"But, Mom, all the other kids have one!" - CEO Compensation and Director Networks

Amir Barnea and Ilan Guedj[§]

This Draft: June 2006

Abstract

This paper explores how networks of directors affect CEO compensation. We find that firms that have more connected board members, and whose board members are connected to better connected firms award their CEOs a higher compensation. Controlling for firm size, investment opportunities, industry, and performance, a CEO of a firm which is in the top quintile of connected firms receives a 10% higher salary and a 13% higher total compensation than a CEO of a firm which is in the bottom quintile of connected firms. These results are robust to alternative explanations such as interlocked boards, busy boards, and entrenched boards; they are also robust to the independence of the board, geographic location of the firm, different governance measures, and potentially unobserved CEO or firm characteristics. These results highlight the important role that board networks play in the decision to compensate a CEO.

[‡]Preliminary. Comments are very welcome.

[§]Both authors are from the department of Finance, McCombs School of Business, University of Texas at Austin, Austin, TX. (Barnea: phone: 512-471-2012 email: amir.barnea@mccombs.utexas.edu) (Guedj: phone: 512-471-5781 email: guedj@mail.utexas.edu)

> Outlandish goodies are showered upon CEOs simply because of a corporate version of the argument we all used when children:
> "But, Mom, all the other kids have one."
>
> Warrant Buffet in a letter to Berkshire Hathaway shareholders, 2006.

1 Introduction

In the past few years there has been a resurgence of interest, both in the popular press and in the academic literature, on the ever-increasing level of CEO compensation.[1] While the formal procedure of setting the level of CEO pay which involves a compensation committee, an outside consultant and eventually the approval of the board of directors is clear, it still is not fully understood why boards seem to always be willing to raise the salary of CEOs.

In this paper we contribute to the literature analyzing CEO compensation by relating it to the characteristics of the board of directors approving this remuneration. Specifically, we employ methods from social network analysis to construct network measures of firms' directors. We use these measures to explore how, beyond standard controls and governance measures, CEO compensation is affected by board members' networks and by the centrality and predominance of these connections. Using data collected on firms which were included in the S&P 1,500 index between 1996 and 2004, we analyze the networks of board members each year and derive from them measures of the connectivity of each firm's board. Our main result is that firms that are better connected and whose connections are with better connected firms pay their CEOs significantly higher salaries and total compensation.

Theoretically, the board of directors is omnipotent in its capability of governing the firm.[2] This power held by the board highlights the importance of understanding

[1] See for example Murphy (1999) and Core, Guay, and Larcker (2003) for thorough reviews of the literature.

[2] See for example Kole (1997) or the Delaware Corporate Law sec 141.

how decisions are made at the board level and whether the characteristics of the board are relevant to its decisions. Our approach of applying measures of social networks to analyze board of directors emerges naturally from two main motives.

First, it is almost obvious that connections matter in business. They are important in hiring decisions, they are important in generating business so it is interesting to explore whether they are important when it comes to CEO compensation. Beyond that, the exposure of directors to other companies and other boards may change their perceptions of what is an acceptable compensation. As Bebchuk and Fried (2004) argue: *"... cognitive dissonance might lead even independent directors who are not executives themselves to hold beliefs that are conductive to granting generous executive compensation."*

Second, the methodology we employ in this study overcomes the limitation in observable characteristics of boards of directors. Unfortunately, we do not know enough about the members themselves even though they directly impact firms' decisions. Most academic research on boards has used the available data such as the basic identity of the board members, the size of the board, and which board member is independent. Alas, this information does not provide a full picture of what influences the decisions of board members. The most central characteristic that has been explored in the finance literature is board independence.[3] However, in some cases even this characteristic can be limited as its definition is somewhat arbitrary. For example, Verizon Communications contributed hundreds of thousands of Dollars to the National Urban League, while its head was sitting on the board (Strauss (2002)). Had it been a business partner, and not a non-profit, the director would have been defined as an insider. This example illustrates how important it is to try and find many different characteristics to describe and understand what may motivate the decisions of the board members. Our approach contributes to the literature by using

[3]For example: Core, Holthausen, and Larker (1999) find that more independent boards tend to award higher total compensation to CEOs.

the existing data but extracting from it in a clean way an alternative and complimentary measure that is independent of outside definitions, and is generated by simple observable links.

We find that, controlling for firm size, investment opportunities, industry, and observable characteristics of the CEO and the board, firms that have more connected boards grant higher salaries to their CEOs. Our results are statistically and economically significant. *Ceteris paribus*, a CEO of a firm which is in the top quintile of connected firms receives a 10% higher salary and a 13% higher total compensation than a CEO of a firm which is in the bottom quintile of connected firms.

What could be driving these results? A possible explanation is an expectation story à la Bebchuk and Fried (2004). When board members sit on multiple boards that are more accustomed to high salaries, they are more likely to approve an increase in CEO pay as they would not view it as lavish; they have seen worse.

In order to test this potential explanation we construct for each firm a variable that proxies for the average salary that its board members observe on the other boards they sit on. We then interact this variable with our network measures and find that indeed, connected boards that are accustomed to high pay on other boards, are even more likely to grant a higher salary than connected boards that are not exposed to such high salaries.

Moreover, the idea that board members implicitly benchmark CEO pay to what they observe in other firms, also implies that pay changes among well connected firms should move more closely together than pay changes among less connected firms as they have fewer examples to learn from. In line with that, we find that the unexplained pay change component (beyond standard controls) of highly connected firms has a much lower standard deviation than the unexplained pay change component of the least connected firms. Thus, the results of these tests support the idea that when connected board members have a "reference point" of higher salaries, it makes them more inclined to approve an increase in CEO pay.

While this idea explains a large part of the impact of our network measures on CEO pay, it does not account for the entire network effect. One possible reason is that our social network measures capture a larger picture that includes also the *social* aspects of those networks. Our social networks measures capture not only which firms a board member is directly connected to, but also how central and significant these connections are. This centrality proxies for the immeasurable social aspects that potentially affect board members, such as social events, parties, golfing, and so on. These unquantifiable aspects can have a large impact on the perceptions of board members and eventually on the decision these board members make.

A potential concern we address with respect to our results is that our network measures may be capturing an unobserved board, firm, or CEO characteristic. In order to account for this concern, we perform several robustness tests. First, we control in our analysis for many board characteristics and alternative explanations that have been shown in the literature to have an impact on governance or compensation. We control for independent boards (Core et al (1999)), busy boards (Fich and Shivdasani (2006)), interlocked boards (Hallock (1997)), entrenched boards (Bebchuk and Cohen (2005)), the Gompers, Ishii, and Metrick (2003) governance index, and the Bebchuk, Cohen, and Ferrell (2005) governance index. While these controls are important, they do not directly address the concern that our results are driven by unobserved characteristics at the firm or the CEO level. For example it is possible that "good CEOs" attract both high pay and connected board members independently yet simultaneously. In order to control for that, we perform our analysis using CEO fixed effects and (separately) firm fixed effects. We also perform a series of between effects and changes on changes analyses. All these alternative specifications yield essentially the same result that CEOs of companies that have a more connected board receive a higher compensation. These results compounded by our robustness tests, we believe, highlight the important role of board networks in the decision on CEO compensation.

Our paper is not the first one to study connections at the firm level that may

affect its board's decisions. Fich (2005) analyzes how connections are related to the appointment of a CEO to the firm. Agrawal and Knoeber (2001) explore how political connections of board members affect the likelihood of the firm receiving government contracts. Fich and Shivdasani (2006) find that boards that have "busy directors" have weaker governance. Hallock (1997) studies "interlocked boards" and finds that CEOs who lead interlocked firms earn higher compensation.[4] Lastly, Larcker et al. (2005) analyze a specific connection, the "back door" distance between a CEO and the chair of the compensation committee. They find that closer connections between the CEO and the chair of the compensation committee result in higher CEO compensation. Our study is conceptually different than these papers in the sense that it maps the entire network of firms as opposed to analyzing specific connections. We analyze multidimensional aspects of the overall networks that board members have with other firms, and question whether these connections affect CEO compensation. By doing so, our paper complements these previous studies by adding a new dimension to the understanding of the characteristics that affect board decisions.

The remainder of the paper proceeds as follows: in Section 2 we describe the data and how we construct the different network measures. Section 3 describes the empirical methodology and results. Section 4 describes our robustness tests for potential alternative explanations, and Section 5 concludes.

2 Data and Director Networks Measures

2.1 Sample Selection

We use five different data sets in order to generate our sample. The first is the IRRC-Directors data set which documents directors' characteristics for all firms that were included in the S&P 1,500 index during the years 1996-2004. Using this data set we

[4]When a director is also an executive at a firm on whose board the CEO sits, it is usually referred as an "interlock" between the two firms.

create the networks measures of firms and directors. We obtain CEO compensation data from ExecuComp and firm characteristics from Compustat and CRSP. Lastly, corporate governance variables are collected from the IRRC-Governance data set. In order to generate the final sample we impose two additional restrictions. First, we omit all observations in which the annual salary of the CEO is lower than \$50K. We are doing so since we view salaries below \$50K as a compensation which is well below the market value of a CEO of an S&P 1,500 firm. There were 157 of such cases during the entire sample. The reason that such cases exist is because it became popular among some mangers to deliberately give up their salary as some sort of a gesture to shareholders or their employees. For example, Apple's CEO, Steve Jobs, is known for the fact that he gave up his salary entirely in the last 8 years in which he served as a CEO.

The second restriction we impose is related to the network measures. Since the main purpose of this study is to explore social networks effects among directors and firms, we cannot include in our sample firm-year observations in which the relevant firm is not part of the network (we call these cases islands). Once a firm is not part of the network, which means that it is not linked to any other firm in the sample in a given year, it will be impossible to calculate its network scores and therefore meaningless to incorporate it in the analysis. We identified 1,473 firm-year observations that were classified as islands. We omit these observations from our sample. We do perform the analysis including islands as a robustness test, however, conceptually those are not truly comparable. Hence, we elect to exclude them from the analysis.

After imposing these two restrictions the final sample consists of 10,269 CEO-year observations. 1,956 unique firms appear in our final sample at least once.

We present summary statistics of firm and CEO characteristics in Table 1. The first group of columns documents the entire sample (before omitting island observation) whereas in the second and third groups we partition the sample to network

firms and island firms. As the table suggests, island firms are on average, smaller in size, younger in age, less leveraged and their CEOs earn a lower salary.

2.2 Networks measures

We generate three director network measures: degree, betweenness, and closeness. These measures are the most commonly used in research of networks in the social sciences.[5] Some of them were recently introduced also in the Finance literature in the context of venture capital (see Hochberg et al. (2006)) and mutual funds (see Kuhnen (2005)). We construct the three network measures following the standard methodology

For each firm and each year in our sample, we collect data on individual directors who serve on the firm's board during the sample period. Based on this information, we build an annual matrix of firm networks. The matrix maps the connections between the different firms in our sample, based on the individual connections of the directors. Rows and columns represent all firms in the sample for a specific year. If firm A and firm B share at least one director the value of cell (A, B) will be 1 and zero otherwise. For example, if we identify that director i sits on the boards of both firm A and firm B, this documents a link between the two firms. This link results in a value of 1. If more than one director sits on both boards it will still result in a value of 1 in the corresponding cell in the matrix.

Degree, the most straightforward measure, simply counts the number of direct links that each firm has to other firms in the network. The variable *Degree* is the sum of each row (or column) of the matrix described above. The mean number of links that a firm has over the entire sample is about 7. On the other hand, in the far end of the distribution, some companies had as many as 40 direct links for some years during the sample period (for example, JP Morgan Chase had 41 direct connections during the year of 1998.) Due to the skewness of the distribution of this variable we

[5]See for example Wasserman and Faust (1997) for an extensive discussion of such measures.

use the natural log of *Degree* in the regression analysis.

Closeness, adds another aspect to our analysis by evaluating the importance of the links that each firm has. The measure weights a firm's ties to other firms by the centrality of the firms it is tied to as measured by the *Degree* of these firms. In this paper, we define the variable *Closeness* to be the "eigenvector centrality" measure suggested by Bonacich (1972, 1987). Eigenvector centrality measures the extent to which a firm is connected to other well-connected firms. Formally, we use the symmetric matrix described above that documents the connections between all firms and derive the eigenvector of this matrix. Firm A's *Closeness* measure is simply given by its corresponding eigenvalue. It is important to stress that the *Closeness* measure is different from *Degree* as it is a recursive variable that assigns weights to each connection by taking into account the importance of the firm it is connected to. For example, if both firm A and firm B have a *Degree* measure of seven, but the seven links that firm A has are to better connected firms, then firm A's *Closeness* score will be higher than that of firm B.

Betweenness, estimates a different dimension of network centrality - non-direct links. In essence the measure evaluates the importance of each firm in linking other firms to each other. The key factor for a high betweenness score is the number of geodesic paths passing through a firm. To illustrate the measure, consider a case in which board member i serves as a director in both firm A and firm B and board member j serves as a director in both firm B and firm C. Assume also that there is no direct link between A and C (not a single joint director). Hence, firm B will have a high score of *Betweenness* as it stands in between firm A and firm C. It is of course hypothetically possible to draw a different non-direct link between firms A and C using an alternative path, however, this alternative path can be longer and less effective. Potentially, a firm that stands between many firms in the network has an important role, and this measure quantifies this role.

While these three measures are the standard way to measure connections between

firms, we perform a robustness test for our measures which we explain and present in Section 3. For this robustness test we construct an alternative matrix. For every year, we build a symmetric matrix of all directors in the network and assign a value of 1 if directors i and j sit on the same board. Using this matrix we construct the same network measures (*Degree*, *Closeness*, and *Betweenness*) for each *director*. We then average across directors in each firm every year. This measure yields similar to identical results. The purpose of this alternative way of calculating the network measures is to explore whether information is lost if for example only one director generates all the connectivity of the firm. By averaging across directors such cases disappear and we can verify that indeed it is not those outliers that drive our results.

Table 2 presents summary statistics of the above three social networks measures by year. It is interesting to note that although since 1997 there is a monotonic positive increase in mean CEO salary throughout the sample period, this isn't the case for the social networks measures. Two of the three measures, degree and closeness actually decline over most of the sample period. This result hints that it is not over-all inflation of board sits that generates the increase in CEO compensation.

3 Empirical Results

In this section, we present the results of our empirical analyses examining the association between the network of directors sitting on a firm's board and the compensation of the CEO of that firm. First, we show the basic regression that outlines the main results and show the relationship between our network measures and compensation. Then, we inquire how robust those measures are to CEO characteristics and to several governance measures. In Section 4 we discuss potential explanations of these results and run several tests and robustness tests in order to try and corroborate our hypothesis.

3.1 Main Results

Table 3 reports the results of the regression of CEO compensation on various network measures. There are six specifications alternating different measures of the board's network and CEO compensation. All the different specifications yield the same fundamental result: CEO compensation increases with an increase in the network of her board. For example, using the *Closeness* measure, a CEO of a firm that is in the top quintile of the connected firms, all else equal, will have a salary which is higher by $73,000 than that of a CEO of a firm in the bottom quintile of the connected firms. This is about the equivalent of a 11% higher salary. This highlights the important impact the network of the board has on the decision to award compensation to the firm's CEO.

We use two specifications for CEO compensation. In Table 3 columns (1) - (3), the dependent variable is *CEO Salary*, which is defined as the Dollar value ($ thousands) of the base salary (cash and non-cash) earned by the CEO during the fiscal year. This is the basic compensation of the CEO (after excluding from the sample CEOs that have elected not to receive any salary.) Looking at the salary without stock option seems to be a simple and clean measure. Hence when a board votes on a salary increase it understands very clearly the financial ramifications.

In Table 3 columns (4) - (6) we use a different specification. The dependent variable is *CEO Total Comp* which is the natural log of CEO total compensation (ExecuComp data item TDC1) which is comprised of the following: salary, bonus, other annual, total value of restricted stock granted, total value of stock options granted (using Black & Scholes), long-term incentive payouts, and all other total. This variable gives the full compensation of the CEO. As stated earlier, to some extent it is not completely clear when a board votes on a compensation scheme, what is the economic value of an option. For this reason, we think that *CEO Salary* is probably a cleaner variable in order to verify the understanding of the board when it votes on the CEO's salary. Nevertheless, *CEO Total Comp* represents the full

amount of compensation and is also very important. As Table 3 shows, we get the same results as with the variable *CEO Salary*: A CEO's compensation increases with an increase in the network scores of her firm. Using the *Closeness* measure, a CEO of a firm that is in the top quintile of the connected firms, all else equal, will have a total compensation that is higher by $746,000 than that of a CEO of a firm in the bottom quintile of the connected firms. This is the equivalent of a 14% higher compensation.

When comparing columns (1), (2), and (3) the results are similar using either one of our three network measures. The economic implication is also of the same magnitude. It is notable, however, that *Closeness* has a much higher statistical significance. To some extent, it is understandable as it not only incorporates more information than *Degree*, but it also incorporates more relevant information (for the purpose of this study) than *Betweenness.* The *Closeness* measure captures how well connected is the board, and to what other central firms is the board connected. As we hypothesize in this paper, it is the observation of other firms (captured directly by *Closeness*) that is important in affecting CEO compensation. These results are robust to using variations of these measures such as the intersection of *Degree* and *Closeness*.

All our regressions in Table 3 and in all the regressions hereafter use the same set of basic controls. *Assets* is the natural log of the book value of assets, and as has been shown in many previous studies it is the most significant factor explaining the pay of a CEO. Unsurprisingly, we also find a positive relation between firm size and CEO pay which is both statistically and economically significant. This is, of course, a very intuitive result; the larger the firm the more the firm can and needs to pay its CEO. This result has been shown in many studies. We have also run these regressions with non-linear specifications of size, and also when replacing size with market capitalization. In both cases the results are similar.

We also control for several variables to proxy for the current and future profitability of the firm: *Tobin's q*, following the definition in Kaplan and Zingales (1997),

controls for the firm's investment opportunities. *ROA*, the return on assets, has a high positive and statistically significant coefficient. We also use *TDA*, the total debt to assets, to proxy for the leverage of the firm. Finally, we control for the firm's age as it has been shown in numerous studies to be highly correlated with compensation. In the context of network analysis, firm age is a natural control since it is possible that some firms acquire more connections simply due to the fact that they have have been around longer. As Table 3 shows, we indeed find that firm age is positively correlated with CEO compensation. All the regressions have year and industry fixed effects to control for industry and time variations in compensations. Most of these control variables are significant but do not alter our basic results, indicating that controlling for the standard variables, our network measures have an important effect on compensation.

3.2 CEO Characteristics

Many studies have shown that CEO characteristics have an explanatory power both on firm performance (Bertrand and Schoar (2003)) and on CEO compensation (Murphy (1999)). From this stems the importance of testing if observables of the CEO have an impact on compensation when the network of board of directors is taken into account.

Table 4 reports the results of such a regression. We use the same specification as in our base regression in Table 3, the dependent variable is *CEO Salary*. Columns (1) - (3) report the regression results for our network measures. In columns (4) - (7) we explore each individual CEO characteristic impact on one network measure, *Closeness*. When comparing Table 3 and Table 4 one can see that adding the CEO characteristics does not alter neither the economic nor the statistical significance of the result. Adding all CEO characteristics unfortunately reduces the sample size from 10,017 observations to as low as 4,831 due to a lack of observations in ExecuComp. However, adding those variables increases the R^2 of the results from 53% to 60%, highlighting the additional value of those variables when available.

We use three main CEO characteristics: *CEO Age*, *CEO Gender*, and *CEO Tenure*. The longer the tenure of a CEO, the higher her salary. The economic value of tenure is not very high as, ceteris paribus, one more year on the job adds on average only $3,000 to a CEO. This result is consistent with the existing literature. One surprising result is that in our sample women CEOs receive higher salaries than men CEOs. We know that this in general is not the case. The sample in ExecuComp is problematic for that purpose as it only looks at very large firms, firms that were included at some point in time in the S&P 1,500. The few women in our sample (139 observations) are disproportionably in large successful firms and from that follows the higher average salary. This indeed is not representative. As one would expect the age of a CEO is positively correlated with salary. When all three variables are put together in a regression (columns (1) - (3)), CEO tenure looses significance as it is subsumed by the age of the CEO. Both measures are highly correlated and capture the same basic insight, representing the experience of the CEO which is usually rewarded with a higher compensation.

Tables 3 - 4 use all three of our network measures, and in almost all cases all three measures behave in the same way. From now on, we report results using only the *Closeness* measure for two reasons: First, this is done for clarity and simplicity; Second, as we have seen in all these regressions the measures generate the same results, but the *Closeness* measure is stronger. The reason for it is that it incorporates more information than *Degree*; not only it accounts for the number of connections but also for the importance of these connections. Moreover, *Closeness* incorporates more relevant information for the purpose of this study than *Betweenness*.

3.3 Governance

CEO compensation is clearly interrelated to the governance of the firm (Bertrand and Mullainathan (2001).) In firms where governance is weak the board is essentially captured by the CEO and in essence will be willing to award the CEO any compensa-

tion she seeks. On the other hand, if the governance is strong, the board has a say in compensation decisions and will not be as likely to award unwarranted compensation to the CEO. Hence, controlling for governance measures is important to understand the robustness of our results, and test whether our network effect captures in some way the level of governance of the firm.

We use three different governance measures: First, following Core, Holthausen, and Larker (1999) who find that more independent boards tend to award higher total compensation to CEOs, we control for the independence of the board. A board is defined as independent if the majority of the directors in a firm are classified as independent. Second, following Bebchuk and Cohen (2005) we control for staggered boards. A staggered Board is a board where the shareholders of the company cannot replace a majority of the board of directors without the passage of at least two annual elections. Third, following Yermack (1996) who finds that smaller boards are more efficient, we control for the number of directors on the board. We also add the two widely used measures of governance, the Gompers, Ishii, and Metrick (2003) governance index, and the Bebchuk, Cohen, and Ferrell (2005) index; both use the charter provisions of the firm to imply the level of entrenchment of the management.

Table 5 reports the results of our standard regression when the above governance measures are added and the dependent variable is *CEO Salary*. Most of the governance measures independently do not have a high statistically significant impact except for the independence of the board. Boards that are independent are more likely to award a lower salary to the CEO. When all measures are put together in the regression we find that the entrenchment measure of Bebchuk, Cohen, and Ferrell (2005) is positive and statistically significant. As expected, governance measures have an impact on CEO pay. On average, more entrenched boards award higher salaries and more independent boards award lower salaries. However, our measure of the network level of the firm is not impacted by the addition of the governance measures.

As Tables 3 - 5 indicate our results seem to be very robust to different measures,

specifications and known firm, CEO, and governance characteristics that have an impact on CEO pay.

4 Robustness Tests and Alternative Explanations

In this section we perform several robustness tests. We investigate more the robustness of the results to other explanations and mostly investigate our hypothesis that these results can be explained by the fact that a more connected board has different expectations than a less connected board which yields a difference in the salary awarded to the CEO. We end by showing that these results are robust to variations on the way the network measures are defined.

4.1 CEO Salary and Alternative Explanations

Several papers have shown the existence of variables that have an impact on CEO compensation. In this section we investigate whether our results are robust to the inclusions of three of the main measures: *Interlocked Boards*, *Busy Boards*, and *Independent Boards*.

Our paper is somewhat related to previous work by Hallock (1997) and Fich and White (2003) on interlocked boards. A board is defined as "interlocked" if one of the following cases applies: 1) The CEO serves on the board committee that makes her compensation decisions; 2) The CEO serves on the board (and possibly compensation committee) of another company that has an executive officer serving on the compensation committee of the indicated CEO's company; or 3) The CEO serves on the compensation committee of another company that has an executive officer serving on the board (and possibly compensation committee) of the indicated CEO's company. While these definitions are somewhat complex they are related to our network measures as joint directorships, at least of the CEO, are taken into account. Moreover, previous studies have shown a positive link between interlocked boards

and CEO compensation. We therefore include interlocked boards as a control in our regression analysis. Specification (2) of Table 6 reports our regression results when interlocked boards is added to the regression as a control variable. The results suggest that while consistent with Hallock (1997) and Fich and White (2003) the presence of interlocked boards is positively related to CEO compensation, our *Closeness* measure is robust to the inclusion of interlocked boards as a control variable.

In another related paper, Fich and Shivdasani (2006) explore whether "Busy Boards" are effective monitors. They define busy boards as those boards in which the majority of outside directors hold three or more directorships. While the authors do not test directly whether busy boards affect CEO compensation, they find that "Busy Boards" are associated with weak corporate governance, lower market-to-book ratios, and weaker profitability. In line with these results we include busy boards as a control variable in our analysis. Consistent with Fich and Shivdasani (2006) we find that the coefficient of "Busy Boards" is positively related to CEO compensation, though only marginally significant. Our *Closeness* measure is robust also to this alternative specification.

Another characteristic of the board which previous research has shown to be important is the independence of the board. For example, Core, Holthausen, and Larker (1999) find that more independent boards tend to award lower salaries and higher total compensation since they award high incentive-based compensation. We therefore include the variable *independent board,* which is a dummy variable that equals one if the majority of the directors in a firm are classified as independent. Consistent with Larker et al. (1999) we find that independent boards grant higher salaries to CEOs.

Lastly, specification (5) of Table 6 deals with another alternative explanation - that our network measures are a proxy for geographic clustering of firms. Firms' headquarters are not uniformly spread across the different states in the US, and they tend to cluster sometimes also by industry. For example, there is a cluster of high-tech firms in The Silicone Valley. Therefore, it is possible that firms whose headquarters

are in the same geographic location (same state) are more connected to each other and potentially, mimic each other's CEO compensation schemes. In order to rule out the possibility that our network measures are a proxy for this clustering, we perform our analysis using states fixed effects. The results which are shown in specification (5) of Table 6 dismiss this concern.

4.2 The Effect of Directors' Exposure to other Firms

We argue that when directors have multiple board seats it may affect their perspective when it comes to a decision on CEO compensation. The mere fact that a director is exposed to higher salaries in other boards that she sits on, may lead her to be softer when it comes to a decision on CEO pay. In other words, when directors observe high salaries it may affect the way they behave in the subsequent period. We perform two tests to corroborate this argument.

First, in Table 7 we test this hypothesis directly. We construct the variable *Mean Salary,* which is computed as the average *CEO Salary* at year *t-1* of all CEOs that the firm had a link to through joint directorships of its board members. The prediction, is that directors' exposure to high salaries at year *t-1* is positively related to granting higher salaries to the CEO in the subsequent year. The results confirm the hypothesis. The fact that directors are exposed to high salaries at year *t-1* is positively associated with higher salaries at year *t*. It is important to note that *Mean Salary* captures some network elements since its definition is based on the direct links (the same as the variable *Degree*) between the firm and other firms. Nevertheless, as Table 7 reports, our *Closeness* network measure is robust beyond the inclusion of *Mean Salary* in the regression.

In specifications (2) and (3) we explore these effects further by adding to the regression two interaction terms with *Closeness,* our main network measure. We construct the following two dummy variables. *Top 20%* is a dummy variable that equals one if *Mean Salary* is in the top quintile across all firms and *Top 50%* is a

dummy variable that equals one if *Mean Salary* is greater than the median value across all firms. We then interact these variables with *Closeness* in order to test whether the positive influence of the network effects is greater for firms whose directors observe higher salaries. We find that for firms whose directors observe the top 20% salaries, the network effects are almost 70% higher! For firms whose directors observe salaries above the median value the networks effects are higher by 40%. This means that having a board of directors that is connected and is used to observing high salaries increases the impact of connectiveness by up to 70%. This implies that as we argue, the reference point of the board has an important impact on the level of CEO compensation.

Second, the idea that connected directors use the information that they obtain in other firms as a reference point has an important implication in a different dimension. It implies that pay changes among well connected firms would move more closely together than pay changes among less connected boards as they have fewer observations to learn from. In line with that, we find that the unexplained pay increase component (beyond standard controls) of highly connected firms has a much lower standard deviation than the unexplained pay increase component of the least connected firms. Thus, the results of these tests support the idea that connected board members have a benchmark for higher salaries which makes them more inclined to approve an increase in CEO pay.

In order to test this prediction we perform a variance ratio test. We first run the CEO compensation variable on all the explanatory variables in our regression beside the network measure and obtain the residuals of this regression. Then, we sort firms by their *Closeness* score. The hypothesis is that more connected firms (higher *Closeness* score) will have a lower unexplained variance as they learn from each other more often. We find that the variance ratio test (which we do not report here) supports this hypothesis; the group of firms with the lowest *Closeness* score have a variance which is 30% greater than that of the connected firms in the network.

This difference is statistically significant at the 1% level.

4.3 CEO Salary and the Closeness Network Measure - Robustness Tests

In order to grant more generality to our analysis and to establish even a firmer link between our network measures and CEO compensation, we present in this section a series of robustness tests and extend our analysis using fixed effects, between effects and time difference effects regressions. In specifications (1) and (2) of Table 8 we present the results of fixed effects regressions at the firm level and at the CEO level. These regressions address a potential concern that our results are driven by an unobserved characteristic either at the firm level or at the CEO level. For example, it is possible that some firms have a special ability to diagnose the true "type" of the CEO and pay her accordingly. Alternatively, it is possible that some firms both pay high salaries and attract connected board members at the same time. The fixed effects analysis controls for these potential concerns and as the table shows, our results are robust to these alternative specifications.

In specification (3) of Table 8 we report results of between-effects regressions which pool the observations for each firm using the mean values of both the right- and left-hand side variables and create a cross-section of 1,925 firms. In addition, the procedure helps to overcome another potential problem of excess volatility in *CEO Salary*. The between-effects analysis helps to neutralize such potential effects. As the table shows, our results are robust to this alternative analysis.

In specification (4) we control for another important aspect of our panel analysis - changes of levels. If indeed the fact that a firm becomes a central member of the network has a significant influence on its CEO compensation then we would expect to find that positive changes in the network scores over time are associated with an increase in CEO pay. The methodology, which is somewhat similar to the one used by Hartzell and Starks (2003), is comprised of the following steps: First, we split the

sample to two periods (1996-2000 and 2001-2004). Second, similar to the between-effects approach, for each half of the sample we average all observations for each firm across all years in a way that a cross section of all firms is created. We then subtract for each firm the values of the second half of the sample from the values of the first half of the sample and perform the regression analysis. The results are consistent with all of our previous findings. Firms that exhibit an increase in the *Closeness* measure over the sample period also increase their CEO pay. To summarize, all these alternative robustness tests yield essentially the same result, indicating that there is an important role of board networks explaining CEO compensation. In specification (5) we perform a Fama-Macbeth(1973) specification that yields the same results as the other specifications.

4.4 The Network Measures

As discussed in Section 2.2, the three network measures we employ are very standard in the social network literature, and encompass the different facets of networks. However, there could arise one concern from our analysis. We aggregate the information of all the different board members to one firm observation. In doing so, there could potentially be a high disparity in network connections between the different board members. Our hypothesis is that the importance of the network measures is that they capture each and every board member's connection creating **together** an impact on the firm. However, one needs to concede that if hypothetically most of the firm's connections are derived by one or a few members of the boards, the interpretation could be different.

Therefore, in order to account for such a possibility we generate a variant on our network measures, and construct an alternative connection matrix. For every year, we build a symmetric matrix of all the directors in the network and assign a value of 1 if directors i and j sit on the same board. Using this matrix we construct the same network measures (**Degree**, **Closeness**, and **Betweenness**) but this time, for each

director. We then average the network scores across all directors in each firm every year. Such a measure underweight the connections of a firm if they are generated by one or a few board members.

Table 9 reports the results of such regression. We use the same specifications as defined in Section 3.1. Due to space limitations we only report the regressions where the dependant variable is *CEO Salary*, but the results hold in the same way when replaced with *CEO Total Comp*. We use three different specifications of our alternative network measures.

First, in columns (1) - (3), we use the mean measures for all directors in the firm. These measures are the most similar to the one specified in Table 3. Simply, we compute the measure of connectiveness of each director and then calculate the average across all the directors of each firm every year. Both statistically and economically we get the same result as in Table 3. This indicates that the results are not driven by a few very connected directors, but more by the mean connectiveness of **all** the board members.

In order to better understand the results we perform two variants on this specification. In columns (4) - (6) we take the maximal connection measure of all the board members. Hence, we essentially look at the board member that is the most connected on the board. We find that the results get much weaker. Both *Degree* and *Betweenness* are not statistically significant anymore. *Closeness* is still significant but less. This reinforces the idea that the results are not driven by one very strong and connected board member. But, it is much more a measure that encompasses the entire board of directors. The main reason *Closeness* is still significant is that there is some level of homogeneity on a board of a firm and the best connected member is a good indication of the average connectiveness of the entire board.

If the results are driven in large part by a measure of the entire board, then looking at the "weakest link", the least connected member of the board, can give an indication about this. Columns (7) - (9) in Table 4.4 use the least connected member to specify

the network measures. As expected, this specification yields similar results to the original measures. All three measures become significant. Of course, this measure weakens the strength of the test as it is enough to have one member of the board who is not connected to impact this measure. However, the fact that even with this handicap, the measure delivers similar results to the original specification indicates that it is the board as a whole that impacts CEO compensation and not only several influential board members.

5 Conclusion

This paper explores how networks of directors affect CEO compensation. We map the entire network of all board members of S&P 1,500 firms between 1996-2004, and generate network measures that capture several dimensions of these connections.

We present strong empirical evidence that firms that have more connected board members, and whose board members are connected to better connected firms award a higher compensation to their CEOs. Controlling for firm size, investment opportunities, industry, and performance, a CEO of a firm which is in the top quintile of connected firms receives a 10% higher salary and a 13% higher total compensation than a CEO of a firm which is in the bottom quintile of connected firms. These results are robust to alternative explanations such as interlocked boards, busy boards, and entrenched boards; they are also robust to the independence of the board, geographic location of the firm, governance measures, and potentially unobserved CEO or firm characteristics.

These results highlight the importance of understanding the intricate ways in which a board of directors makes decisions. We present evidence that the decision regarding CEO compensation is highly affected by a unique characteristic of the board - how central it is in the overall director network.

References

[1] Agrawal, Anup, and Charles R. Knoeber, 2001, Do Some Outside Directors Play a Political Role?, *Journal of Law and Economics* 44, 179-198.

[2] Bebchuk, Lucian A., and Jesse Fried, 2004, Pay Without Performance: The Unfulfilled Promise of Executive Compensation, *Harvard University Press.*

[3] Bebchuk, Lucian A., and Alma Cohen, 2005, The Costs of Entrenched Boards, *Journal of Financial Economics*, 78, 409-433.

[4] Bebchuk, Lucian A., Alma Cohen, and Allen Ferrell, 2005, What Matters in Corporate Governance?, *Harvard Law School Olin Discussion Paper No. 491.*

[5] Bertrand, Marianne and Antoinette Schoar, 2003, The Managing with Style: The Effect of Managers on Corporate Policy, *Quarterly Journal of Economics*, 118 (4), 1169-1208.

[6] Bertrand, Marianne and Sendhil Mullainathan, 2001, Are CEOs Rewarded for Luck? The Ones Without Principals Are, *Quarterly Journal of Economics*, 116(3), 901-32.

[7] Bonacich, Philip, 1972, Factoring and weighting approaches to status scores and clique identification, *Journal of Mathematical Sociology* 2, 113-120.

[8] Bonacich, Philip, 1987, Power and centrality: A family of measures, *American Journal of Sociology*, 92, 1170-1182.

[9] Core, John E., Robert W. Holthausen, and David F. Larcker, 1999, Corporate Governance, Chief Executive Officer Compensation and Firm Performance, *Journal of Financial Economics* 51, 371-406.

[10] Core, John E., Wayne Guay, and David F. Larcker, 2003, Executive Equity Compensation and Incentives: A Survey, *Economic Policy Review*, 9(1)51, 371-406.

[11] Fich, Eliezer M., 2005, Are Some Outside Directors Better than Others? Evidence from Director Appointments by Fortune 1000 Firms, *Journal of Business* 78(5),1943-1971.

[12] Fich, Eliezer M., and Anil Shivdasani, 2006, Are Busy Boards Effective Monitors?, *The Journal of Finance* 61(2),689-724.

[13] Fich, Eliezer M., and Lawrence J. White, 2003, CEO Compensation and Turnover: The Effect of Mutually Interlocked Boards, *Wake Forest Law Review*, 38, 935-959.

[14] Gompers, Paul A., Joy L. Ishii, and Andrew Metrick, 2003, Corporate Governance and Equity Prices, *Quarterly Journal of Economics*, 118 (1), 107-155.

[15] Hallock, Kevin F., 1997, Reciprocally Interlocking Boards of Directors and Executive Compensation, *Journal of Financial and Quantitative Analysis* 32(3), 331-344.

[16] Hartzell, Jay C., and Laura T. Starks, 2003, Institutional Investors and Executive Compensation, *The Journal of Finance* 58(6), 2351-2374.

[17] Hochberg, Yael, Alexander Ljungqvist, and Yang Lu, 2006, Whom You Know Matters: Venture Capital Networks and Investment Performance, *The Journal of Finance*, forthcoming.

[18] Kaplan, Steven N., and Luigi Zingales, 1997, Do investment-cash flow sensitivities provide useful measures of financing constraints? *Quarterly Journal of Economics* 112, 169-216.

[19] Kole, Stacey R., 1997, The Complexity of Compensation Contracts, *Journal of Financial Economics* 43(1), 79-104.

[20] Kuhnen, Camelia M., 2005, Social Networks, Corporate Governance and Contracting in the Mutual Fund Industry, *working paper, Stanford Graduate School of Business*.

[21] Larcker, David F., Scott A. Richardson, Andrew J. Seary, and Irem Tuna, 2005, Back Door Between Directors and Executive Compensation, *working paper*.

[22] Murphy, Kevin J., 1999, Executive Compensation, *in Orley Ashenfelter and David Card (eds.), Handbook of Labor Economics*, Vol. 3, North Holland.

[23] Strauss, Gary, 2002, Do conflicts cloud objectivity of corporate boards?, *USA TODAY*, 03/05/2002.

[24] Yermack, David D., 1996, Higher Valuation of Companies with a Small Board of Directors, *Journal of Financial Economics* 40, 185-212.

[25] Wasserman, Stanley, and Katherine Faust, 1997, Social Network Analysis: Methods and Applications, *Cambridge University Press, New York, NY*.

Table 1: Summary Statistics

This table provides descriptive statistics of firm and CEO characteristics for our sample firms. We present details for both *Network Firms* and *Island Firms* which we later omit from the final analysis. *Network Firms* are firms which are connected to other firms through joint directorships of one of their board members. *Island Firms* are firms in which all board members hold only one board sit - on their firm's board. The total sample consists of 11,742 firm-year observations between 1996 and 2004. Out of them 10,269 firm-year observations are of network firms and 1,473 are of Island Firms. Companies are included in the sample if the CEO Salary is greater than $50K. The table presents the mean, median, and the number of observations for each variable. *Assets* ($ millions) is the natural log of the book value of assets. *Tobin's q* is equal to the market value of assets divided by the book value of assets following Kaplan and Zingales (1997). *ROA* is the return on assets defined as operating income divided by the book value of assets. *TDA* is total debt to assets defined as the book value of long term debt divided by the book value of assets. *Firm Age* is the age of the firm (years) based on the date in which a firm's share price first appeared on the CRSP tape. *CEO Salary* ($ thousands) is the Dollar value of the base salary (cash and non-cash) earned by the CEO during the fiscal year. *CEO Total Comp* ($ thousands) is CEO total compensation. It is comprised of the following: salary, bonus, other annual, total value of restricted stock granted, total value of stock options granted (using Black & Scholes), long-term incentive payouts, and all other total (ExecuComp data item TDC1). *CEO Age* is the age of the CEO. *CEO Gender* is a dummy variable that equals one if the CEO is male. *CEO Tenure* is the number of months since the individual became CEO.

	All Firms			Network Firms			Island Firms		
	Mean	Median	N	Mean	Median	N	Mean	Median	N
Assets	2255.21	641.05	11,703	2499.00	731.92	10,234	556.81	303.03	1,469
Tobin's q	1.900	1.397	11,693	1.875	1.392	10,225	2.071	1.449	1,468
ROA	0.1294	0.1278	11,582	0.1300	0.1287	10,136	0.1245	0.1225	1,446
TDA	0.2374	0.2309	11,666	0.2435	0.2383	10,210	0.1946	0.1565	1,456
Firm Age	24.93	21.00	11,688	26.24	24.00	10,216	15.88	13.00	1,472
CEO Salary	667.18	609.35	11,742	689.83	640.00	10,269	509.29	435.10	1,473
CEO Total Comp	5178.13	2480.76	11,685	5503.84	2699.96	10,226	2895.30	1358.93	1,459
CEO age	57.74	58.00	6,604	57.79	58.00	5,696	57.44	57.00	908
CEO Gender	0.986	1.000	11,742	0.986	1.000	10,269	0.986	1.000	1,473
CEO Tenure	7.17	5.00	10,897	6.84	5.00	9,617	9.63	7.00	1,280

Table 2: Summary Statistics of Network Measures by Years

This table presents the mean, and the number of observations for each variable by year. *Degree* is a measure of the number of unique direct links that each firm has to other firms in the network through joint directorships of its board members. *Closeness* is a recursive measure of *Degree* that weights a firm's ties to other firms by the centrality of the firms it is tied to in the network. *Betweenness* is a normalized measure of the number of geodesic paths of all firms in the network passing through each firm. *CEO Salary* ($ thousands) is the Dollar value of the base salary (cash and non-cash) earned by the CEO during the fiscal year. *CEO Total Comp* ($ thousands) is the CEO total compensation. It is comprised of the following: salary, bonus, other annual, total value of restricted stock granted, total value of stock options granted (using Black & Scholes), long-term incentive payouts, and all other total (ExecuComp data item TDC1).

Year	N	Degree	Betweenness	Closeness	CEO salary	CEO Total Comp
1996	979	8.46	0.00266	0.2449	632.16	3,456.53
1997	1,113	7.74	0.00236	0.2284	622.07	4,157.50
1998	1,200	7.81	0.00220	0.2269	643.22	5,214.41
1999	1,190	7.73	0.00220	0.2267	662.06	5,774.96
2000	1,203	6.97	0.00226	0.2138	677.75	7,254.79
2001	1,215	6.68	0.00235	0.2068	695.55	6,620.04
2002	1,124	6.19	0.00261	0.2048	733.73	5,625.50
2003	1,152	6.09	0.00264	0.2055	757.05	5,072.00
2004	1,093	6.44	0.00270	0.2079	782.83	5,900.99
All years	10,269	7.11	0.00243	0.2180	689.83	5,503.84

Table 3: CEO Compensation and Network Measures

This table presents regressions of CEO compensation on the network measures. In specifications (1) - (3) the dependent variable is *CEO Salary* which is defined as the Dollar value ($ thousands) of the base salary (cash and non-cash) earned by the CEO during the fiscal year. In specifications (4) - (6) the dependent variable is *CEO Total Comp* which is the natural log of CEO total compensation (ExecuComp data item TDC1) which is comprised of the following: salary, bonus, other annual, total value of restricted stock granted, total value of stock options granted (using Black & Scholes), long-term incentive payouts, and all other total. *Degree* is a measure of the number of unique direct links that each firm has to other firms in the network through joint directorships of its board members. *Closeness* is a recursive measure of *Degree* that weights a firm's ties to other firms by the centrality of the firms it is tied to in the network. *Betweenness* is a normalized measure of the number of geodesic paths of all firms in the network passing through each firm. *Assets* is the natural log of the book value of assets. *Tobin's q* is equal to the market value of assets divided by the book value of assets following Kaplan and Zingales (1997). *ROA* is the return on assets defined as operating income divided by the book value of assets. *TDA* is total debt to assets defined as the book value of long term debt divided by the book value of assets. *Firm Age* is the natural log of the age of the firm (years) based on the date in which a firm's share price first appeared on the CRSP tape. All specifications include industry (2-digit SIC code) fixed effects as well as year fixed effects. All t-statistics are calculated with robust standard errors and are clustered by year.

	Salary			Total Compensation Including Option Grants		
	(1)	(2)	(3)	(4)	(5)	(6)
Degree	17.80			0.08		
	(5.09)***			(6.92)***		
Closeness		285.76			0.79	
		(11.02)***			(5.69)***	
Betweenness			4411.79			17.09
			(3.31)**			(6.35)***
Assets	137.06	138.62	138.76	0.44	0.46	0.45
	(51.41)***	(52.89)***	(60.26)***	(48.53)***	(48.89)***	(58.60)***
Tobin's q	-0.13	-0.16	-0.29	0.10	0.10	0.10
	-0.05	-0.07	-0.12	(4.37)***	(4.31)***	(4.36)***
ROA	132.76	131.51	133.67	0.53	0.53	0.53
	(2.75)**	(2.71)**	(2.79)**	(2.79)**	(2.77)**	(2.84)**
TDA	-32.53	-34.16	-29.75	-0.24	-0.24	-0.23
	(2.23)*	(2.32)**	(2.08)*	(2.72)**	(2.84)**	(2.72)**
Firm Age	29.55	30.24	30.23	-0.06	-0.06	-0.06
	(11.30)***	(11.37)***	(11.66)***	(3.96)***	(3.36)***	(3.60)***
Year FE	Yes	Yes	Yes	Yes	Yes	Yes
Industry FE	Yes	Yes	Yes	Yes	Yes	Yes
R^2	0.53	0.53	0.53	0.48	0.48	0.48
Observations	10,057	10,057	10,057	10,017	10,017	10,017

Note: *** denotes significance at the 1-percent level; ** denotes significance at the 5-percent level; * denotes significance at the 10-percent level.

Table 4: CEO Salary and CEO Characteristics

This table presents regressions of CEO salary on our network measures, the standard controls as well as CEO characteristics. In all of the specifications the dependent variable is *CEO Salary* which is defined as the Dollar value ($ thousands) of the base salary (cash and non-cash) earned by the CEO during the fiscal year. *Degree* is a measure of the number of unique direct links that each firm has to other firms in the network through joint directorships of its board members. *Closeness* is a recursive measure of *Degree* that weights a firm's ties to other firms by the centrality of the firms it is tied to in the network. *Betweenness* is a normalized measure of the number of geodesic paths of all firms in the network passing through each firm. *Assets* is the natural log of the book value of assets. *Tobin's q* is equal to the market value of assets divided by the book value of assets following Kaplan and Zingales (1997). *ROA* is the return on assets defined as operating income divided by the book value of assets. *TDA* is total debt to assets defined as the book value of long term debt divided by the book value of assets. *Firm Age* is the natural log of the age of the firm (years) based on the date in which a firm's share price first appeared on the CRSP tape. *CEO Tenure* is the number of months since the individual became CEO. *CEO Gender* is a dummy variable that equals one if the CEO is male. *CEO Age* is the age of the CEO. All specifications include industry (2-digit SIC code) fixed effects as well as year fixed effects. All t-statistics are calculated with robust standard errors and are clustered by year.

	(1)	(2)	(3)	(4)	(5)	(6)	(7)
Degree	25.16						
	(7.94)***						
Closeness		288.86		372.06	280.64	312.83	311.52
		(7.17)***		(11.94)***	(10.29)***	(10.80)***	(10.68)***
Betweenness			5,889.65				
			(8.16)***				
Assets	132.93	136.96	135.46	140.80	138.83	132.65	132.73
	(18.23)***	(20.11)***	(21.10)***	(46.93)***	(55.08)***	(20.47)***	(20.53)***
Tobin's q	-2.90	-2.89	-2.99	-0.79	-0.14	-2.06	-2.06
	-(0.94)	-(0.94)	-(1.00)	-(0.33)	-(0.06)	-(0.74)	-(0.74)
ROA	216.94	216.48	215.79	124.63	132.14	189.49	189.89
	(6.96)***	(6.94)***	(7.07)***	(2.43)**	(2.73)**	(7.04)***	(7.08)***
TDA	-7.33	-10.00	-4.10	-20.35	-33.59	-17.57	-17.27
	-(0.34)	-(0.46)	-(0.19)	-(1.18)	(2.29)*	-(0.84)	-(0.83)
Firm Age	31.41	32.59	32.84	30.98	30.26	29.07	29.14
	(13.51)***	(14.03)***	(14.32)***	(9.88)***	(11.62)***	(13.21)***	(13.33)***
CEO Tenure	-0.12	-0.29	-0.40	3.31			
	-(0.41)	-(1.00)	-(1.46)	(10.74)***			
CEO Gender	-35.16	-33.84	-35.45		-71.48		-29.95
(Male=1)	(2.41)**	(2.39)**	(2.57)**		-(1.74)		-(1.74)
CEO Age	6.91	6.93	7.01			6.66	6.69
	(16.39)***	(16.65)***	(16.49)***			(32.24)***	(31.65)***
Year FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Industry FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes
R^2	0.60	0.60	0.60	0.54	0.53	0.58	0.58
Observations	4,831	4,831	4,831	8,684	10,057	5,586	5,586

Note: *** denotes significance at the 1-percent level; ** denotes significance at the 5-percent level; * denotes significance at the 10-percent level.

Table 5: CEO Salary and Governance Measures

This table presents regressions of CEO salary on the *Closeness* network measure, the standard controls as well as governance measures. In all of the specifications the dependent variable is *CEO Salary* which is defined as the Dollar value ($ thousands) of the base salary (cash and non-cash) earned by the CEO during the fiscal year. *Degree* is a measure of the number of unique direct links that each firm has to other firms in the network through joint directorships of its board members. *Closeness* is a recursive measure of *Degree* that weights a firm's ties to other firms by the centrality of the firms it is tied to in the network. *Assets* is the natural log of the book value of assets. *Tobin's q* is equal to the market value of assets divided by the book value of assets following Kaplan and Zingales (1997). *ROA* is the return on assets defined as operating income divided by the book value of assets. *TDA* is total debt to assets defined as the book value of long term debt divided by the book value of assets. *Firm Age* is the natural log of the age of the firm (years) based on the date in which a firm's share price first appeared on the CRSP tape. *GIM Index* is the governance index proposed by Gompers, Ishii and Metrick (2003). *BCF Index* is the entrenchment index proposed by Bebchuk, Cohen and Ferrell (2004). *Independent Board* is a dummy variable that equals one if the majority of the directors in a firm are classified as independent. *Staggered Board* is a dummy variable that equals one if the shareholders of the company cannot replace a majority of the board of directors without the passage of at least two annual elections. *Board Size* is the number of board members. All specifications include industry (2-digit SIC code) fixed effects as well as year fixed effects. All t-statistics are calculated with robust standard errors and are clustered by year.

	(1)	(2)	(3)	(4)	(5)	(6)	(7)
Closeness	261.68	249.37	250.26	311.39	285.04	288.18	296.81
	(6.75)***	(6.41)***	(6.50)***	(11.39)***	(11.48)***	(6.77)***	(6.98)***
Assets	141.44	141.60	141.55	138.63	138.56	142.20	141.79
	(50.51)***	(50.49)***	(51.17)***	(53.36)***	(54.34)***	(57.60)***	(57.10)***
Tobin's q	1.65	2.04	1.96	-0.32	-0.16	1.79	1.46
	-(0.63)	-(0.80)	-(0.78)	-(0.13)	-(0.07)	-(0.70)	-(0.57)
ROA	159.09	156.09	156.68	131.52	131.42	156.95	158.36
	(4.41)***	(4.30)***	(4.33)***	(2.72)**	(2.69)**	(4.37)***	(4.41)***
TDA	-21.62	-23.50	-23.37	-32.80	-34.16	-23.00	-20.23
	-(1.33)	-(1.49)	-(1.50)	(2.25)*	(2.32)**	-(1.51)	-(1.27)
Firm Age	34.87	33.17	33.10	30.71	30.20	33.85	35.74
	(11.82)***	(13.91)***	(14.06)***	(11.51)***	(10.50)***	(12.21)***	(10.15)***
GIM Index	-2.20						-2.08
	-(1.80)						-(1.52)
BCF Index		0.15				2.87	
		-(0.12)				(3.00)**	
Staggered Board			-2.20			-5.03	5.09
			-(0.49)			-(1.02)	-(1.06)
Independent Board				-41.57		-60.00	-52.97
				-(3.16)**		-(5.68)***	-(4.57)***
Board Size					0.09	-0.49	-0.31
					-(0.08)	-(0.46)	-(0.30)
Year FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Industry FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes
R^2	0.52	0.52	0.52	0.52	0.53	0.53	0.52
Observations	9,275	9,275	9,275	9,275	10,057	9,275	9,275

Note: *** denotes significance at the 1-percent level; ** denotes significance at the 5-percent level; * denotes significance at the 10-percent level.

Table 6: CEO Salary and Alternative Explanations

This table presents regressions of CEO salary on the *Closeness* network measure, the standard controls as well as controls for alternative explanations. In all of the specifications the dependent variable is *CEO Salary* which is defined as the Dollar value ($ thousands) of the base salary (cash and non-cash) earned by the CEO during the fiscal year. *Degree* is a measure of the number of unique direct links that each firm has to other firms in the network through joint directorships of its board members. *Closeness* is a recursive measure of *Degree* that weights a firm's ties to other firms by the centrality of the firms it is tied to in the network. *Assets* is the natural log of the book value of assets. *Tobin's q* is equal to the market value of assets divided by the book value of assets following Kaplan and Zingales (1997). *ROA* is the return on assets defined as operating income divided by the book value of assets. *TDA* is total debt to assets defined as the book value of long term debt divided by the book value of assets. *Firm Age* is the natural log of the age of the firm (years) based on the date in which a firm's share price first appeared on the CRSP tape. *Independent Board* is a dummy variable that equals one if the majority of the directors in a firm are classified as independent. *Interlocked Board* is a dummy variable that equals one if one of the following cases applies: 1) The CEO serves on the board committee that makes his compensation decisions; 2) The CEO serves on the board (and possibly compensation committee) of another company that has an executive officer serving on the compensation committee of the indicated CEO's company; or 3) The CEO serves on the compensation committee of another company that has an executive officer serving on the board (and possibly compensation committee) of the indicated CEO's company. *Busy board* is a dummy variable that equals one if the majority of outside directors hold three or more directorships following Fich and Shivdasan (2006). All specifications include industry (2-digit SIC code) fixed effects as well as year fixed effects. Specification (5) includes, additionally, states fixed effects to account for the geographic location of each firm's headquarter. All t-statistics are calculated with robust standard errors and are clustered by year.

	(1)	(2)	(3)	(4)	(5)
Closeness	311.39	288.17	272.37	289.01	320.41
	(11.39)***	(9.61)***	(8.23)***	(8.11)***	(10.06)***
Assets	138.63	136.45	136.17	135.89	135.79
	(53.36)***	(61.90)***	(65.96)***	(63.79)***	(47.69)***
Tobin's q	-0.32	-0.30	-0.46	-0.57	-0.33
	-(0.13)	-(0.12)	-(0.19)	-(0.24)	-(0.14)
ROA	131.52	121.34	124.42	124.71	138.94
	(2.72)**	(2.49)**	(2.53)**	(2.54)**	(2.93)**
TDA	-32.80	-26.52	-27.96	-25.84	-36.55
	(2.25)*	-(1.79)	(1.90)*	-(1.73)	(2.65)**
Firm Age	30.71	29.49	29.78	29.94	28.59
	(11.51)***	(10.31)***	(10.62)***	(10.75)***	(10.68)***
Independent Board	-41.57			-31.43	
	(3.16)**			(2.49)**	
Interlocked Board		13.00		11.92	
		(2.73)**		(2.50)**	
Busy Board			10.15	9.91	
			(2.05)*	(2.03)*	
Year FE	Yes	Yes	Yes	Yes	Yes
Industry FE	Yes	Yes	Yes	Yes	Yes
State FE	No	No	No	No	Yes
R^2	0.53	0.52	0.52	0.52	0.54
Observations	10,057	9,017	8,997	8,997	10,057

Note: *** denotes significance at the 1-percent level; ** denotes significance at the 5-percent level; * denotes significance at the 10-percent level.

Table 7: CEO Salary and Additional Network Effects

This table presents regressions of CEO salary on the *Closeness* network measure, the standard controls as well as additional network and interaction variables. In all of the specifications the dependent variable is *CEO Salary* which is defined as the Dollar value ($ thousands) of the base salary (cash and non-cash) earned by the CEO during the fiscal year. *Degree* is a measure of the number of unique direct links that each firm has to other firms in the network through joint directorships of its board members. *Closeness* is a recursive measure of *Degree* that weights a firm's ties to other firms by the centrality of the firms it is tied to in the network. For each firm, *Mean Salary* is computed as the average *CEO Salary* at year *t-1* of all CEOs that the firm was linked to through joint directorships of its board. *Top 20%* is a dummy variable that equals one if *Mean Salary* is in the top quintile across all firms. *Top 50%* is a dummy variable that equals one if *Mean Salary* is greater than the median value across all firms. *Assets* is the natural log of the book value of assets. *Tobin's q* is equal to the market value of assets divided by the book value of assets following Kaplan and Zingales (1997). *ROA* is the return on assets defined as operating income divided by the book value of assets. *TDA* is total debt to assets defined as the book value of long term debt divided by the book value of assets. *Firm Age* is the natural log of the age of the firm (years) based on the date in which a firm's share price first appeared on the CRSP tape. *CEO Tenure* is the number of months since the individual became CEO. *CEO Gender* is a dummy variable that equals one if the CEO is male. *CEO Age* is the age of the CEO. All specifications include industry (2-digit SIC code) fixed effects as well as year fixed effects. All t-statistics are calculated with robust standard errors and are clustered by year.

	(1)	(2)	(3)
Closeness	232.45	247.26	222.88
	(4.39)***	(4.65)***	(4.00)***
Mean Salary	0.09		
	(3.68)***		
Closeness × Top 20%		170.16	
		(2.77)**	
Closeness × Top 50%			88.40
			(2.40)**
Assets	138.53	139.31	139.41
	(63.50)***	(57.44)***	(66.80)***
Tobin's q	2.09	2.41	2.38
	-(0.60)	-(0.68)	-(0.68)
ROA	160.19	156.65	157.32
	(4.25)***	(4.21)***	(4.26)***
TDA	-30.02	-30.04	-30.05
	(4.14)***	(3.75)***	(3.85)***
Firm Age	34.44	34.70	34.80
	(12.84)***	(13.32)***	(12.79)***
Year FE	Yes	Yes	Yes
Industry FE	Yes	Yes	Yes
R^2	0.53	0.53	0.53
Observations	7,951	7,951	7,951

Note: *** denotes significance at the 1-percent level; ** denotes significance at the 5-percent level; * denotes significance at the 10-percent level.

Table 8: Robustness Tests and Time Variations

This table presents regressions of CEO salary on the *Closeness* network measure using fixed effects, between effects and time difference effects. The dependent variable is *CEO Salary* which is defined as the Dollar value ($ thousands) of the base salary (cash and non-cash) earned by the CEO during the fiscal year. *Degree* is a measure of the number of unique direct links that each firm has to other firms in the network through joint directorships of its board members. *Closeness* is a recursive measure of *Degree* that weights a firm's ties to other firms by the centrality of the firms it is tied to in the network. *Assets* is the natural log of the book value of assets. *Tobin's q* is equal to the market value of assets divided by the book value of assets following Kaplan and Zingales (1997). *ROA* is the return on assets defined as operating income divided by the book value of assets. *TDA* is total debt to assets defined as the book value of long term debt divided by the book value of assets. *Firm Age* is the natural log of the age of the firm (years) based on the date in which a firm's share price first appeared on the CRSP tape. Specification (1) includes year fixed effects as well as firm fixed effects. Specification (2) includes year fixed effects as well as CEO fixed effects. In specification (3) we perform a between effects analysis in which all observations are averaged for each firm across all years that it is present in the sample and a cross section of all firms is created. These specifications include year fixed effects as well as industry fixed effects. In specification (4) we perform a time difference effects analysis. We first split the sample to two (years 1996-2000 and years 2001-2004) and then for each half of the sample we average all observations for each firm across all years that it is present in the sample in a way that a cross section of all firms is created for each half of the sample. We then subtract for each firm the values of the second half of the sample from the values of the first half of the sample and perform the regression analysis. These specifications include also industry (2-digit SIC code) fixed effects. In specification (5) we perform a Fama-MacBeth (1973) regression. All t-statistics are calculated with robust standard errors. Specifications (1) and (2) are also clustered by year.

	Firm Fixed Effects	CEO Fixed Effects	Between Effects	Time Changes	Fama MacBeth
	(1)	(2)	(3)	(4)	(5)
Closeness	110.24	111.12	355.19	221.55	261.98
	(3.55)***	(2.46)**	(3.20)***	(1.99)**	(8.40)***
Assets	104.60	75.01	132.05	78.06	138.94
	(10.59)***	(12.46)***	(28.43)***	(24.87)***	(51.378)***
Tobin's q	1.28	3.13	-0.69	-2.88	6.60
	-(1.03)	(3.14)***	-(0.17)	-(1.33)	(1.99)*
ROA	186.12	183.46	-31.12	-13.05	107.27
	(3.56)***	(6.10)***	-(0.56)	-(0.08)	(2.02)*
TDA	-80.87	-72.13	-56.30	18.70	-28.91
	-(3.58)***	(-6.02)***	-(1.59)	-(0.51)	-(1.91)*
Firm Age	15.32	43.68	21.37	4.43	29.97
	-(1.14)	(6.98)***	- (3.40)***	-(0.65)	(11.27)***
Year FE	Yes	Yes	Yes	-	-
Industry FE	No	No	Yes	Yes	Yes
Firm FE	Yes	No	No	No	No
CEO FE	No	Yes	No	No	No
R^2	0.89	0.94	0.52	0.80	0.51
Observations	10,057	10,057	10,057	1,954	10,057
Number of Groups	-	-	1,927	-	-

Note: *** denotes significance at the 1-percent level; ** denotes significance at the 5-percent level; * denotes significance at the 10-percent level.

Table 9: CEO Salary and Variations of the Network Measures

This table presents regressions of CEO compensation on variations of our network measures. In all of the specifications the dependent variable is *CEO Salary* which is defined as the Dollar value ($ thousands) of the base salary (cash and non-cash) earned by the CEO during the fiscal year. In specifications (1) - (3) the networks scores were first computed for all directors in the network and then were averaged by firm to generate each firm's score. In specifications (4) - (6) the networks scores were first computed for all directors in the network. Each firm's network was then computed as the highest score that was observed by the most connected director. In specifications (7) - (9) the networks scores were first computed for all directors in the network. Each firm's network was then computed as the lowest score that was observed by the least connected director. *Degree* is a measure of the number of unique direct links that each firm has to other firms in the network through joint directorships of its board members. *Closeness* is a recursive measure of *Degree* that weights a firm's ties to other firms by the centrality of the firms it is tied to in the network. *Betweenness* is a normalized measure of the number of geodesic paths of all firms in the network passing through each firm. *Assets* is the natural log of the book value of assets. *Tobin's q* is equal to the market value of assets divided by the book value of assets following Kaplan and Zingales (1997). *ROA* is the return on assets defined as operating income divided by the book value of assets. *TDA* is total debt to assets defined as the book value of long term debt divided by the book value of assets. *Firm Age* is the natural log of the age of the firm (years) based on the date in which a firm's share price first appeared on the CRSP tape. All specifications include industry (2-digit SIC code) fixed effects as well as year fixed effects. All t-statistics are calculated with robust standard errors and are clustered by year.

	Mean			Max			Min		
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
Degree	38.30			0.56			3.37		
	(4.06)***			-(1.72)			(4.67)***		
Closeness		382.29			284.46			295.34	
		(10.77)***			(7.75)***			(3.68)***	
Betweenness			15,906.05			1,893.03			55,036.10
			(2.45)**			-(1.18)			(2.24)*
Assets	136.75	139.23	140.21	140.32	140.43	142.21	140.83	140.67	143.46
	(51.67)***	(52.75)***	(60.53)***	(57.91)***	(53.33)***	(64.27)***	(50.31)***	(43.14)***	(53.89)***
Tobin's q	0.11	-0.18	-0.23	-0.09	-0.18	-0.21	-0.03	-0.22	-0.24
	-(0.05)	-(0.07)	-(0.09)	-(0.04)	-(0.07)	-(0.09)	-(0.01)	-(0.09)	-(0.10)
ROA	127.52	131.36	133.39	132.73	132.34	134.00	129.22	130.97	134.38
	(2.63)**	(2.71)**	(2.77)**	(2.74)**	(2.72)**	(2.77)**	(2.69)**	(2.71)**	(2.78)**
TDA	-33.10	-34.20	-31.67	-31.93	-34.11	-32.18	-30.89	-33.13	-31.94
	(2.25)*	(2.32)**	(2.15)*	(2.17)*	(2.31)*	(2.17)*	(2.10)*	(2.28)*	(2.19)*
Firm Age	28.95	30.50	30.97	30.55	30.88	31.45	30.11	30.91	31.66
	(10.41)***	(11.44)***	(11.98)***	(11.12)***	(11.57)***	(12.13)***	(10.85)***	(11.36)***	(12.10)***
Year FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Industry FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
R^2	0.53	0.53	0.52	0.52	0.52	0.52	0.52	0.52	0.52
Observations	10,057	10,057	10,057	10,057	10,057	10,057	10,057	10,057	10,057

Note: *** denotes significance at the 1-percent level; ** denotes significance at the 5-percent level; * denotes significance at the 10-percent level.