How Board Quality Affects CEO and Executive Team Pay

Hyoung-Goo Kang
Department of Finance
Hanyang University Business School
222 Wangsimni-ro, Seongdong-gu
Seoul, Korea, 133-791
tel: +82. 2. 2220-2883, fax:+82. 2. 2220-0249
hyoungkang@hanyang.ac.kr

Changmin Lee
Hanyang University Business School
222 Wangsimni-ro, Seongdong-gu
Seoul, Korea, 133-791
changmin74@hanyang.ac.kr

Hui Ou-Yang
Cheung Kong Graduate School of Business
Citibank Tower, 32/F, Suite 3203
3 Garden Road, Central, Hong Kong
houyang@ckgsb.edu.cn

Woonam Seok
Korea Energy Economics Institute (KEEI)
665-1 Naeson-dong, Uiwang-si, Gyeonggi-do
Republic of Korea, 437-713
tel: +82. 31. 420-2171, Fax: +82. 31. 420-2163
swn80@keei.re.kr

JEL Classifications: G30
Correspond to Hui Ou-Yang

How Board Quality Affects CEO and Executive Team Pay

We propose a new concept: *director-tied firm size*, to measure the social capital of directors. Director-tied firm size is the average size of the other firms for which a director of a firm works as external directors. Director-tied firm size affects the pay structure of executive teams because it is related with the advising and monitoring qualities of the boards. Our empirical studies find that the larger the director-tied firm size, the less the incentive pays to CEO and executive teams, but the more the fixed pays. Our results indicate a specific mechanism of how the social capital of directors affects the incentive contracting for executives.

Keywords: board of directors, board quality, executive compensation, social capital

1. INTRODUCTION

What determines the social capital and more broadly the quality of boards? How do they affect executives' pay? We propose a new measure about board quality: the average size of the other firms for which a director of a firm is working as external directors (*director-tied firm size* henceforth). Director-tied firm size is the size of firms that board members hold as external directors and captures the social capital of directors.[1] Our new measure is a significant determinant of compensation structure, and it affects the size and allocation between fixed and incentive parts of executives' compensation.

We argue that the director-tied firm size indicates the social capital of the directors. It determines the monitoring and advising functions of boards, which in turn affects the pay structure. The explanatory power of director-tied firm size remains robust after controlling for other usual measures of board quality on director social capital: the number of external directorships held by board members and the proportion of board members holding more than one directorship. Hence director-tied firm size captures a novel dimension of social capital that traditional measures miss. In sum, director-tied firm size or more broadly *director-tied firm characteristics* are essential in investigating the social capital and quality of boards, which is in turn found to affect executive compensation.

Our new concept of director-tied firm size is better than simple social-ties counts such as the number of external directorships held by board members and the proportion of board members holding more than one directorship. Our concept takes into account both the quantity and quality of boards. It also controls the busyness of boards that other related measures on social capital includes. Therefore, it captures the effect of board quality (about board social) capital in a purer manner than does a simple count of social ties.

A board of directors undertakes significant roles such as monitoring and advising. It is also an integral part of corporate governance. Directors with good human and social capital can be great resources to a firm and its top executives. However, few papers have investigated how the characteristics of firms for which the directors work affect firm behaviors. This is surprising because firms consider the very characteristics of director-tied firms when recruiting directors

[1] Suppose John is a director at firm A1, firm A2 and firm A3 whose market values are \$1B, \$2B and \$3B, respectively. Then, to firm A1, the director-tied firm size of John is \$(2B+3B)/2 = \$2.5B. To firm A2 and A3, the director-tied firm sizes are: \$2B and \$1.5B. Similarly, we can define director-tied Tobin's q and director-tied ROA, etc.

and constructing boards.[2]

Many studies have investigated the relationship between board's composition and CEO compensation.[3] Compensation to executives affects the strategic actions of firms. In comparison, we focus on board quality which depends on the characteristics of board members. The quality of boards should affect executives' pay because the boards affect organizational outcomes indirectly (monitoring top management teams) and directly (advising top management teams)[4]. The monitoring role identifies the true quality and moral hazards of incumbent executives and involves hiring and firing decisions. The advising role guides managerial behavior. Intuitively, the capabilities of the CEO and advising function of the board are complementary, and do not substitute for each other. One increases the marginal productivity of the other.

A CEO can dominate decision-making or the decisions of a CEO can be overridden by a board. In any case, advising is not running a business, but assisting top executives. The better the advising service that a board of directors provides, the higher the marginal productivity of executives under the condition of the complementarity between executive productivity and board advising. This will eventually result in greater pay to executives in equilibrium. Better advising will increase firm value too.

Our empirical findings are novel. We focus on the impact of director-tied firm size on executive compensation, as well as analyze the impact of the number and fraction of the ties that directors have with other firms. In detail, director-tied firm size is a proxy for the social capital quality of directors. It is the size of firms that board members hold as external directors (director-tied firm size; the quality of social capital of directors). The number of external directorships held by board members (# of director-ties) and the proportion of board members holding more than one directorship (% of director-ties) are also analyzed. We find the followings; The larger the director-tied firm size, the less (more) is incentive (fixed) pay to top executives including CEOs; Director-tied firm size does not affect total pay because of the countervailing effects on incentive and fixed pays; The more # and % of director-ties, the higher the total, fixed and incentive pays after controlling for director-tied firm size.

---

[2]This is more surprising given the debates about whether or not CEOs are overpaid, how CEOs should be paid and how boards should function in relation. See Yermack, 1997, 2004; Bertrand and Mullainathan, 2001; Bebchuk and Fried, 2003; Bebchuk and Fried, 2004; Hall and Murhpy, 2003; Jensen, Murphy and Wruck, 2004; Gabaix and Landier, 2008; Fahlenbrach, 2009; Hermalin, 2005; Bebchuk, Cremers and Peyer , 2007.

[3]E.g. Bebchuk and Fried, 2003, 2004; Chhaochharia and Grinstein, 2009.

[4]For related literature, see Vafeas, 2001; Yeh and Woidtke, 2005; Piot and Janin, 2007; Jirapor, Kim, and Davidson, 2008; Hoitash, Hoitash, and Bedard, 2009

2. LITERATURE REVIEW ON ROLES OF THE BOARDS

The literature emphasizes monitoring and advising/ providing resources as the two main roles of the boards of directors. Agency theories tend to view the board of directors as a monitor, and resource dependence theories and management scholars emphasize the advisory and counseling role of a board[i].

The monitoring and advising provided by the board are important to top executives. They affect firm value and dismissal risks. Similarly, board quality would be an important determinant of CEO and executive compensation. First, better advising increases executive pay due to the complementarity between advising quality and executives impacts. Similar intuition is that wage increases if labor productivity increases. Thus, the marginal impact of CEO's quality to the earning of a firm increases with the quality of advising. The more the marginal impact of CEO and executives, the larger the compensations to them. In contrast, as the impact of team abilities (executives and boards) becomes salient in determining firm performance, incentive contracting on only firm performance becomes less efficient, so should be less utilized. Thus, the advising quality of the board should increase total pays, but the relative weight of incentive pays will decrease. Moreover, as the significance of incentive pay decreases due to team contracting; fixed pay should increase in order to make total pay increase.

Second, better monitoring increases the chance of finding current executives' true quality and of replacing underperforming executives. This can decrease total pay by reducing output-based pay (e.g. incentive pay, stock pay) and information costs (e.g. efficiency wage and overpayment from adverse selection; Shapiro and Stiglitz, 1984). For instance, if boards know the quality of management well, firms can pay lower incentives to risk-averse executives. Fahlenbrach (2009) empirically shows that the weaker corporate governance, the higher pay-for-performance sensitivity because strong incentive pays could mitigate bad governance. Thus the monitoring quality of boards affects incentive contracting; governance characteristics such as the monitoring quality of a board can be used as a substitute for CEO pay-for-performance sensitivity.

Let us summarize our intuition from the prior literature, which guides this research, but has not been fully tested yet. First, the higher is the advising quality of a board, the more are total and fixed pays to a CEO and executive teams, but the less are incentive pays. Intuitively, if board quality is high, a firm can rely less on second-best incentive contract for executives (e.g.

Fahlenbrach, 2009) -- (1) Directors can monitor executives directly without relying on incentive contract much; (2) Firm performance depends on both director counseling and executive efforts. Performance-sensitive contracts for executives become less efficient in inducing the efforts of executives due to free riding problems; (3) Good boards can increase the marginal productivity of CEOs affecting compensation structure. Therefore, if board advising quality is high, a firm can pay more fixed and total payment.

Second, the higher is the monitoring quality of a board, the less are total, fixed and incentive pays to CEO and executive teams. If monitoring quality is high, firms can rely less on incentive contract, which is the second-best mechanism. In addition, total and fixed pays can be lowered because firms can save efficiency wages and other information rents. This means that the advising and monitoring qualities of boards affect the compensation differently. Third, the percentages of total pays to a CEO and executive teams (e.g. CPS) are seemingly unrelated to board quality because the percentages depend on the relative significance of monitoring quality and advising quality of a board. As the size of CEO and executive compensation varies proportionally to the impact of monitoring and advising qualities, the ratio of the compensations (i.e. CPS) should be unrelated with board quality. In addition, the relative significance between advising and monitoring qualities can vary in their size depending on various contexts such as director ties to other firms. We further develop such intuition of the existing literature with hypotheses later.

3. HYPOTHESIS

We consider three different measurements of board quality in order to relate them to executive compensation structures. First, *director-tied firm size* -- the simple average of market caps of the other firms where a board member of a firm works as a director -- is positively related to the ability of directors. Firm size affects the relationship between top managers and advising; just as the impact of executives quality increases with the size of the firm under their control (Gabaix and Landier, 2008), the impact of advising quality increases with firm size. Our new measure, director-tied firm size, captures the effect of advising quality. Furthermore, the power of executives comes from the amount of resources under their control. The size-skill complementarities exist in the hierarchies of a firm. Talented executives can share their valuable ability (or knowledge) with the team under their control (Garicano and Rossi-Hansberg, 2006). Thus, the significance of manager ability can be amplified by the amount of controllable

resources in the hierarchy of a firm. Thus, large firms are more likely to have high ability directors.

We regard the sum of the sizes of firms where a director holds a directorship as a measure of the quality of the social capital of a director. Of course, this measure can indicate ability or skill of directors. However, we control this possibility by including explicit measure of ability such as industry adjusted past performances in stock and accounting variables (ROA, abnormal returns) and internal promotion versus external hiring.

The average social capital of the directors of a board becomes the social capital of the board (We will control for the size of a board separately in regressions). Social capital usually refers to the value of a social network. For directors, social capital can mean social similarities showing a shared affiliation as well as a personal network. The benefits of social capital come from better information, power, and solidarity. Social capital enables a board of directors to obtain timely and adequate information and to influence other parties as well[5].

The larger the firm a director works for, the higher the quality of social capital of the director. The size of a firm from which a director retired as CEO explains both the size and quality of social capital (Bourdieu, 1986). CEOs at larger firms have more chances to experience negotiating with more parties, which leads to more outside directorships (Booth and Deli, 1996). The directors in larger firms tend to build more business and contractual relationships, which lead to high-quality and quantity in social networks (Ferris, Jagannathan and Pritchard, 2003). Firm size also affects director compensation as it is positively related to either firm complexity or to the difficulty of the directors' tasks (Brick, Palmon and Wald, 2006). A talented CEO goes to work at a large firm (Gabiaix and Landier, 2009) as does a retired CEO from a big firm to become a director (Kang, Lee and Seok, 2012). These studies suggest that the larger the firm a director works for, the higher quality is the director's social capital. On the other hand, CEOs can move to other firms involuntarily (e.g. due to poor performance) instead of being hired by other firms. Thus, it is necessary to control for firm performance. We did control for industry adjusted profitability and stock returns.

The second and third indicators of board social capital are the number of external directorships held by board members and the proportion of board members holding more than one directorship, as these are the usual indicators about social capital or can reflect the time

[5] Coles, Daniel and Naveen, 2008, 2012; Duchin and Sosyura, 2013

allocation (or dedication) of each director per firm. Controversy exists over the hypothesis that the more directorships a director holds or the more board members with multiple directorships, the lower the quality of the board. Some researchers find evidence that multiple directorships of board members reduce the effectiveness of advising and monitoring of a board (Core, Holthasusen and Larcker, 1999; Fich and Shivdasani, 2006) while some others find that, the more diverse are the groups in which the members of teams belong, the larger is the learning and performance at both individual and team levels (O'Leary, Mortensen and Woolley, 2011). Shared board ties or relationships between directors have been used to capture the complex relationship between social capital, human capital and governance[6]. Similarly, Brickley, Linck and Coles (1999) and Lee (2011) show that retired CEOs from big firms hold multiple directorships.

Therefore, in order to capture the pure effect of social capital embedded in social ties, we need to control for the multidimensional characteristics of multiple directorships. Our regression analysis incorporates and controls for more direct and pure measure of social-capital quality and dedication of boards together in order to contribute to this literature. Once the quality of social ties (i.e. director-tied firm size) is controlled for, the simple quantity of social ties is likely to indicate the residual effect such as busyness and less dedication of directors. Then our hypotheses are in the following subsections.

Hypothesis on Director-tied Firm Size and Executive Compensation

On our conceptualization, director-tied firm size can increase the social capital of board. The social capital of board enhances the quality of board in terms of both advising and monitoring qualities. The advising and monitoring quality and the role of boards have been analyzed in management literature and finance literature. When such board quality increases, the incentive component should decrease, but the fixed component should increase. Thus, we can hypothesize that director-tied firm size increases the fixed but decreases the incentive component.

In more detail, first, director-tied firm size is related to monitoring quality. The monitoring quality of a board is negatively associated with the incentive pay to top executives dependent solely on firm performance. The literature on contracting under multiple signals deals with this problem in detail (Holmstrom, 1979; Sinclair-Desgagné, 1994). If a board can find the true quality of executives, it is optimal for a firm to minimize the incentive pay. They can directly

[6] Coles, Daniel and Naveen, 2008, 2012; O'Leary, Mortensen and Woolley, 2011; Hillman and Dalziel, 2003, Shipilov, Greve, and Rowley, 2010, Nguyen, 2011.

contract on the true quality. The quality of social capital on a board will increase with valuable and diverse experiences in large firms, i.e. director-tied firm size. Valuable and diverse experience of directors can enhance knowledge and monitoring capabilities. This will allow replacing indirect mechanisms (e.g. incentive pay) with direct schemes (e.g. monitoring executives).

Second, director-tied firm size is also related to advising quality. Under team contracting, optimal performance depends on both own and relative performance. The more the advising quality, the stronger the effect of team performance over executive only performance. Thus, the importance of incentive pay which depends on only firm performance should be reduced (Holmstrom, 1982). In extreme, if advising director and CEO work as a team, then an optimal team contract should depend not only on firm performance (i.e. aggregate absolute performance), but also on their relative contribution to the firm value (i.e. relative performance evaluation).

In sum, we have the following hypothesis.

Hypothesis 1. The larger the director-tied firm size, the less the incentive pays to the CEO and executive teams, but the more the fixed pays; after controlling for the number of ties[7] *in directorship network.*

Hypothesis on Multiple Directorship and Executive Compensation

A firm with less dedicated (or busier) directors on its board will pay a higher incentive to CEOs and executive teams in order to complement direct control by boards with second-best incentive contracts. The fixed component should increase too reflecting more information and adverse selection leading to efficiency wage and other information rents. For example, as incentive compatibility conditions impose less efficient workers to be indifferent between signaling and not signaling or between working and shirking, more efficient workers earn positive information rents. Hence, the larger the number of memberships of directors in different boards (after director-tied firm size is controlled for), the busier they are, and so the lower the quality of work in a board. Many memberships in diverse boards require spending more time and energy in adjusting to different tasks and environments.[8] Of course, the multiple directorships can provide valuable social capital. However, it is important to note that we control for this

[7] The number of ties of a director' indicates how many directorships a director holds, i.e. the number of social connections that a director owns.
[8]For such switching cost argument, see Milgrom and Roberts (1992).

dimension of social capital using the director-tied firm size. This explains Hypothesis 2 as follows.

> *Hypothesis 2. The more directors have multiple directorships, the more the total, fixed and incentive pays to the CEO and executive teams after controlling for the director-tied firm size in the directorship.*

Hypothesis on Director-tied Firm Size, Multiple Directorship and CPS

(CEO pay)/(total pay) and (executives)/(total pay) depend on the relative significance of monitoring quality and advising quality of a board. This extends Bebchuk, Cremers and Peyer (2011) and Gabaix and Landier (2008). Furthermore, as the size of CEO and executive compensation varies *proportionally* to the impact of monitoring and advising qualities, CPS (the ratio of CEO compensations over total pay) should be unrelated with board quality.

> *Hypothesis 3. Neither director-tied firm size nor the number of directorship affects CPS (CEO-Pay-Slice out of top-five executives pay).*

In order to complement the discussion, the appendix formally derives the relationship between board quality and executive team pay. We develop a board and CEO pay model in a competitive CEO talent market; the pay to the CEO is determined by the marginal productivity of CEO's quality to the earning of a firm. This model suggests that advising quality increases CEO's total pay, and monitoring quality decreases CEO incentive pay. This model can also explain the allocation of total compensation across CEO and the other executives. This clarifies how our hypotheses are derived[9].

Further Discussion on Hypotheses

While the director-tied firm size is a new concept in the literature, the other two concepts about board quality (i.e. the number of external directorships held by board members and the proportion of board members holding more than one directorship) have been discussed. The literature suggests that our three measures and other related concepts in the literature are all connected to social capital. We summarize them in Table 1.

[9] Since this model can derive the hypotheses, we can use it to motive the hypotheses instead of prior literature. However, in order to emphasize director-tied firm size (our new concept and measure), we emphasize deriving the hypotheses from prior literature logically.

Our concept of director-tied firm size has advantages over social-ties count such as the number of external directorships held by board members and the proportion of board members holding more than one directorship. First, we consider both quantity and quality of social ties. Suppose a firm D0 has two directors, D1 and D2. D1 is the outside director of another firm whose size is 100. D2 is the outside director of 10 other firms whose sizes are 10 each. If we use the traditional measure of social capital (i.e. the number of social ties), D2's social capital is ten times of D1's. However, it is very possible that D1's social capital can be more valuable to firm D0. Or the relative value of social capital for D1 and D2 depends on the business model of D0 at least. Therefore, we need to control not only for the count of social ties, but also for the quality of each social tie. This is what we do in this paper by controlling for both quantity and quality of social ties.

Second, the number of social ties of directors is not a pure measure of board quality. While many social ties can mean the quantity of social capital, they reduce the commitment of directors for each tie. There are meetings requirement for directors for each firm. If a director has many directorships in other organizations, she may be too busy to work for a firm given her limited attention. In addition, directors can face larger legal/liability risks if they engage in many organizations. This will interfere with the work of directors. Our measure is subject less to such problems. Therefore, director-tied firm size is a purer measure of social capital than the other concepts.

******* Insert Table 1 ******

4. DATA

Our main variable is the quality of boards. We collected data about directors during 1996-2011 in RiskMetrics consisting largely of S&P major index firms. Then, we collected data on firms where the directors work from the Compustat and data on executives' compensation from the CompustatExecuComp. The firm data was then matched between RiskMetrics and Compustat based on the CUSIP and Ticker for each year. For additional governance variables such as the E-index and G-index, we used the RiskMetrics database. Each director was identified based on his "Director ID" and "Legacy IRRC director ID" in RiskMetrics. If there was a difference in those two IDs or duplication, we used the director's full name and age to identify their directorship.

The final sample included 12,726 firm-years with 2,305 unique firms[10].

Executive compensation

For executive compensation, we used total compensation, current compensation, and stock-related compensation from the CompustatExecuComp. Total compensation (TDC1 from the CompustatExecuComp) included salary, bonus, other annual compensation, long-term incentive payouts, restricted stock granted, Black-Scholes value of stock options granted, and all other compensation. Current compensation included salary and bonus; stock-related compensation was calculated by total compensation minus current compensation. Executive team compensation was based on the total top-five executives' compensation. Finally, the CPS is CEO compensation divided by executive team compensation. We use the dependent variables (executive compensation structure) at t+1 attenuate any inverse causality. Thus, we match the compensation variables at t+1 with independent variables at t.

Board characteristics

Board characteristics include quality of boards, board size, board independence, and the existence of a non-independent director on a compensation committee. For the quality and busyness (dedication) measurement of boards, we collected data about 1) average firm size where independent board members work as directors outside of a subject firm (director-tied firm size; i.e. the quality of social capital), 2) the number of external directorships (# of director-ties), and 3) the ratio of independent board members holding more than one directorship (% of director-ties). The averages are based on the data of independent board members holding more than one directorship.

Board size is the number of directors on a board and a determinant of board performance. For instance, smaller boards may perform a more efficient monitoring role (Jensen, 1993; Yermack, 1996; Core, Holthausen and Larcker, 1999). Individuals on a big board hold less responsibility, a situation that may cause a free rider problem. Similarly, a smaller jury can make better decisions than a bigger jury because of free rider problems (Mukhopadhaya, 2003).

Board independence is the number of independent board members over board size. If

[10]We select only a firm with the executive compensation data in the ExecuComp database, with the total asset data in the Compustat database, and with governance data in the RiskMetrics. The sample remains only 7,608 firms-years which about 40% of 19184(=1744*11) firm-years.

independent boards undertake monitoring, they will be less likely to pay excessive compensation to executives. However, without a causal relationship, CEO compensation can seem positively related to board independence in data. Board independence has increased in recent decades because of regulations such as the Sarbanes-Oxley Act or new listing standards adopted by the NYSE and NASDAQ. Huge increases in CEO compensation have also occurred in the same period. In the RiskMetrics database, there is a Board Affiliation which categorizes directors into three types: employee, independent, and linked. As linked directors include former employees and professional service providers, they hold inside information. Thus, employees and linked directors are not independent. Therefore, we can mainly analyze independent directors with regard to the ramifications of monitoring.

The existence of a non-independent director on a compensation committee equals 1 if there is a non-independent director on a compensation committee, and 0 otherwise. A non-independent director can be chosen as a compensation committee member to reduce information asymmetry between a board and executives. Vafeas (2003) finds that when an insider is a member of a compensation committee, contingent compensation for CEOs is lower, while non-contingent compensation for CEOs is higher. However, total compensation for CEOs may not be related to an insider being on a compensation committee. Anderson and Bizjak (2003) report ambiguous relationships between outside directors on a compensation committee and CEO compensation (total, contingent, and non-contingent), while a CEO's contingent compensation is lower when the CEO is a member of a compensation committee.

CEO characteristics

For CEO characteristics, we collected data about CEO duality, CEO tenure, CEO from outside, and CEO ownership. *CEO duality* is equal to 1 if the CEO of a firm is the chairman of the firm's board. If a CEO is chairman as well, he can more easily dominate the board. Thus, CEO duality would be positively related to CEO compensation as is CPS. CEO tenure is the difference between the year when the executive became a CEO and the observation year. CEO tenure represents the extent of accumulated firm-specific skills and influence over a board. Thus, CEO tenure would be positively related to CEO compensation, as is the CPS. Bebchuk, Cremers and Peyer (2007) obtained such a result.

CEO from outside is a dummy variable. It is equal to 1 if a CEO joins a firm from outside

in either the same year or one year before he becomes the CEO.[11] Firm-specific skills of executives are important and accumulated over time. Thus, someone outside of a firm would be appointed as a new CEO either when insiders' abilities were lower than outsiders' abilities. Thus, a CEO from outside would be positively related to CEO compensation. In addition, because CEOs from outside have more capabilities than the other executives in the firm, the CEOs from outside are associated with higher CPS. Murphy and Zabojnik (2004, 2007) and Brick, Palmon and Wald (2006) find that CEOs appointed from the outside are more compensated than those promoted internally are.

CEO ownership is the proportion of a CEO's share of a firm relative to the firm's total shares outstanding. CEO ownership can align CEO's interests with shareholders' interests. Thus, larger CEO ownership might be correlated with lower usage of incentive compensation for the CEO. Since the incentive of the CEO is already aligned, additional incentive contract is redundant. On the other hand, large ownership by a CEO can entrench his/her power over the board as the CEO can use the power to increase his/her compensation. In this case, CEO ownership can be positively correlated with both total compensation and CPS.

Firm characteristics

For firm characteristics, we collected data about size, accounting performance, market performance, E-index, and G-index. Firm size is the total market value of the firm. Accounting performance is the return on asset (ROA). ROA is net income over book value of assets. Industry-adjusted ROA is estimated by ROA minus the median value of each industry (SIC 2-digit).

Market performance is the annual stock return (ASR) with sector returns adjusted. ASR is the monthly compounded annual stock return. Industry-adjusted ASR is ASR minus the median value of each industry (SIC-2digit). Compensation schemes reflect not only reservation compensation to retain executives but also consider firm performance to align interests between executives and shareholders. Hence, it is likely that the better the performance of executives, the higher their compensation.

The G-index ("Governance Index") was introduced by Gompers, Ishii and Metrick (2003). The range of the G-index is integer values from 0 to 24. A higher number indicates

[11]It is possible that the executive is hired as the firm's executive from outside of the firm for the CEO heir apparent.

greater management power[12]. The E-index ("Entrenchment Index") was introduced by Bebchuk, Cohen and Ferrell (2009). The range of the E-index is integer values from 0 to 6 where a higher number indicates a greater degree of executive entrenchment[13].

Executive team characteristics

For executive team characteristics, we examine the percentage of executive stock ownership, excluding the CEO. Executive team ownership excluding the CEO is the proportion of the executive team's share other than the CEO's share relative to the firm's total share outstanding. If executive team ownership excluding the CEO is greater, executives below the CEO hold more power in corporate decisions. In this case, the CEO has difficulty in seeking rent over executives below the CEO. Thus, the greater the executive team's ownership excluding the CEO, the higher will be executive team's compensation excluding the CEO, and so the lower CPS.

5. RESULTS

Insert **Table 2**, **Table 3**, **Table 4** and **Table 5**

Table 2 and Table 3 present sample statistics and how each quality measurement is correlated with executive compensation. Table 4 shows the regression result of the total compensation for the CEO and the executive teams excluding the CEO. The quality of boards, measured by the director-tied firm size, is unrelated to executive total compensation. The (negative) monitoring quality of boards, measured by # and % of director-ties after controlling for

[12] The domain of the G-index is the restrictions on shareholder rights and takeover defenses against hostile takeover offers. Such restrictions during the 1980s affected the power balance between shareholders and management. Related corporate provisions are classified into five categories: tactics for delaying hostile bidders, voting rights, director/officer protection, other takeover defenses, and state laws. The G-index adds one point for the existence of each provision for 24 unique governance rules.

[13] Out of the 24 governance provisions in the G-index, six provisions are mainly related to the power balance between shareholders and management. The E-index adds one point for the existence of each provision with six unique governance rules. The provisions are Classified Board, Golden Parachutes, Limits to the Ability to Amend Bylaws, Limits to the Ability to Amend the Charter, Supermajority to Approve a Merger, and Poison Pill. The data are from the Investor Responsibility Research Center. These provisions can affect firm value naturally; for example, Bebchuk, Cohen and Ferrell (2009) found that the E-index is negatively correlated with firm values. The other G-index provisions excluded from the E-index are uncorrelated with firm values. It is expected that the greater the power of management, the higher the compensation for executives. However, it is not clear whether greater entrenchment of executives is related to the greater power of a CEO relative to the executives below the CEO. Thus, the relation between the E-index and CPS is unclear a priori. We control for G-Index and E-Index as control variables. We are not particularly interested in the effect of those indices, so treat them as control variables.

director-tied firm size, is negatively related to the CEO and the total compensation to the executive team. These results support the hypotheses fully, so validating our hypotheses. While the impact of director-tied firm size (the quality of social capital) on fixed and incentive pays is significant, its impact on total pays (incentive + fixed pays) is ambiguous because monitoring and advising qualities offset each other with the increase in social capital. We are the first to analyze the impact of social capital on total, fixed and incentive pays. After controlling for director-tied firm size, # and % of director-ties should be negative indicators about monitoring quality. Our intuitions based on critical literature review and related with our hypotheses hold that monitoring quality tends to decrease total pay, but advising quality increases it, which are supported in Table 4.

Table 5 shows the regression results for the incentive pay to top executives. The director-tied firm size is negatively related to stock-related compensation while # and % are positively related. These results support our hypotheses that higher ability and more dedication of independent directors are linked to better quality of board monitoring, which leads to lower stock-related compensation for executives. To remind, the # and % of director-ties have both positive and negative effects. Negative effect reflects less dedication of board members due to busy schedules. Positive effect is the various experience and knowledge of board members acquired from other activities. However, once director-tied firm size is controlled for, # and % only capture busyness and less dedication leading to increased stock-related compensation. This result is also related to the literature on whether the negative number effect (less dedication of board members) dominates the positive variety effect (knowledge and informational benefits of board members) of boards[14].

Insert Table 6

Table 6 can be regarded as a robustness check of Table 5. Firms with higher quality of the social capital of boards pay more fixed compensation. The relationship between the fixed pay and the quality of board measured by # and % of director-ties is negative. This means, the lower the monitoring quality of a board due to less dedicated directors, the higher the fixed pay to executives. This reflects information costs and efficiency wage resulting from asymmetric

[14] The findings of O'Leary, Mortensen and Woolley (2011) are consistent with ours. They maintain that when the number of members in a team is fixed, the more diverse are the groups in which the members of teams belong, the larger is the learning at both individual and team levels. On the other hand, with the variety of groups controlled, the larger the number of individuals in a team, the lower the learning.

information on the human capital of executives. Under-pricing is less likely to occur because executives can move to another firm especially when the CEO market functions well. On the other hand, over-pricing can be sustained because firms with busier boards pay more incentives and fixed pay to executives (e.g. efficiency wage; Shapiro and Stiglitz, 1984) in order to avoid adverse selection in a market filled with asymmetric information. Our findings also support Bertrand and Mullainathan (2001) in which executives will have more chances to seek rent if a board does not monitor an executive's efforts and action choices. Collusion between executives and busy directors is possible too.

Insert Table 7 and Table 8

Table 7 presents the regression results of (the incentive pay/total pay) to executives. Firms with better boards allocate more (less) fixed (incentive) pay over total pay. However, firms with dedicated boards allocate less fixed and incentive pay. In sum, Table 7 supports our hypotheses.

Table 8 shows the regression results of the CPS (CEO Pay Slice) computed with total compensation, stock-related compensation, and fixed compensation. The quality measures for boards and the CPS are not significantly related to each other in most cases. The results suggest that the quality of boards tends to evenly affect the total and incentive compensation for both the CEO and the other executives. This supports our Hypothesis 3.

6. RESULTS AND CONTRIBUTION TO PRIOR LITERATURE

Formation and characteristics of board quality

There are several consensuses in the literature. First, firms regard board quality as an important determinant of firm performance[15]. To measure the effects of boards and more broadly governance, Gompers, Ishii and Metrick (2003) introduced the Governance Index (hereafter G-index) of board characteristics and management power. They find that the higher the G-index value, the lower a firm's value; The higher the G-index, the more difficult it is to replace incumbent managers, resulting in greater agency costs and lower firm values although G-index may not be a normative indicator. Our new measure, director-tied firm size, and its impact contribute to this literature.

[15]See Fama and Jensen (1983ab), Gilson (1990), Kaplan and Reishus (1990), Li (1997), Ferris, Jagannathan and Pritchard (2003), Keys and Li (2005), and Lee (2009).

Second, managers from high-performing firms are more likely to become outside directors. Professional labor market values directors' capabilities in guiding and monitoring firms (Fama, 1980). For example, directors can hold fewer directorships at other firms after fraud in their firms. They can even lose their board seats if their firms are sued (Fich and Shivdasani, 2006). Thus experience and past performance matter in becoming outside directors; financial fraud harms directors' reputations. Thus, since we measure the board quality on the dimension of social capital, the past performance of director-tied firms should be controlled for. We find our new measure on the social capital of boards explains the executive compensations even after we control for the impact of director-tied firm performances.

Third, former executives from large firms are likely to be regarded as capable outside directors. This extends the argument of Gabaix and Landier (2008) such that valuable directors as well as managers are also more likely to work for valuable firms. To analyze how firm size, CEO ability and compensation interact, Gabaix and Landier (2008) proposed a simple competitive assignment model about the CEO market. They assume that CEOs have heterogeneous talents and are assigned to firms competitively. The managerial impact of a CEO's talent on firm value increases with the size of the firm under his/her control. The best CEO goes to the largest firm because the largest firm pays the most to the best CEO. In turn, the market capitalization of a firm should be one of the most important determinants of CEO compensation. They support these predictions empirically; the CEO's pay increases with the size of a firm and the size of the average market value of a firm in the market. Extending this reasoning and findings suggests that the best CEOs from large firms are likely to be regarded as most talented potential directors. Also, the directors serving on the boards of large firms should be regarded as being of high quality. Furthermore, directorship network can imprint the institutional norm and information from *large firms* including compensation schemes (Marquis, 2003). They can bring along and hire their colleagues from large firms too (Nguyen, 2011). These imprinted resources from large firms can be valuable to other firms. Our new measure on board quality and empirical findings are consistent with the intuition of this existing literature.

Fourth, the number of ties in directorship network is often used to measure the amount of social capital of the board as well as busyness. Many relate the busyness of directors in their networks to important organizational outcomes[16]. Coles, Daniel and Naveen (2008, 2012) use the

[16]Ferris, Jagannathan, and Pritchard, 2003; Fich and Shivdasani, 2006; Jiraporn, Kim, and Davidson, 2008; Jackling and Johl, 2009; Jiraporn, Singh, and Lee, 2009; Ahn, Jiraporn, and Kim, 2010; Dewally and Peck, 2010

number of outside directors or the number of social ties per director as important indicators about board quality.

Corporate governance and executive compensation

Our paper is related to Faleye, Hoitash and Hoitash (2011), but further analyzes the ramifications of board quality. They argue that boards affect firm value by monitoring and advising, which is often a tradeoff; if an outsider director is on principal monitoring committees in many boards, she will concentrate on monitoring for a new firm as well; however, she is likely to offer ineffective advising services to the firm. Faleye et al empirically show that monitoring-intensive boards reduce excessive compensation (total and incentive pay) for a CEO, but at the cost of "weaker strategic advising and greater managerial myopia". Similarly, we examine the relationship between board quality and executive compensation; we analyze board quality using the concept of director-tied firm size.

To date, many studies have suggested a negative relationship between corporate governance and CEO pay, for example, resulting from managerial entrenchment (Yermack, 1997; Bertrand and Mullainathan, 2001; Bebchuk and Fried, 2003, 2004), the misevaluation of stock options by the corporate board (Jensen, Murphy and Wruck, 2004) or agency problems (Bebchuk, Cremers and Peyer, 2011).

In contrast, Hermalin (2005) suggests that firms should pay more to a CEO with better corporate governance. Because CEO pay is determined by the bargaining process between the CEO and the board, a firm should compensate for higher risk of dismissal from tighter monitoring. Until now, there has not been any empirical evidence about this claim.

Our findings suggest that better-governed firms can pay more to executives, but this depends on the relative strength of advising and monitoring qualities of boards. For example, we advance the previous argument proposing that firms with better-advising boards make CEOs more productive and therefore better compensated.

Also, executive team pay is related to board quality in the similar way to the CEO's in our results. Intuitively, both election and dismissal of executive officers below a CEO tend to be made either by the boards, by the CEO, or by both. A board advises executives. Then, board quality should affect compensation for executives below the CEO because board quality affects the retention of executives (monitoring) or the impact of executives on the productivity of the firm (advising).

7. CONCLUSION

High-quality boards can better undertake monitoring and advising. Enhanced monitoring increases the likelihood of identifying the current executives' true quality and of replacing incompetent executives. Thus, the better the monitoring of a board, the less are the output-based pay (e.g. incentive pay, stock pay) and information costs (e.g. efficiency wage and overpayment from adverse selection). Better advising increases the marginal productivity of top executives, which increases wages in turn.

Our empirical analysis uses three proxies for the quality of directors in a board: (1) the size of firms that board members hold as external directors (director-tied firm size; the quality of social capital of directors), (2) the number of external directorships held by board members (# of director-ties), and (3) the proportion of board members holding more than one directorship (% of director-ties). Our empirical studies generate several new findings. The larger the director-tied firm size, the less (more) is incentive (fixed) pay to top executives including CEOs. Director-tied firm size does not affect total pay because of the countervailing effects on incentive and fixed pays. The more # and % of director-ties, the higher the total, fixed and incentive pays after controlling for director-tied firm size.

Our results provide managerial implications and guidance. First, our findings can be useful to the construction of optimal boards and the interpretation of a given structure of a board of directors in relation to their roles in advising and monitoring. For example, it can be costly to increase the social capital of boards such as director-tied firm size. Then, a firm should design a balance between board quality and incentive pay to executives. If we increase the former, we can reduce efficiency loss (first best minus second best efficiency). If we increase the latter, we could lower the quality of board slightly.

Second, implications can also eventually be drawn to firm values: how to manage the social and human capital of boards; how to enhance corporate governance of a firm by changing directors; and how to form the relationship between directors and top executives. For example, firms should consider director-tied firm size in hiring new directors by checking the total size and number of firms that director candidates are serving. In addition, investors can analyze director-tied firm size and # and % of director ties in order to decide investment or shareholder activism.

8. REFERENCES

'*' denotes management literature mentioned in the endnote.

Adams, R. B., Hermalin, B. E. and Weisbach, M. S. 2010.The Role of Boards of Directors in Corporate Governance: A Conceptual Framework and Survey. ***Journal of Economic Literature***, 48(1): 58-107.

Ahn, S., Jiraporn. P., and Kim, Y. S. 2010. Multiple directorships and acquirer returns. ***Journal of Banking and Finance,*** 34(9): 2011-2026.

Bebchuk, L. A., and Fried M. J. 2003. Executive Compensations as an Agency Problem. ***Journal of Economic Perspectives.*** 17:71. 92.

Bebchuk, L. A., and Fried M. F. 2004. ***Pay without Performance: The Unfulfilled Promise of Executive Compensation.*** Cambridge: Harvard University Press.

Bebchuk, L., Cremers, K.J.M., and Peyer, U.C. 2007. Pay Distribution in the Top Executive Team. ***Harvard Law and Economic Discussion Paper***. 574.

Bebchuk, L., Cremers, K.J.M., and Peyer, U.C. 2011. The CEO Pay Slice. ***Journal of Financial Economics.*** 102:199-221

Bertrand, M. and Mullainathan, S. 2001. Are CEOs Rewarded for Luck? The Ones without Principles Are. ***Quarterly Journal of Economics.*** 116(3):901. 932.

Booth, J. R. and Deli D.N. 1996. Factors Affecting the Number of Outside Directorships Held by CEOs. ***Journal of Financial Economics.*** 40:81-104.

Bourdieu, P. 1986. The Forms of Capital. In J. Richardson (Ed.) ***Handbook of Theory and Research for the Sociology of Education*** 241-258. New York. : Greenwood Press.

Brick, I.E., Palmon, O., and Wald, J. K. 2006. CEO Compensation, Director Compensation, and Firm Performance: Evidence of Cronyism? ***Journal of Corporate Finance.*** 12:403-423.

Brickley, J. A., Linck, J. S. and Coles, J. L. 1999. What Happens to CEOs After They Retire? New Evidence On Career Concern, Horizon Problem, and CEO Incentives. ***Journal of Financial Economics***, 52:341-377.

Chhaochharia, V., and Grinstein, Y. 2009. CEO compensation and board structure. ***The Journal of Finance.*** 64(1): 231-261.

Coles, J., Daniel, N., and Naveen, L. 2012. Board advising. Working Paper, Arizona State University. http://ssrn.com/abstract=2002250

Coles, J., Daniel, N., Naveen, L., 2008. Boards: does one size fit all? Journal of Financial Economics 87: 329-356.

Core, J., Holthausen, R., and Larcker, D. 1999. Corporate Governance, CEO Compensation, and Firm Performance. ***Journal of Financial Economics.*** 51(3):371-406.

Dewally, M., and Peck, S. W. 2010. Upheaval in the boardroom: Outside director public resignations, motivations, and consequences. ***Journal of Corporate Finance.*** 16(1): 38-52.

Duchin, R. and Sosyura, D. 2013. Divisional managers and internal capital markets. ***Journal of Finance.*** 68(2):387-429.

* Ellstrand, A. E., Tihanyi, L., and Johnson, J. L. 2002. Board structure and international political risk. ***Academy of Management Journal.*** 45(4): 769-777.

Fahlenbrach, R. 2009. Shareholder Rights, Boards, and CEO Compensation. ***Review of Finance.*** 13(1):81-113.

Faleye, O., Hoitash, R., and Hoitash, U. 2011. The Costs of Intense Board Monitoring. ***Journal of Financial Economics.*** 101(1):160-181

Fama, E. 1980. Agency Problem and the Theory of the Firm. ***Journal of political economy.*** 88:288-307.

Fama, E., and Jensen, M,. 1983a. Separation of Ownership and Control. ***Journal of Law and Economics.*** 26:301-325.

Fama, E., and Jensen, M. 1983b. Agency problems and residual claims. ***Journal of Law and Economics.*** 26:327-349.

Ferris, S. P., Jagannathan, M. and Pritchard, A. C. 2003. Too busy to mind the business? Monitoring by directors with multiple board appointments. ***Journal of Finance.*** 58(3): 1087-1111.

Fich, E. M., and Shivdasani, A. 2006. Are busy boards effective monitors? ***Journal of Finance.*** 61(2): 689-724.

Fich, E. M., and Shivdasani, A. 2007. Financial Fraud, Director Reputation, and Shareholder Wealth. ***Journal of Financial Economics***. 86:306-336.

Gabaix, X., and Landier, A. 2008. Why Has CEO Pay Increased So Much? ***Quarterly Journal of Economics.*** 123:49-100.

Garicano, L., and Rossi-Hansberg, E. 2006. Organization and Inequality in a Knowledge Economy. ***Quarterly***

Journal of Economics. 121(4):1383-1435.
Gilson, S. C. 1990. Bankruptcy, Boards, Banks, and Blockholders: Evidence on Change in Corporate Ownership When Firm Default. ***Journal of Financial Economics.*** 27(2):355-387.
* Gomez-Mejia, L. R., and Balkin, D. B. 1992. Determinants of faculty pay? An agency theory perspective. ***Academy of Management Journal.*** 35(5): 921-955.
Gompers, P. A., Joy, L. I., and Metrick, A. 2003. Corporate Governance and Equity Prices. ***Quarterly Journal of Economics.*** 118(1):107. 55.
Hall, B. J., and Murphy, J. K. 2003. The Trouble with Stock Options. ***Journal of Economic Perspectives.*** 17:49-70.
Hermalin, B. E. 2005. Trends in Corporate Governance. ***Journal of Finance.*** 60(5):2351-2384.
* Hillman, A. J., and Dalziel, T. 2003. Boards of directors and firm performance: Integrating agency and resource dependence perspectives. ***Academy of Management Review.*** 28(3): 383-396.
* Hillman, A. J. 2005. Politicians on the board of directors: Do connections affect the bottom line? ***Journal of Management***, 31(3): 464-481.
Hoitash, U., Hoitash, R., and Bedard, J. C. 2009. Corporate governance and internal control over financial reporting: A comparison of regulatory regimes. ***Accounting Review.*** 84(3): 839-867.
Hölmstrom, B. (1979). Moral hazard and observability. ***The Bell Journal of Economics***, 74-91.
Holmström, B. 1982. Moral hazard in teams. ***Bell Journal of Economics***, 13(2): 324-340.
Jackling, B., and Johl, S. 2009. Board structure and firm performance: Evidence from India's top companies. ***Corporate Governance-an International Review.*** 17(4): 492-509.
Jensen, M. 1993. Presidential Address: The Modern Industrial Revolution, Exit and the Failure of Internal Control Systems. ***Journal of Finance.*** 48:831-880.
Jensen, M., Murphy J. K. and Wruck, G. E. 2004. ***Theory of the Firm: Managerial Behavior, Agency Costs, and Ownership Structure.*** . ECGI Finance Working Paper (44).
Jiraporn, P., Singh, M., and Lee, C. I. 2009. Ineffective corporate governance: Director busyness and board committee memberships***. Journal of Banking and Finance.*** 33(5): 819-828.
Jiraporn, P., Kim, Y. S. and Davidson, W. N. 2008. Multiple directorships and corporate diversification. ***Journal of Empirical Finance.*** 15(3): 418-435.
* Johnson, J. L., Daily, C. M., and Ellstrand, A. E. 1996. Boards of directors: A review and research agenda. ***Journal of Management.*** 22(3): 409-438.
* Johnson, R. A., Hoskisson, R. E., and Hitt, M. A. 1993. Board of director involvement in restructuring--The effects of board versus managerial controls and characteristics. ***Strategic Management Journal.*** 14: 33-50.
* Judge, W. Q., and Zeithaml, C. P. . 1992. Institutional and strategic choice perspectives on board involvement in the strategic-decision process. ***Academy of Management Journal***. 35(4): 766-794.
Kang, H. G, Lee, C. M., and Seok, W. N. 2012. ***The Effect of Sarbanes-Oxley (SOX) Act on Retired CEO Director Quality.*** Working Paper
Kaplan, S. 2012. ***Executive compensation and corporate governance in the US: Perceptions, facts, and challenges.*** Chicago Booth working paper.
Kaplan, S. N., and Reishus, D. 1990. Outside Directorships and Corporate Performance. ***Journal of Financial Economics.*** 27(2):389-410.
Keys, P. Y., and Li, J. 2005. Evidence on the Market for Professional Directors. ***Journal of Financial Research.*** 28(4):575. 589.
Lee, C. M. 2009. The Market for Corporate Directors. Working Paper available at SSRN: http://papers. ssrn.com/sol3/papers. cfm? abstract_id=1071703
Li, J. 1997. ***Board of Directors in the Context of Corporate Governance: Two Essays.*** Ph. D. Thesis, Florida State University.
* Marquis, C. 2003. The Pressure of the Past: Network Imprinting in Intercorporate Communities. ***Administrative Science Quarterly.*** 48(4): 655-689.
Milgrom, P. R., and Roberts, J. 1992***. Economics, Organization, and Management.*** Englewood Cliffs, N. J. : Prentice-Hall.
Murphy, K., and Zabojnik, J. 2004. CEO Pay and Appointment: A Market-Based Explanation for Recent Trends. ***American Economic Review Papers and Proceedings.*** 94(2):192-96
* Nguyen, B. D. 2011. Does the Rolodex Matter? Corporate Elite's Small World and the Effectiveness of Boards of Directors. ***Management Science***. 58(2): 236-252.
* O'Leary, M. B., Mortensen, M. and Woolley, W. A. 2011. Multiple Team Membership: A Theoretical Model of its Effects on Productivity and Learning for Individuals, Teams, and Organizations. ***Academy of Management Review.*** 36(2):461-478.

Pfeffer, J., and Salancik, G. R. 1978. ***The External Control of Organizations.*** New York: Harper and Row.

Piot, C. and Janin, R. 2007. External auditors, audit committees and earnings management in France. ***European Accounting Review.*** 16(2): 429-454.

* Rindova, V. P. 1999. What corporate boards have to do with strategy: A cognitive perspective. ***Journal of Management Studies.*** 36(7): 953-975.

Sinclair-Desgagné, B. (1994). The First-Order Approach to Multi-signal Principal-Agent Problems. ***Econometrica***, 62(2), 459-66.

Shapiro, C. and Stiglitz, J. 1984. Equilibrium Unemployment as a Discipline Device. American Economic Review. 74:433-44.

* Shipilov, A. V., Greve, H. R., and Rowley, T. J. 2010. When Do Interlocks Matter? Institutional Logics and the Diffusion of Multiple Corporate Governance Practices. ***Academy of Management Journal***. 53(4): 846-864.

* Tihanyi, L., Johnson, R. A., Hoskisson, R. E., and Hit, M. A. 2003. Institutional ownership differences and international diversification: The effects of boards of directors and technological opportunity. ***Academy of Management Journal.*** 46(2): 195-211.

Vafeas, N. 2001. On audit committee appointments. ***Auditing-a Journal of Practice and Theory.*** 20(1): 197-207.

Weisbach, M., and Hermalin, B. 1988. The Determinant of Board composition. ***RAND Journal of Economics.*** 19:589-606.

* Westphal, J. D. 1999. Collaboration in the boardroom: Behavioral and performance consequences of CEO-board social ties. ***Academy of Management Journal***. 42(1): 7-24.

Yeh, Y. H., and Woidtke, T. 2005. Commitment or entrenchment? : Controlling shareholders and board composition. ***Journal of Banking and Finance.*** 29(7): 1857-1885.

Yermack, D. 1996. Higher Market Valuation for Firms with a Small Board of Directors. ***Journal of Financial Economics.*** 40:185-11.

Yermack, D. 1997. Good Timing: CEO Stock Option Awards and Company News Announcements. ***Journal of Finance.*** 52(2):449-476.

9. APPENDIX: MODEL

CEO Quality and Board Quality

In the first stage, the firm only has a prior distribution for the quality of an incumbent CEO, Q_u[17], which has a mean $\mu > 0$. [18]In the second stage, the firm would be likely to find the true quality of the CEO, Q_u. The probability of finding the true quality depends on the quality of the monitoring committee (or independent directors), Q_{MC}. Otherwise, the firm learns nothing about the incumbent CEO with probability $1 - Q_{MC}$. Finally, the firm decides whether or not to fire the incumbent CEO based on the true quality $Q_u$or the prior expectation of the quality of the CEO, and then the market value of a firm is realized. If the incumbent CEO is fired, the market value of a firm depends on the quality of the replaced CEO. The quality of a potentially replaced CEO is randomly distributed with mean 0. If the firm finds the true quality of an incumbent CEO, the incumbent CEO is fired when

$$Q_u < 0$$

When the firm finds nothing, the incumbent CEO is retained because the firm decides whether or not to fire the incumbent CEO based on the prior expectation, μ, and $\mu > 0$. For the sake of exposition, the probability of an incumbent CEO's being retained when the firm finds the true quality of an incumbent CEO is $H(Q_u)$and $H'(Q_u) > 0$. Now, we will derive the market value of a firm, which depends on the qualities of the CEO and boards. The market value of a firm is

$$M(Q_k, Q_{AC}, Q_{MC}) = \underbrace{F(Q_k, Q_{AC}, Q_{MC})}_{Earning} - \underbrace{W_{CEO} - NW_{Director}}_{Cost}, k = u \text{ or } r \quad (1)$$

Where F is the earning (or production) function, $Q_k$is the quality of CEO. u represents incumbent CEO and r represents the potentially replaced CEO. Q_{MC} is the quality of monitoring committee, and $Q_{AC}$is the quality of advising committee. The cost is composed of two parts; the CEO pay, W_{CEO}; and the pay for directors, $W_{Director}$. N is the size of boards. [19]

Motivation for Hypothesis 1 and 2 (CEO Pay):

The CEO's pay, W_{CEO}, in Equation (1) is composed of two parts:

$$W_{CEO} = W_{CEO}^{u} + W_{CEO}^{r}$$

where $W_{CEO}^{u}$is the compensation of an incumbent CEO,[20]and W_{CEO}^{r}denotes the wage level of a potentially replaced CEO. This analysis focuses on the wage level of an incumbent CEO.
We assume symmetric complementarities (Becker (1981) and Becker (1993)) between CEO quality and board quality. [21]The earning (or production) function is

---

[17] This assumption implies that it is uncertain that the CEO's (general) skill would be well-matched with the firm-specific project and environment.
[18] We assume μ is greater than 0, otherwise the firm would fire the CEO at once and hire a new one.
[19] Director compensation can be separated into two parts. One is an annual retainer, and the other is compensation depending on his chairmanship and membership of board committee. However, in our model, we assume that director compensation is the same within the firm.
[20] We assume that $W_{CEO}^{u}$is given to the incumbent CEO before finding his true quality or finding nothing.
[21] Alternatively, we can consider the production function which is asymmetrically sensitive to the quality of CEO and of boards, for instance,

$$F(Q_k, Q_{AC}, Q_{MC}) = S^{\sigma} E[Q_k] Q_{AC} \quad (2)$$

where S denotes the size of a firm,[22] σ indicates "return-to-scale" parameter and $E[Q_k]$ indicates the expected quality of the CEO. Based on Weisbach and Hermalin (1988), Murphy and Zabojnik (2004), Gabaix and Landier (2008), and Lee (2009), the market value of a firm is

$$M(Q_k, Q_{AC}, Q_{MC}) = \underbrace{S^{\sigma} E[Q_k] Q_{AC}}_{Earning} - \underbrace{W_{CEO} - NW_{Director}}_{Cost}, k = u \; or \; r$$

If an incumbent CEO is retained, the market value of a firm depends on the quality of an incumbent CEO, Q_u. Otherwise, the market value of a firm depends on the quality of a replaced CEO, Q_r. Q_{AC} is the quality of advising committee. More specifically, the market value of a firm is

$$\begin{aligned} M(Q_k, Q_{AC}, Q_{MC}) \quad = \quad & \underbrace{S^{\sigma} Q_{MC} H(Q_u) Q_u Q_{AC}}_{Expected\ earning\ with\ true\ quality} \\ + \quad & \underbrace{S^{\sigma}(1 - Q_{MC}) \mu Q_{AC}}_{Expected\ earning\ from\ no\ information} \\ & \underbrace{W_{CEO} - NW_{Director}}_{Cost}, k = u \; or \; r \end{aligned} \quad (3)$$

The earnings of a firm can be separated into two cases, i) the CEO is replaced or ii) the CEO is retained. Since the expected quality of the replaced CEO, $E[Q_r]$ is 0, we do not include case i) in Equation (3).

Suppose that W_{CEO}^{u} is equal to the expected marginal contribution of an incumbent CEO's prior quality to the earnings of a firm. Taking the derivative of Equation (3) with respect to μ, W_{CEO}^{u} is

$$W_{CEO}^{u} = S^{\sigma}(1 - Q_{MC}) \mu Q_{AC}$$

Then, CEO pay is higher at the firms with higher Q_{AC} and is lower with higher Q_{MC}.

Derivation of Hypothesis 3 (Executives pay):

Based on Gabaix and Landier (2008), we assume that the production of a firm is considered as the collection of each manager's production. Then, the market value of a firm is given by

$$M\left(Q_k^{CEO}, Q_k^i, Q_{AC}, Q_{MC}\right) = F\left(Q_k^{CEO}, Q_{AC}, Q_{MC}\right) + \sum_{i=1}^{I} F\left(Q_k^i, Q_{AC}, Q_{MC}\right)$$

$$S^{\sigma}(E[Q_k])^{\theta}(Q_{AC})^{1-\theta}$$

This is originally proposed by Kremer and Maskin (1996). This, however, does not affect the qualitative prediction of the model used in this paper.

[22] This set-up reflects the "Size-Skill Complementarity". See Gabaix and Landier (2008) for more details.

$$-W_{CEO} - \sum_{\substack{i=1 \\ k = u \text{ or } r}}^{I} W_i - NW_{Director}$$

$F\left(Q_k^{CEO}, Q_{AC}, Q_{MC}\right)$ is the production of CEO. $F\left(Q_k^i, Q_{AC}, Q_{MC}\right)$ is the production of each manager *i*. Q_k^{CEO} is the quality of CEO. Q_k^i is the quality of each manager *i* below CEO. If the boards monitor and advise each manager in the same way under the assumption of the symmetric complementarities between managers' quality and board quality, the pay of each manager is:

$$W_i^u = S^{\sigma_i}(1 - Q_{MC})\mu Q_{AC}.$$

Here, we include a heterogeneous return-to-scale parameter, σ_i. Then our theoretical predictions are the same as those for CEO pay. Executive pay is higher at firms with higher Q_{AC} and lower Q_{MC} in the case of complement between executive's quality and board quality. It naturally follows that the relative wage between the CEO and executives below the CEO is:

$$\frac{W_i^{CEO}}{W_i^u} = S^{\sigma_{CEO} - \sigma_i}.$$

Therefore, board quality does not matter in the relative pay of the CEO compared to executives below the CEO.

Table 1: Related Concepts of Board Quality

Reference	Discussion
Booth and Deli (1996)	Firm size: CEOs in large firms have more outside directorship because of their better social network.
Ferris, Jagannathan and Pritchard (2003)	Number of ties: A director in a larger firm holds more directorships. Such multiple directorships do not harm firm performance (measured with market-to-book ratio).
Fich and Shivdasani (2006)	Number of ties: Multiple directorships (more than two board membership) are linked to weak corporate governance.
Fich and Shivdasani (2007)	Experience and reputation: Financial fraud harms directors' reputations -- directors can hold fewer directorships at other firms after fraud in their firms, and directors can even lose their board seats if their firms are sued.
Keys and Li (2005)	Number of ties: Professional directors (holding at least two board memberships) are more likely to receive new appointment after takeover. And, a board with more professional directors tends to generate better performance because of their better human capitals.
Brickley, Linck and Coles (1999)	Experience and past performance: If CEOs generate high accounting performance, they receive more outside directorship and tend to remain on their own boards after retiring.
Coles, Daniel and Naveen (2008)	Number of outside directors: Larger boards are required for larger firms, diversified firms, and leveraged firms.
Coles, Daniel and Naveen (2012)	Number of ties per director: "…We compute our measure of Advising Quality as follows. First, for each outside director in a given firm, we count the number of directors on other firms that he or she is connected to by serving together as directors on the board of another company. Then we sum across all outside directors of the firm, taking care to eliminate duplicate connections. Finally, we divide the sum by the number of outside directors to obtain Advising Quality per outside director. Total Advising is given by the product of Advising Quantity × Advising Quality, where Advising Quantity represents that number of outside directors …" The more the complexity of a firm, the higher the quality and quantity of board advising for the firm.

Table 2: Sample Statistics

This table shows the sample statistics for the variables during 1996-2011. Executive compensation is based on TDC1, which includes salary, bonus, other annual compensation, long-term incentive payouts, restricted stock granted, Black-Scholes value of stock options granted, and all other compensation. Executive team pay excluding the CEO is the sum of top-four executives' compensation excluding the CEO. The CPS is the ratio of CEO compensation to the total top-five executive compensation. CEO from outside is assigned 1 if the date he joined company and the date he became CEO are the same, and 0 otherwise. CEO Tenure is the difference between the observed year and the year when he became CEO. % of CEO Ownership shows the percentage of shares the CEO owns. Industry-Adjusted Return on Asset (ROA) is calculated as ROA minus the median value of each industry (SIC 2-digit) ROA. ROA is the return on asset calculated by net income divided by book value of assets. Industry-Adjusted Annual Stock Return (ASR) is calculated as ASR minus the median value of each industry (SIC 2-digit) ASR. Board Size is the number of board members. Non- independent Director on a Compensation Committee becomes 1 if the compensation committee includes a non-independent director and 0 otherwise. If the CEO serves as a chairman at the board, the CEO Duality dummy equals 1. Director-tied firm size is the average firm size where independent board members hold external directorships. Firm size is measured by total assets. # of director-ties is the average number of external directorships held by independent board members holding external directorship(s). % of director-ties is the ratio of independent board members holding more than one directorship. All values are adjusted for inflation by using the GDP deflator and are in 2005 dollars (thousands).

Variable	Obs	Mean	Std. Dev.	Min	Max
CEO Pay (Thousands of 2005$)	12726	4870.36	4131.35	276.29	23624.47
Executive Team Pay except CEO (Thousands of 2005$)	12726	6766.95	5844.81	640.33	78876.42
CEO Pay Slice (CPS)	12726	40.78	8.65	20.26	94.69
CEO from outside of the firm	12726	0.27	0.44	0.00	1.00
CEO Tenure	12726	6.40	6.08	0.00	33.00
Percentage of CEO stock ownership	12726	1.21	3.03	0.00	30.14
Industry Adjusted Return on Asset by Industry (SIC 2-digit) Median	12726	1.78	10.67	-265.13	47.58
Industry Adjusted Annual Stock Return by Industry (SIC 2-digit) Median	12726	4.45	37.04	-100.54	328.71
Entrenchment Index from Bebchuk, Cohen and Ferrell (2009)	12726	2.77	1.35	0.00	6.00
Total Asset (Millions of 2005$)	12726	12118.49	49378.60	49.71	1653050.00
Percentage of executive team stock ownership except CEO	12726	0.70	1.82	0.00	19.08
Board Size	12670	9.70	2.51	5.00	21.00
Non-independent Director in Compensation Committee	12670	0.13	0.34	0.00	1.00
Percentage of Independent Directors	12670	0.73	0.15	0.00	1.00
CEO Duality (CEO holds chairman position)	12670	0.63	0.48	0.00	1.00
Director-tied firm size (Thousands of 2005$)	10676	20635.68	40672.38	68.46	837470.60
# of director-ties	10676	1.88	0.68	1.00	8.00
% of director-ties	10676	59.12	22.57	6.67	100.00

Table 3: Relationship between Executive Compensation and Board Quality
This table shows the pairwise correlation coefficients between compensation and the measurement about the monitoring quality of a board during 1996-2011. Team pay excluding the CEO is the sum of top-four executives' compensation excluding the CEO. The CPS is the ratio of CEO compensation to the total top-five executive compensation. Director-tied firm size is the average firm size where independent board members hold external directorships. Firm size is measured by total assets. # of director-ties is the average number of external directorships held by independent board members holding external directorships. The % of director-ties is the ratio of independent board members holding more than one directorship. *, **, and *** indicate significance level of each correlation coefficient at the 10%, 5%, and 1% levels.

	CEO Pay	Team Pay	CPS	Director-tied firm size	# of director-ties	% of director-ties
CEO Pay	1					
Team Pay	0.8294***	1				
CPS	0.4173***	-0.0357***	1			
Director-tied firm size	0.3111***	0.3616***	0.0052	1		
# of director-ties	0.1784***	0.1726***	0.0378***	0.1281***	1	
% of director-ties	0.2908***	0.2791***	0.0751***	0.1472***	0.2352***	1

Table 4: Regression of Executive's Total Compensation
This table shows the results of the industry and year fixed effects regression during 1996-2011. Industry effects are based on the SIC 2-digit code. The dependent variable is the total compensation for the CEO and for the executive team excluding the CEO. See Table 2 for a description of the variables. *, **, and *** indicate significance at the 10%, 5%, and 1% levels. Industry and year fixed effects are controlled.

Dependent Variable : Ln (Total Pay)	CEO			Executive Team Except CEO		
	(1)	(2)	(3)	(4)	(5)	(6)
CEO from Outside of the Firm	0.123***	0.116***	0.122***	0.054***	0.054***	0.052***
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
CEO from Outside is Missing	0.027**	0.028**	0.022	-0.011	-0.010	-0.010
	(0.036)	(0.033)	(0.104)	(0.297)	(0.383)	(0.392)
CEO Tenure	0.005***	0.002**	0.005***	0.004***	0.003***	0.005***
	(0.000)	(0.021)	(0.000)	(0.000)	(0.003)	(0.000)
% of CEO Ownership	-1.083***	-1.125***	-1.554***	-0.689***	-0.730***	-1.049***
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
Ind-Adj ROA	0.447***	0.446***	0.479***	0.341***	0.343***	0.353***
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
Ind-Adj Annual Stock Return	0.156***	0.154***	0.167***	0.147***	0.148***	0.154***
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
E-index	0.027***	0.022***	0.021***	0.005	0.004	0.001
	(0.000)	(0.000)	(0.000)	(0.231)	(0.361)	(0.757)
Ln(Total Asset)	0.426***	0.426***	0.396***	0.399***	0.396***	0.373***
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
Executive Team Ownership Except CEO	-1.547***	-0.931***	-1.018**	0.053	0.188	0.255
	(0.000)	(0.005)	(0.012)	(0.834)	(0.466)	(0.405)
Board Size		-0.013***	-0.009***		-0.001	0.002
		(0.000)	(0.005)		(0.769)	(0.543)
Non-independent Director in		0.009	0.034		-0.031**	-0.014
Compensation Committee		(0.629)	(0.103)		(0.045)	(0.388)
Percentage of Independent Directors		0.218***	0.239***		-0.016	-0.053
		(0.000)	(0.000)		(0.678)	(0.222)
CEO Duality		0.113***	0.088***		0.043***	0.030***
		(0.000)	(0.000)		(0.000)	(0.005)
Ln (Director-tied firm size)			0.003			0.002
			(0.648)			(0.664)
# of director-ties			0.035***			0.032***
			(0.000)			(0.000)
% of director-ties			0.246***			0.226***
			(0.000)			(0.000)
Constant	4.406***	4.346***	4.298***	5.146***	5.164***	5.144***
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
N	12726	12670	10676	12726	12670	10676
Adj R-square	0.537	0.542	0.548	0.591	0.591	0.601

Table 5: Regression of Executive's Stock Related Compensation
This table shows the results of the industry and year fixed effects regression during 1996-2011. Industry effects are based on the SIC 2-digit code. The dependent variable is stock-related compensation for CEO and for executive team excluding CEO. Stock-related compensation is calculated by total compensation (TDC1) minus current compensation (TCC) in the CompustatExecomp database. See Table 2 for a description of the variables. *, **, and *** indicate significance at the 10%, 5%, and 1% levels. Industry and year fixed effects are controlled.

Dependent Variable : Ln(Stock Pay)	CEO			Executive Team Except CEO		
	(1)	(2)	(3)	(4)	(5)	(6)
CEO from Outside of the Firm	0.170***	0.156***	0.173***	0.093***	0.087***	0.092***
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
CEO from Outside is Missing	0.007	0.010	0.015	-0.026	-0.023	-0.022
	(0.780)	(0.701)	(0.546)	(0.204)	(0.258)	(0.297)
CEO Tenure	-0.002	-0.004**	0.001	0.001	-0.001	0.003
	(0.375)	(0.043)	(0.535)	(0.718)	(0.587)	(0.102)
% of CEO Ownership	-2.579***	-2.527***	-3.095***	-2.166***	-2.187***	-2.768***
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
Ind-Adj ROA	0.380***	0.379***	0.516***	0.369***	0.376***	0.454***
	(0.002)	(0.002)	(0.000)	(0.001)	(0.001)	(0.000)
Ind-Adj Annual Stock Return	0.166***	0.167***	0.175***	0.175***	0.175***	0.176***
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
E-index	0.067***	0.057***	0.053***	0.034***	0.030***	0.025***
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.002)
Ln (Total Asset)	0.547***	0.546***	0.504***	0.521***	0.520***	0.485***
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
Executive Team Ownership Except CEO	-3.388***	-2.016***	-2.479***	-1.626***	-1.160**	-1.106
	(0.000)	(0.010)	(0.008)	(0.003)	(0.042)	(0.100)
Board Size		-0.019***	-0.010*		-0.010**	-0.004
		(0.001)	(0.081)		(0.024)	(0.351)
Non-independent Director in		-0.011	0.031		-0.049	-0.021
Compensation Committee		(0.772)	(0.437)		(0.106)	(0.513)
Percentage of Independent Directors		0.496***	0.451***		0.151*	0.104
		(0.000)	(0.000)		(0.053)	(0.204)
CEO Duality		0.154***	0.112***		0.083***	0.048**
		(0.000)	(0.000)		(0.000)	(0.017)
Ln (Director-tied firm size)			-0.023**			-0.017*
			(0.045)			(0.060)
# of director-ties			0.040**			0.049***
			(0.026)			(0.001)
% of director-ties			0.474***			0.427***
			(0.000)			(0.000)
Constant	2.430***	2.249***	2.412***	3.119***	3.098***	3.177***
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
N	12681	12625	10647	12709	12653	10664
Adj R-square	0.372	0.378	0.392	0.445	0.447	0.463

Table 6: Regression Result of Executive's Current Compensation
This table shows the results of the industry and year fixed effects regression. Industry effects are based on the SIC 2-digit code. The dependent variable is current compensation (TCC in the CompustatExecomp database) for the CEO and for the executive team excluding the CEO. See Table 2 for a description of the variables. *, **, and *** indicate significance at the 10%, 5%, and 1% levels. Industry and year fixed effects are controlled.

Dependent Variable : Ln(Current Pay)	CEO			Executive Team Except CEO		
	(1)	(2)	(3)	(4)	(5)	(6)
CEO from Outside of the Firm	0.035***	0.036***	0.035***	0.006	0.012	0.009
	(0.003)	(0.002)	(0.006)	(0.522)	(0.153)	(0.308)
CEO from Outside is Missing	0.002	0.001	-0.002	-0.007	-0.007	-0.003
	(0.840)	(0.927)	(0.857)	(0.331)	(0.385)	(0.700)
CEO Tenure	0.008***	0.006***	0.007***	0.004***	0.003***	0.004***
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
% of CEO Ownership	-0.315	-0.365*	-0.827***	0.223	0.191	-0.009
	(0.101)	(0.063)	(0.001)	(0.108)	(0.166)	(0.957)
Ind-Adj ROA	0.394***	0.392***	0.403***	0.232***	0.231***	0.224***
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
Ind-Adj Annual Stock Return	0.141***	0.143***	0.156***	0.110***	0.113***	0.120***
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
E-index	0.014***	0.009**	0.007*	-0.003	-0.003	-0.006**
	(0.000)	(0.010)	(0.074)	(0.364)	(0.219)	(0.048)
Ln (Total Asset)	0.261***	0.246***	0.230***	0.260***	0.246***	0.233***
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
Executive Team Ownership Except CEO	-0.332	-0.040	0.090	1.187***	1.107***	1.226***
	(0.171)	(0.867)	(0.748)	(0.000)	(0.000)	(0.000)
Board Size		0.008***	0.009***		0.015***	0.015***
		(0.000)	(0.000)		(0.000)	(0.000)
Non-independent Director in		0.024*	0.043***		-0.014	0.001
Compensation Committee		(0.094)	(0.007)		(0.176)	(0.938)
Percentage of Independent Directors		0.078**	0.069		-0.113***	-0.161***
		(0.044)	(0.124)		(0.000)	(0.000)
CEO Duality		0.098***	0.094***		0.026***	0.027***
		(0.000)	(0.000)		(0.000)	(0.000)
Ln (Director-tied firm size)			0.011***			0.009***
			(0.006)			(0.004)
# of director-ties			0.029***			0.029***
			(0.000)			(0.000)
% of director-ties			0.059***			0.071***
			(0.003)			(0.000)
Constant	4.968***	4.901***	4.842***	5.624***	5.626***	5.593***
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
N	12696	12640	10650	12726	12670	10676
Adj R-square	0.544	0.548	0.560	0.616	0.619	0.632

Table 7: Regression Result of Stock-Related Pay over Total Pay
This table shows the results of the industry and year fixed effects regression. Industry effects are based on the SIC 2-digit code. The dependent variable is the proportion of stock-related compensation in total compensation ((TDC1-TCC)/TDC1 in the CompustatExecomp database) for the CEO and for the executive team excluding the CEO. See Table 2 for a description of the variables. *, **, and *** indicate significance at the 10%, 5%, and 1% levels. Industry and year fixed effects are controlled.

Dependent Variable :	CEO			Executive Team Except CEO		
Stock Pay/Total Pay	(1)	(2)	(3)	(4)	(5)	(6)
CEO from Outside of the Firm	2.639***	2.362***	2.602***	1.838***	1.579***	1.711***
	(0.000)	(0.000)	(0.000)	(0.000)	(0.001)	(0.000)
CEO from Outside is Missing	0.298	0.352	0.436	-0.336	-0.299	-0.324
	(0.501)	(0.427)	(0.343)	(0.392)	(0.446)	(0.432)
CEO Tenure	-0.165***	-0.180***	-0.106***	-0.063**	-0.077**	-0.016
	(0.000)	(0.000)	(0.009)	(0.043)	(0.017)	(0.661)
% of CEO Ownership	-0.390***	-0.377***	-0.385***	-0.441***	-0.439***	-0.501***
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
Ind-Adj ROA	0.571	0.628	2.316	3.632*	3.773*	5.046**
	(0.774)	(0.754)	(0.309)	(0.057)	(0.050)	(0.022)
Ind-Adj Annual Stock Return	0.382	0.334	0.138	1.222**	1.153**	0.986*
	(0.477)	(0.533)	(0.810)	(0.011)	(0.016)	(0.060)
E-index	0.959***	0.874***	0.853***	0.623***	0.574***	0.531***
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.001)
Ln (Total Asset)	5.303***	5.561***	5.067***	5.321***	5.602***	5.153***
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
Executive Team Ownership Except CEO	-0.485***	-0.321**	-0.394***	-0.549***	-0.446***	-0.455***
	(0.000)	(0.012)	(0.009)	(0.000)	(0.000)	(0.000)
Board Size		-0.508***	-0.349***		-0.519***	-0.407***
		(0.000)	(0.001)		(0.000)	(0.000)
Non-independent Director in Compensation Committee		-0.386	-0.113		-0.531	-0.370
		(0.558)	(0.873)		(0.347)	(0.545)
Percentage of Independent Directors		7.206***	7.294***		5.082***	5.065***
		(0.000)	(0.000)		(0.000)	(0.001)
CEO Duality		1.135***	0.373		1.001***	0.366
		(0.007)	(0.396)		(0.006)	(0.346)
Ln (Director-tied firm size)			-0.567***			-0.506***
			(0.004)			(0.003)
# of director-ties			0.471			0.452
			(0.152)			(0.111)
% of director-ties			6.905***			7.305***
			(0.000)			(0.000)
Constant	4.055**	2.369	5.069**	-0.287	-0.656	1.332
	(0.012)	(0.215)	(0.019)	(0.838)	(0.693)	(0.482)
N	12726	12670	10676	12726	12670	10676
Adj R-square	0.320	0.325	0.342	0.355	0.360	0.380

Table 8: Regression of CEO Pay Slice (CPS)
This table shows the regression result of CPS on CEO, board, and firm characteristics. CPS is the ratio of CEO compensation to the total top-five executive compensation. The first three columns use CPS based on total compensation (TDC1 in CompustatExecomp database) as the dependent variable. The next three columns use CPS based on stock-related compensation (TDC1 - TCC in CompustatExecomp database) as the dependent variable. The first three columns use CPS based on current compensation (TCC in CompustatExecomp database) as the dependent variable. The regressions include industry and year fixed effects. Industry Effects are based on the SIC 2-digit code. See Table 2 for description of variables. *, **, and *** indicate significance at the 10%, 5% and 1% levels, respectively. Industry and year fixed effects are controlled.

Dependent Variable: CPS	Total Pay			Stock Pay			Current Pay		
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
CEO from Outside of the Firm	1.644***	1.474***	1.643***	1.878***	1.714***	1.970***	0.739***	0.617***	0.641***
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.001)
CEO from Outside is Missing	0.921***	0.887***	0.764***	1.098***	1.077***	1.115***	0.190	0.144	-0.023
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.189)	(0.315)	(0.882)
CEO Tenure	0.028*	-0.001	0.016	-0.035	-0.063**	-0.031	0.088***	0.061***	0.068***
	(0.069)	(0.959)	(0.364)	(0.152)	(0.012)	(0.256)	(0.000)	(0.000)	(0.000)
% of CEO Ownership	-0.091***	-0.091***	-0.118***	-0.122*	-0.111*	-0.171**	-0.128***	-0.130***	-0.192***
	(0.008)	(0.008)	(0.002)	(0.066)	(0.095)	(0.028)	(0.000)	(0.000)	(0.000)
Ind-Adj ROA	0.025***	0.024***	0.029***	0.009	0.008	0.016	0.036***	0.036***	0.039***
	(0.002)	(0.002)	(0.001)	(0.419)	(0.472)	(0.199)	(0.000)	(0.000)	(0.000)
Ind-Adj Annual Stock Return	0.002	0.001	0.003	-0.002	-0.002	-0.000	0.007***	0.007***	0.009***
	(0.376)	(0.514)	(0.221)	(0.511)	(0.485)	(0.980)	(0.000)	(0.000)	(0.000)
E-index	0.519***	0.427***	0.451***	0.761***	0.631***	0.663***	0.379***	0.293***	0.304***
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
Ln (Total Asset)	0.642***	0.717***	0.544***	0.594***	0.586***	0.418***	-0.010	-0.041	-0.105
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.003)	(0.844)	(0.485)	(0.151)
Executive Team	-0.371***	-0.259***	-0.296***	-0.374***	-0.219**	-0.274***	-0.337***	-0.259***	-0.241***
Ownership Except CEO	(0.000)	(0.000)	(0.000)	(0.000)	(0.011)	(0.008)	(0.000)	(0.000)	(0.000)
Board Size		-0.286***	-0.237***		-0.201***	-0.132*		-0.146***	-0.121***
		(0.000)	(0.000)		(0.002)	(0.064)		(0.000)	(0.001)
Non-independent Director in		0.923***	1.123***		0.953**	1.316***		0.884***	0.957***
Compensation Committee		(0.001)	(0.000)		(0.030)	(0.006)		(0.000)	(0.000)
Percentage of Independent Directors		0.054***	0.067***		0.070***	0.082***		0.041***	0.051***
		(0.000)	(0.000)		(0.000)	(0.000)		(0.000)	(0.000)
CEO Duality		1.642***	1.379***		1.716***	1.473***		1.536***	1.425***
		(0.000)	(0.000)		(0.000)	(0.000)		(0.000)	(0.000)
Ln (Director-tied firm size)			0.014			-0.114			0.024
			(0.871)			(0.402)			(0.709)
# of director-ties			0.093			0.046			0.002
			(0.497)			(0.832)			(0.983)
% of director-ties			0.005			0.004			-0.001
			(0.223)			(0.577)			(0.741)
Constant	32.234***	30.469***	29.805***	34.407***	31.393***	32.209***	34.531***	32.960***	32.332***
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
N	12726	12670	10676	12714	12658	10668	12726	12670	10676
Adj R-square	0.058	0.077	0.083	0.038	0.046	0.046	0.109	0.127	0.142

[i] See economics and finance literature such as Fama and Jensen, 1983ab; Adams, R. B., Hermalin, B. E. and Weisbach , 2010; Coles, Daniel and Naveen, 2008, 2012. See related management literature such as Pfeffer and Salancik, 1978; Judge and Zeithaml, 1992; Gomez-Mejia and Balkin, 1992; Johnson, Hoskisson, and Hitt, 1993; Johnson, Daily and Ellstrand, 1996; Rindova, 1999; Westphal, 1999; Ellstrand, Tihanyi, and Johnson, 2002; Hillman and Dalziel, 2003; Hillman, 2005. We put "*" to denote management literature in the reference.