022*	*-0.242*	*0.018*	*0.232*	*0.041*
Log CEO stock ownership	**-0.266**	**-0.310**	**-0.287**	**-0.282**		***0.569***	*-0.236*	*-0.245*	***0.383***	*-0.163*	*0.121*	*-0.122*	*0.244*	*0.028*	*-0.105*	*-0.105*
Max (CEO's board tenure, tenure as CEO)	-0.096	-0.036	-0.050	-0.076	**0.580**		*-0.034*	*-0.205*	***0.625***	*-0.100*	***0.255***	*-0.197*	*0.188*	*-0.017*	*-0.083*	*-0.124*
Board size	**0.335**	**0.465**	**0.606**	**0.495**	-0.217	-0.013		*0.119*	*-0.051*	*0.170*	*0.114*	*-0.191*	*-0.215*	*0.110*	***0.279***	*0.132*
Fraction of independent directors	**0.254**	0.123	0.183	0.168	**-0.267**	**-0.249**	0.095		*-0.035*	*0.185*	*0.131*	***0.485***	***-0.321***	*0.057*	*0.212*	*0.222*
CEO co-option	-0.162	-0.025	-0.033	-0.071	**0.394**	**0.562**	-0.035	-0.062		*-0.062*	***0.271***	*-0.052*	*0.105*	*0.005*	*-0.075*	*-0.062*
Fraction of outside CEO-directors	0.226	0.176	0.199	0.210	-0.161	-0.114	0.166	0.187	-0.068		*0.111*	*0.080*	*-0.048*	*0.037*	*0.141*	*0.053*
CEO is chairman (0/1)	0.188	0.166	0.196	0.203	0.133	0.217	0.100	0.123	**0.261**	0.119		*0.047*	*-0.014*	*0.038*	*0.139*	*0.073*
CEO is the only insider (0/1)	0.089	-0.065	-0.052	-0.027	-0.138	-0.218	-0.212	**0.453**	-0.064	0.087	0.047		*-0.161*	*0.005*	*0.069*	*0.111*
CEO on the nominating committee (0/1)	-0.234	-0.197	-0.235	-0.241	**0.256**	0.201	-0.172	**-0.349**	0.115	-0.043	-0.014	-0.161		*-0.048*	*-0.200*	*-0.186*
Classified board (0/1)	-0.004	-0.063	-0.007	0.001	0.023	-0.012	0.091	0.059	0.007	0.041	0.038	0.005	-0.048		***0.497***	***0.298***
G-index	**0.294**	0.083	0.175	0.194	-0.114	-0.072	0.233	0.211	-0.078	0.147	0.138	0.070	-0.198	**0.491**		***0.630***
Net E-index	0.088	-0.066	0.042	0.016	-0.134	-0.134	0.107	0.228	-0.061	0.048	0.072	0.106	-0.181	**0.298**	**0.635**	