The Price of a CEO's Rolodex*

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Abstract: CEOs with large networks earn more than those with small networks. An additional connection to an executive or director *outside the firm* increases compensation by about $17,000 on average, more so for "important" members such as CEOs of big firms. Pay-for-connectivity is unrelated to several measures of corporate governance, evidence in favor of an efficient contracting explanation for CEO pay.

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"As first-year CEO Brad Smith tries to reshape software maker Intuit for the online age, he has opened his Rolodex and is cribbing ideas from some tech industry icons. A dinner with Hewlett-Packard (HPQ) CEO Mark Hurd sparked ideas for a massive benchmarking project and reinforced Smith's conviction that Intuit (INTU) had to lay off 7% of its staff. Conversations with Google (GOOG) inspired a program that lets Intuit engineers contribute 10% of their time to experimental projects. And Smith rang up Facebook Chief Operating Officer Sheryl Sandberg to help Intuit shape online user communities around its products..."

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I. Introduction

Two prevailing views continue to dominate research on the level of CEO compensation. *Rent extraction* contends that CEOs are able to transfer wealth from shareholders through lax corporate governance (e.g., Bebchuk and Fried, (2004)), while in an *efficient contracting* framework, CEOs are worth what they are paid (e.g., Gabaix and Landier, (2008)). Although an extensive literature has emerged to explore the former hypothesis, evidence that CEO pay reflects a manager's market value is scarce.[1] Given that such value-creating attributes are difficult to measure, this is understandable. Bertrand's (2009) comparison is apropos: "while it is quite easy to rank the quality of, say, tennis players, it is difficult to envision how a similar ranking is established for CEOs."

In this paper, we rank CEOs by their personal associations with high ranking executives or directors at other firms. We refer to this general family of connections a CEO's "rolodex."

Two assumptions are required for a CEO's network to influence his or her wage. First, networks must accrue value to the firm. This can be justified a number of ways, perhaps the most immediate being that networks confer information advantages to the firm that ultimately improve its real business decisions (e.g., Fracassi (2008)). Networks can also create value via non-information based channels, such as the granting of political favors (e.g., Faccio (2006),

[1] See, for example, Yermack (1996), Conyon (1997), Core, Holthausen, and Larcker (1999), Bertrand and Mullainathan (2000), Bertrand and Mullainathan (2001), Hartzell and Starks (2003), and Yermack (2004).

Faccio, Masulis, and McConnell (2006), and Bertrand, Kramarz, Schoar, and Thesmar (2005)). Regardless of the specific mechanism, the CEO's network must represent something for which a firm is willing to pay.

The second requirement is that the CEO's network be, at least partly, excludable.[2] If so, then network members (CEOs) can extract rents in the labor market from those outside desiring access (shareholders). Unless the CEO labor market is perfectly competitive, the market-value paradigm predicts a wage premium in situations where a CEO can leverage personal connections to benefit the firm.

To test this joint hypothesis, we study the compensation arrangements for roughly 2,700 CEOs of large, public firms for the years 2000-2007. The main explanatory variable of interest, the CEO's rolodex, we construct using BoardEx, a proprietary database that reports (among other items) a CEO's past or current business relationships, affiliations with charitable or volunteer organizations, boards on which the CEO has served, and past universities attended. For every CEO in our sample, we construct the simplest possible measure for connectedness: the sum of other external executives or directors related to the CEO through any of these channels. Importantly, a CEO's *rolodex* includes only connections to those outside the firm. Connections to the CEO's presumed monitors are intentionally excluded.

In pooled panel regressions of CEO pay, we find that on average, an additional connection is worth a little more than $17,000 in total compensation. A one-standard-deviation increase in the size of the *rolodex* changes the CEO's pay by about 10%. Moreover, the effect of connections on pay is concave which, given that the information provided by network members is likely to contain some redundancy, is intuitive. A capital-constrained firm may be willing to

[2] Excludability in this context does not mean that the CEO can literally prevent the firm from contacting an individual in his or her network. Instead, we require only that the CEO's cooperation improve the value a firm can extract from a network member. For example, it is difficult to imagine that the firm could, without the CEO's participation, request political favors from one his or her college classmates.

pay handsomely for a CEO connected to an investment banker, but at the margin, it is unlikely that a 5th investment banking connection would be similarly valued.

While suggestive that network effects influence CEO compensation, these benchmark results alone do not allow us to make definite conclusions about causality. The most obvious reason is that the size of a CEO's network is likely to be correlated with unobservable determinants of wages, potentially introducing omitted variable bias. To give a specific example, consider the fact that CEOs are disproportionately trained at a few elite universities (although certainly not exclusively), so that a large network of *university* connections is almost certainly correlated with the CEO's academic background, intelligence, or other drivers of productivity. How then could we tell whether a well-paid Harvard-trained CEO is compensated for an extensive school network, or whether simply being trained at or admitted to Harvard drives the wage premium?

Fortunately, the data allow us to address such endogeneity concerns. In the specific case of *university* connections discussed above, we can include fixed effects for each university, and thus identify network effects purely through within-university (i.e., time-series) variation. For example, by including a Harvard Business School (HBS) fixed effect in the wage regressions, we exploit the fact that in 1984, five HBS graduates may have gone on to become CEOs as of 2004, whereas the class of 1991 may have produced only two. Because this is implicitly a comparison of two HBS graduates, the network-pay relation is identified purely from time series variation within each school's graduating class. Lest one remain concerned about within-school trends in quality or prestige, we repeat the same specification, but interact each university with a five-year graduation interval – e.g., separate fixed effects for HBS Class of 1980-1984, HBS Class of 1985-1989, and so on. This exercise strengthens the result, and is the strongest evidence that the pay-connections relation reflects a premium to networking, rather than a return to general skill, intelligence, or training.

A second way to approach the causality issue is to look in the cross-section, asking if certain, particularly “important” members of a CEO’s *rolodex* are more valued than others, and/or if certain firms pay higher prices for access to a CEO’s network. For the first, we partition each CEO’s network along four dimensions: 1) to those within the firm’s industry (similar firms likely have the most relevant information), 2) to other firm “insiders” (those officers involved in day-to-day activities vs. more mildly involved directors), 3) to those who are industry leaders (firms with the largest market share in their industry), and 4) to “nearby” executives and directors. The final distinction is made not only to capture differences in information accessibility but also because, in some circumstances (e.g., firms that compete in local product markets), the value of the information itself may depend on geographical proximity. Between all such comparisons, the point estimates in wage regressions appear consistent with information flow (e.g., connections to firms within the same industry matter more for pay), but multicollinearity considerably limits inference.[3] However, in five of the six pairwise comparisons (e.g., comparing large-within industry connections to small-out of industry ones), the point estimates can be distinguished at conventional levels.

For the second, we explore the determinants of the network wage premium from the *firm’s* perspective. To do so, we develop proxies intended to capture how much a firm benefits from its CEO’s connectivity. The first is the firm’s geographic isolation from its industry peers, under the assumption that such isolation imposes at least some barrier to the transmission of information relevant for the firm. We collect zip code data for company headquarters, and form clusters by ranking firms by the number of industry peers located nearby. Interestingly, although firms in industry clusters appear to pay higher overall levels, the *marginal* effect of the network-pay relation is reduced. In other words, firms isolated from industry clusters pay a

[3] Cross-sectinoally, CEOs with a large number of connections to industry insiders are, all else equal, also more likely to have a larger number of connections to industry outsiders. Thus, estimating the marginal value of each connection type in the same specification poses multicollinearity problems.

50% higher per-connection premium, potentially reflecting their high marginal value of well-connected top executives.

The second firm-level cross-sectional test pertains to the firm's existing connectedness through its other (non-CEO) executives and/or directors. To fix intuition for the tests we run, suppose that Angela and Brian are external individuals that Firm X would like to access; for example, Angela might be the CFO of a competing firm and Brian might sit on the board of an influential bank. Further, suppose that Firm X's CEO went to business school with both Angela and Brian, but that in addition, the CIO of Firm X used to work with Brian. In wage regressions, we find that the CEO is monetarily rewarded for introducing Angela to Firm X, but that there is no analogous premium for Brian, a "duplicate" connection. This test, by construction idiosyncratic to each CEO-firm pairing, is difficult to reconcile with non-information based stories. This is because it is not simply the case that the *number* of a firm's existing connections influences how much it values the CEO's network – rather, it is that the value of *specific connections* is evaluated in the context of the firm's existing connection portfolio.

We conclude by explicitly considering a number of alternative explanations for the network-pay relation, as well as some robustness extensions to our results. Chief among these alternatives is that a CEO's network may measure his or her "power" in wage bargaining, irrespective of any value such connections may have for the firm. While possible, several previous results indicate that by itself, this is unlikely to reconcile the body of evidence. In particular, it is difficult to imagine how bargaining power could be systematically related to the number of one's classmates that go on to become successful, assuming that (as must be case under this alternative) such connections do not confer value to the firm. Similar reasoning applies to the analysis of duplicate vs. unique elements of the CEO's *rolodex*. Nonetheless, a more direct way to address this possibility is to ask whether the network-pay relation varies with other proxies for the balance of power between the CEO and his or her pay setters. Examining four proxies for the strength of corporate governance and two proxies for CEO power, we find that the *rolodex* effect is similar across firms with weak governance, strong governance, weak CEOs and powerful CEOs.

The paper is organized as follows. In the subsequent section, we provide background on the existing networking literature. We then describe our data and the construction of variables in Section III. Section IV presents the results of our main specifications relating a CEO's outside personal connections to pay. Section V considers which names in the CEO's rolodex appear to be most valuable, while Section VI describes which firms value these names the most. Section VII discusses our views on a number of alternative hypotheses, and performs a set of robustness checks. Section VIII concludes.

II. Background and Empirical Specification

Following Lazear and Oyer (2010), partition the time *t* wage of CEO *i* at firm *j* as follows:

$$w_{i,j,t} = f(\alpha_{i,t}, \beta_{j,t}, \phi_{i,j,t}) + \varepsilon_{i,j,t}. \qquad (1)$$

The first argument maps a family of generic *CEO attributes*, α, into his or her wage. Such attributes might include managerial skill, intelligence, or other features that are valued similarly across firms. Unless the market for these attributes is perfectly competitive, the CEO's wage will, at least partly, reflect their contribution to firm productivity. The second argument captures the effect of *firm characteristics* that enhance the CEO's productivity. Holding the manager's attributes constant, one might expect a firm's competitive position, geographical location, size, preference for human capital, or other characteristics to influence the output of its CEO. The final argument refers to *match quality*, denoted by ϕ. Noting that the index includes both *i* and *j*, we expect match quality to depend on characteristics of *both* the firm and individual CEO. For example, a CEO that specializes in growth strategies (which will show up in

α) may be a particularly good fit at a young firm with promising prospects (which will show up in β). The effect on wage from this union will be captured by match quality (ϕ).

Taking a total derivative and dropping subscripts, we have

$$dw = \frac{\partial f}{\partial \alpha} d\alpha + \frac{\partial f}{\partial \beta} d\beta + \frac{\partial f}{\partial \phi} d\phi + d\varepsilon. \qquad (2)$$

Most existing studies of CEO pay levels focus on the middle term, and in so doing, have contributed to our understanding of how firms influence managerial productivity and wages. Recent studies, however, have made strides in understanding the effects of the first and third terms, the effects individual attributes and/or firm-CEO matches have on productivity, investment decisions, and wages. Prominent examples include Bertrand and Schoar's (2003) study of CEO fixed effects in leverage and investment regressions, Schoar's (2007) examination of CEO's individual career paths, Malmedier and Tate's (2009) analysis of "Superstar CEOs," and Kaplan, Klebanov, and Sorensen's (forthcoming) determination of which personality attributes are most correlated with a CEO's success.

The primary contribution of this study is to characterize the effect of one particular CEO attribute – his or her network to other executives and directors – on pay levels. In doing so, it is important to acknowledge early on the biggest strength of our empirical strategy, as well as its biggest weakness. On the plus side, our data on CEO networks (discussed shortly) is very detailed, affording us considerable variation in network sizes, types, and other relevant dimensions. On the minus side, the variation is almost entirely cross-sectional – i.e., we have little meaningful time-series variation in either the size or composition of a CEO's network. Returning to Equation (2), the resulting trade-off is clear. Although we will be able to show that CEO compensation varies with our network measures (presumably a subset of the arguments in the first term), to the extent that this measure is correlated in the cross-section with: 1) other CEO attributes like skill or education, 2) firm attributes like size or growth opportunities, or 3) firm-CEO match quality, we will be limited in what we can properly establish about a causal relation between network size and pay. As we will see, some of our tests can be fairly precise in making these distinctions, while others remain open to the criticism that our network measure may be correlated with other determinants of productivity and/or wages.

It is worth noting, however, that only the second type of misspecification is especially problematic for our purposes. That is, if we are simply picking up cross-sectional differences in firm characteristics that happen to be systematically related to the CEO's network size, this would clearly have a different interpretation than either the first or third terms, which necessarily involve the CEO's personal attributes. By contrast, misspecification with regard to the first term simply means that our network measure provides better measurement of a CEO's productivity or bargaining power in wage negotiations, relative to existing proxies. This is still useful, given that our existing measures of CEO attributes currently remains limited. Even less problematic is the role potentially played by the third term. Almost certainly (and, as we will show), some firms appear to value network benefits more highly than others, and thus, are likely to select CEOs with different network sizes in equilibrium. But whether the wage differences we observe are products purely of different network sizes (first term in Equation (2)), or firms' differential value conferred by them (third term), variation in network size is ultimately responsible.

With these caveats in mind, we restrict our analysis entirely to the relation between CEO pay and his/her network's size and composition. Underlying these tests is the assumption that, at least to some degree, the benefits of the CEO's network partially accrue to the firm. An increasing number of studies demonstrate that social interactions and the networks they generate can have meaningful effects on economic outcomes, both at the personal level as well as among organized groups such as firms. In both cases, one key advantage of networks is the effect of knowledge spillovers (e.g., Glaeser, Kalla, Scheinkman, and Shleifer (1992), Jaffe, Trajtenberg, and Henderson (1993)), whereby information generated in one part of the network becomes accessible to other members. Numerous academic studies have focused on specific applications.

For example, Hochberg, Ljungqvist, and Lu (2007) show that venture capital (VC) firms form networks based on their syndication histories. They present evidence that being well networked is associated with superior subsequent performance. Whether such benefits accrue from selection effects (i.e., networked VC firms are sent the “best” deals by other network members), or from monitoring synergies is less important, as both are plausible network externalities. In the same VC industry, Hochberg, Ljungqvist, and Lu (forthcoming) emphasize a third mechanism: network members can collude to deter potential entrants, raising entry costs and boosting economic rents for incumbents.

Strategic alliances within the pharmaceutical/biotech sector are another natural place to look for network benefits. Robinson and Stuart (2006) show that a firm’s position in the network can act as a substitute for explicit control arrangements such as high equity stakes. They argue that information sharing between network members has two effects; not only is the information itself valuable, but also its credibility allows for reputational capital to be built or destroyed.

The growing number of studies of CEO and/or director networks, of which this paper is one, often provide explicit example of information flow across network nodes. Fracassi (2010), for example, finds that firms sharing board members invest more similarly, and that death of such directors severs this link. As a second example, Engelberg, Gao, and Parsons (forthcoming) show that when bankers share social ties to their lenders (e.g., a firm’s CEO and bank President having a past work tie), interest rates are lower, and subsequent firm performance is improved. This is consistent with network ties reducing information asymmetries, and ultimately creating a surplus to be shared between the firm and bank.

However, information sharing is not the only reason that networks confer value to their members. Another group of studies examines the value of social ties to government officials, i.e., political connections. Across 42 different countries, Faccio (2006) finds that firms with social connections to government officials enjoy easier access to financing, lower taxes and greater market share. Bertrand, Kramarz, Schoar, and Thesar (2005) focus on a sample of French firms and find that CEOs with personal connections to politicians can extract benefits such as tax subsidies for their firms (although there is some evidence of quid pro quo). Faccio, McConnell, and Masulis (2006) and Goldman, Rocholl, and So (2008) also present evidence that political connections can create value for firms.

Regardless of *how* networks confer value, our study is an application of the results of these studies to the CEO labor market. Here, we do not attempt to link networks to firm decisions or performance, not only because of space constraints, but also because any observed relationship will be *net of* the surplus that accrue to the CEO. In other words, if the CEO captures most of the rents his network creates, then we will still observe a wage premium, but little to no performance differences between firms with differentially connected CEOs. Consequently, we focus our efforts entirely on first establishing a relation between pay and networks, and then attempt to be more specific about why this relation exists.

III. Data and Variable Constructions

The data in this study are collected from several sources. Return and pricing data are from CRSP stock return files and accounting data are from COMPUSTAT annual files. CRSP and COMPUSTAT are linked through the CRSP-COMPUSTAT link file generated by CRSP and restricted to firms with common shares only (share code 10 and 11 according to CRSP). The geographic location of a company's headquarters comes from the COMPUSTAT quarterly files. We obtain the five-digit zip code from the COMPUSTAT quarterly files and then match the zip code to the latitude and longitude of the centroid where the five-digit zip code resides. The mapping between the latitude and longitude of the centroid and the zip code is provided by the SAS Institute, which receives data from the US Census Bureau.

We collect several firm-level corporate governance variables, including board size and the staggered board classification from the RiskMetrics Governance database. We also collect the entrenchment index ("E-Index") from Bebchuk, Cohen and Ferrel (2009) and the corporate governance index ("G-Index") from Gompers, Ishii, and Metrick (2003). Institutional holding data are taken from the Thomson Reuters institutional ownership database.

We obtain the biographic information of senior executives and directors from the BoardEx database provided by Management Diagnostic Limited. Management Diagnostic Limited is a private research company specializing in collecting and disseminating social network data on company officials of US and European public and private companies.

The BoardEx database is organized as a time series of hypertext-linked individual curriculum vitae. At a specific point in time, called the "report date" in BoardEx, an individual's curriculum vitae is constructed based on the most recent disclosure information obtained by the analysts at the Management Diagnostic Limited. The curriculum vitae contains college, graduate and professional education and degree information, past employment history (including beginning and ending dates of various roles), current employment status (including primary employment and outside roles), and social activities (club memberships, positions held in various foundations and charitable groups, among others).

Management Diagnostic Limited provided us the complete set of active and inactive companies incorporated in the United States with market capitalization greater than or equal to ten million dollars by the beginning of 2000. The inactive companies were publicly traded companies at one point in time during the period between January, 2000, and December, 2007, but no longer traded by the end of December, 2007. We focus on the period 2000-2007 because conversations with staff at Management Diagnostic Limited and our exploration of the data reveal that, prior to 2000, BoardEx's coverage of US public companies is extremely limited. Using data after 2000 thus mitigates the effects of survivorship bias. Other authors who have used the BoardEx database chose a similar sample window due to these concerns (Fracassi and

Tate, 2010), or opted to focus on one year of cross-sectional observations (Fernandes, Ferreira, Matos and Murphy, 2008).

The unique company-level identification code in BoardEx is called "Company ID." However, there is no existing link between "Company ID" in BoardEx and identifiers from other commonly used databases. We create the link between the BoardEx database and these other databases in several steps. First, for active companies, BoardEx provides the ticker symbol, the International Security Identification Number (ISIN) and the company name.[4] The "Company ID" in BoardEx is matched with the Permanent Company Identification Code (PERMCO) created by the Center for Research in Security Prices (CRSP) by ticker symbol and CUSIP (derived from ISIN). For the inactive companies, BoardEx does not always keep the ticker symbol and the ISIN. If the ticker symbol and the International Security Identification Number are not provided, we match the company name recorded by BoardEx with the most recent name of a company in CRSP using a name recognition program implementing the Levenshtein algorithm.[5] To ensure the quality of the matching procedure, we manually checked all matches and made necessary adjustments.

Our matching procedure yielded 8,428 unique company matches between the BoardEx and CRSP databases. In terms of BoardEx's coverage of common stocks in CRSP, at the beginning of the sample period, BoardEx covered about 66% of CRSP stocks representing about 85% of market capitalization in CRSP. At the end of the sample period, BoardEx covered about 74% of the CRSP stocks representing about 92% of market capitalization in CRSP. Understanding the scope of coverage is important in interpreting our connection variables. When we say that a CEO has *N* connections, we mean he is connected to *N* unique officers and directors that have firms in our linked BoardEx/CRSP/COMPUSTAT database. The

[4] For US firms, the International Security Identification Number is essentially constructed by appending "US" to the front and a single-digit check code to the end of the regular nine-digit CUSIP number.

[5] The Levenshtein algorithm computes the least number of operations necessary to modify one string to another string. For instance, two perfectly matched strings will require zero steps to modify one string to the other.

connections variable will not include connections to individuals in private firms (which are in BoardEx but not in the CRSP database) or firms not covered by BoardEx (which are in the CRSP database).

After matching firms in BoardEx to PERMNOs and GVKEYs, we again use the Levenshtein algorithm to match CEO names in BoardEx with CEO names in ExecuComp (after an initial match of their firms by GVKEY) and then hand-check the matches. Our final sample consists of 2,723 unique CEOs from 1,791 unique firms between 2000 and 2007.

In our analysis of CEO education, we use BoardEx's Institute ID to identify educational institutions. First, for universities which have multiple Institute IDs we aggregate them into a single Institute ID.[6] BoardEx does not list a unique ID for degree type, only a description of the executive's "qualification." Following Cohen, Frazzini and Malloy (2008), we map each of the 8000+ degree descriptions into one of six types: (1) Undergraduate, (2) Masters, (3) MBA, (4) Ph.D., (5) Law, and (6) Other. When we say two individuals have a *university connection* we mean that they have graduated (within a year) from the same university and have the same degree type.

Table 1 provides some summary statistics on our connections variables, control variables and compensation variables in our sample. A CEO has an average of 118 total connections, comprised of social connections (mean 66), past professional connections (mean 42) and university connections (mean 10). We also find large variation in the number of total connections a CEO has across each connection type. For example, the standard deviation of social connections is 96 and at least 10% of our CEOs have over 200 social connections each.

IV. External Networks and CEO Compensation

[6] For example, BoardEx assigns "University of Kansas" ID #80243, "University of Kansas School of Business" ID #1214703, "University of Kansas School of Law" ID #632015 and "University of Kansas School of Medicine" ID #806097. We merge all of these into the "University of Kansas" ID.

We begin by running pooled cross-sectional regressions, where the dependent variable is the CEO's pay (or the natural logarithm of it). The covariates of interest are the connection variables, of which there are three relevant types. *Past_professional* connections are those between executives who no longer work for the same firm, but who once did. For instance, suppose that the CEO of Wachovia and CFO of Wells Fargo both worked for McKenzie after undergraduate school. Each would accrue a *past professional* connection to the other. A *university* connection is assigned between two people that attended the same university and graduated within a year of each other with the same degree type. By construction, connections made during university years predate the CEO's current year of employment (i.e., we do not include the few school connections where the graduation year is after the current-year observation). Two people share a *social* connection if they are members of the same social organization. As in Schmidt (2008) and Fracassi and Tate (2008), we only form social connections among individuals who have "active roles" in the social organizations listed in BoardEx. A CEO's *rolodex* at time *t* is the sum of *past professional, university,*and *social* connections.

In Panel A of Table 2, we regress each CEO's total compensation on his or her *rolodex*, along with a number of standard controls. The first four columns show the results when specifying compensation in dollars. Column 1 indicates that an additional connection is worth roughly $20,000. When controls for various firm characteristics (e.g., size, market-to-book), CEO tenure, and tenure squared are added in Column 2, the magnitude diminishes slightly to about $17,000 but remains highly significant. Year and Fama-French 49 industry controls are added in column 3, with little change on the *rolodex* coefficient. Standard errors are robust for heteroskedasticity, and are clustered by firm to allow for unobserved firm-level shocks to compensation to persist over time.

When the square of *rolodex* is added to the specification in column 4, we find a negative, significant coefficient on squared term, indicating decreasing returns to connectivity in CEO wage regressions.[8] One interpretation, which we later consider later on in more detail, is one of redundancy. As an example, consider a CEO with a university connection to an investment banker specializing in his industry. The banker may have valuable information about credit conditions, demand for new issues of the firm's securities, or other information allowing the firm to hone its financing decisions. However, it is difficult to imagine that access to a *second* investment banker confers a similar benefit. Almost certainly, some of this information will be redundant, which will lead a rational firm to pay less for it.

An important concern is the effect of firm size. Given that CEOs of larger firms are likely to have bigger networks, and that larger firms are associated with higher pay levels, it is possible that *rolodex* may be capturing residual size effects. In unreported robustness checks, we have experimented extensively with controls for firm size, utilizing logarithmic, polynomial, and various non-parametric specifications. Even including separate dummy indicators for each size percentile (i.e., a dummy variable for a firm in the 37th asset percentile, one for the 38th, etc.) results in virtually no change on the *rolodex* coefficient.

The next four rows present the results when total compensation is expressed in natural logarithms, so that the coefficients correspond approximately to percentage changes in total compensation rather than to dollar changes. Without controls for firm characteristics, an additional connection increases a CEO's total pay by three-tenths of one percent. However, when firm attributes are included, the point estimates are reduced to between 0.06% and 0.08%. Taking column 7 as the most informative estimate, we find that a one-standard-deviation change in the size of the CEO's rolodex (135) is associated with a 9% increase in total compensation.

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[8] Although this polynomial approximation implies that for a sufficiently high value (494 specifically) pay is *negatively* related to connections, over 97.5% of CEOs have values of *rolodex* below this value. Additionally, several alternative specifications that allow for, but do not impose, a negative relation indicate no evidence that additional connections are ever associated with decreasing pay. For example, dividing up *rolodex* into equal groups (e.g., quintiles, deciles) reveals an increasing relation over the entire range; other alternatives include a logarithmic specification, which we present in Table 8 and discuss in Section VII.

In Panel B, we present the same tests, but exclude all performance-based pay. As expected, when only salary is considered, the magnitudes and explanatory power are considerably lower. The third column indicates that an additional connection is worth slightly less than one thousand dollars in salary, with a robust *t*-statistic over twelve. Likewise, with respect to the logarithm of salary, another connection increases salary by about .037%, a result significant at the 2% level.

That network connections are rewarded across all pay types (i.e., for salary alone and when incentives are added) presents an interesting dichotomy. The salary results suggest that connections have *passive* value - firms benefit from a CEO's network even in the absence of his efforts. For example, we can imagine a well-connected CEO increasing a manufacturer's visibility with wholesale customers who are relatively indifferent between suppliers producing homogenous products. Even without extensive effort from the CEO, sales may increase. More generally however, we would expect the full value of a network connection to be realized after an *active* investment of time or effort by the CEO. Continuing with the example, whatever sales windfalls may occur are likely to be magnified if the CEO initiates, rather than simply fields, sales calls to network members. In this way, we can view network connections as having two sources of value, each of which show up in the expected ways in our pay regressions. In most of our remaining analysis, we present results only for total CEO pay, but note that, in the vast majority of cases, similar effects are found when salary alone is considered.

Table 3 presents the results when the log of total compensation is regressed on the individual components of the *rolodex* variable: *university*, *past professional*, and *social*. We conduct this exercise primarily to demonstrate robustness; however, this decomposition also allows us to rule out alternative interpretations, particularly that the *rolodex* variable may be capturing some element of the CEO's skill or work ethic unrelated to the ability to generate or maintain network relationships (i.e., some other component in the first term of Equation (2)).

For comparison, we first replicate the main (aggregated) result for total pay in column 1, and then present the disaggregated result in column 2. As seen, each component is individually significant, with *university* connections being about four times as valuable (0.242%) as either *social* (0.057%) or *past professional* (0.053%) connections. Columns 3, 4 and 5 show that the coefficients on *social*, *past professional*, and *university* connections are similar when estimated in isolation. *University* connections have the largest effect on pay of any connection type. Compared to the average marginal effect for an element of the *rolodex* variable (0.066%), column 5 of Panel B indicates that *university* connections (when estimated in isolation) are over four times as important (0.29%) and highly significant (p-value < .01). The average CEO shares a university connection with approximately 10 other directors and executives, so that the average marginal effect translates to roughly 3% in total compensation, in the neighborhood of $150,000-$200,000. Obviously, this evidence cannot be easily explained by reverse causality, as university connections are formed many years prior to his appointment as CEO.[9]

On the other hand, it is not only possible, but also quite likely that the number of a CEO's *university* connections may be correlated with his or her skill, ability, work ethic, or other determinants of future productivity. If school choice provides information about the CEO's latent productivity (almost certainly true on average), and if elite schools train a disproportionate number of CEOs (they do), then the presence of a large network may simply proxy for management ability.

As seen in Figure 1, a small number of elite universities train a large fraction of CEOs. Although the top panel shows that although over 50% of CEOs graduate from a school that produces no other CEO (in our sample) except him or her, a substantial number of institutions produce many CEOs. The bottom panel shows that the five universities graduating the most CEOs-Harvard University, Stanford University, University of Pennsylvania, MIT, and Columbia University - account for 660 chief executives, over 24% of the entire sample. Clearly, attending

[9] The mean age of a CEO is fifty-five years old, removing university connections by roughly thirty years' time.

an elite institution allows one to rub shoulders with a large number of future CEOs and directors, connections which may be subsequently valued in the labor market. However, these are not random settings. Elite universities have stringent admission and graduation requirements, and insofar as these are correlated with the CEO's future productivity, might be expected to influence pay as well. Thus, two different mechanisms can explain the coefficient on *university* connections shown in column 1 of Panel B.

Fortunately, our data are well-suited to address this problem. Because we observe the specific universities attended for most CEOs, we can sweep out all cross-sectional variation in average quality between any two schools by including dummy variables (i.e., fixed effects) for each university. Critically, adding university fixed effects does not prevent *university* connections from being separately identified. The reason is that although the university fixed effect applies to each graduate of a given school, the number of its graduates that go on to become public company executives or directors fluctuates over time. One reason is that schools may change enrollments over time; another is simply the random variation in the number of "successful" people attending a given university in a given year.[10] Consequently, with university-fixed effects included, the coefficient on *university* connections is identified purely through this time-series variation.

An even more stringent specification that allows for time variation in school quality includes university-decade fixed effects, e.g., fixed effects for Stanford 1980-1989, Stanford 1990-1999, etc. We show this in column 6. Rather than reducing the returns to school connectivity, the coefficient increases slightly to 0.344, indicating that each *university* connection is associated with a .34% increase in CEO pay.[11]

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[10] Fluctuation in prevailing labor market conditions provides one plausible reason for such year-to-year variation, as described in Schoar (2007). We deal explicitly with such "recession" year effects at the beginning of the CEO's career in Section VI.

[11] This specification also includes controls for the specific type of degree if available, e.g., MBA, JD, etc. We omit these coefficients from presentation in Table 3, but note that they do not affect the coefficient on rolodex.

The last column of Table 3 provides a decomposition of *university* connections into those made in business school or law school (i.e., MBA or JD) and those made elsewhere. Interestingly, we only find a positive, significant coefficient on these professional degree connections (.41%). This can be justified either because the class sizes are smaller in MBA and law schools or because networking, particularly in business school, might be explicitly taught. In either case, column 7 indicates that at least as far as the CEO labor market is concerned, network connections formed in professional school settings are particularly valuable.

V. Valuable Connections

To this point, we have emphasized access to information as one channel through which a CEO's network of external connections can benefit the firm. If true, then the most "important" names in a CEO's *rolodex* - those that convey the most valuable information - should command higher prices in the labor market.

Consider the steps required for externally collected information to benefit the firm. It must first be *generated* by network members, and must then be *transmitted* to the CEO. For the first step, we identify three connection types likely to transmit high quality information to the firm: 1) those to firm insiders (executives) at other firms, 2) those to members within the same industry, and 3) those to members of large firms. For transmission, we use geographical proximity (i.e., local connections). As we show, each of these is associated with an additional wage premium, consistent with the idea that firms derive informational benefits from the CEO's network.

Insider Connections

We first distinguish between an external connection to a board member and one to a member of the executive team. Intuitively, directors and executives have different roles within the firm, and as such, different access to firm-specific information. While executives are intimately involved with the firm's day-to-day operations, directors are often modeled (e.g., Adams and Ferreira (2007)) as advisors who depend on executives to share information with *them*. In other words, although both directors and executives possess valuable information, the latter's central role in the firm's operations means they are likely to be better informed. This claim is supported by studies of stock trading patterns. For example, Ravina and Sapienza (2008) compare the insider trading profits from corporate executives and independent directors, and find that trades initiated by independent directors are less profitable than those of the executives.[13]

Motivated by this argument, in Table 4, we break up *rolodex* into two mutually exclusive groups: connections to those that BoardEx classifies as "Executive directors" (EDs), and those that BoardEx classifies as "Supervisory Directors" (SDs). Interestingly, these connections are present in approximately equal proportions, with SD connections comprising 53.5% of the connections in the typical CEO's *rolodex*. When *rolodex* is replaced by these two variables in column 1, we find that the coefficient on *Connections to Insiders* is .204% and significant while the coefficient on *Connections to Directors* has small magnitude, and is statistically indistinguishable from zero. Furthermore, a test of the linear restriction that these two variables are the same has a p-value of .029.

Industry Connections

It is intuitive that a CEO would prefer information about his own industry. For example, the CEO of a bank would find information about credit markets more important than information about textile markets. The second column of Table 4 breaks up *rolodex* into *industry* connections and *out-of-industry* connections depending upon whether the CEO's connection shares the same Fama-French industry as the CEO. Although much less prevalent (the average CEO has 23 *industry* connections compared to over four times as many to those

[13] Note that both groups earn market-adjusted profits (indicating that both possess private information), but that those of executives are larger (indicating that they are more informed).

outside the industry), the coefficient on *industry* connections (.10%) is twice the size of the coefficient on *out-of-industry* connections (.05%). However, the large standard error on the coefficient estimate for *industry* connections makes it statistically insignificant (p=.55), and a linear restriction test also fails to statistically distinguish the magnitudes of the two coefficients.

Connections to Large Firms

The third column asks whether connections to industry leaders – in the top market share quartile of their industry – are associated with an additional premium. Presumably, there are many reasons why network connections to the biggest firms are especially attractive. For example, one could imagine that firms with higher market penetration are more attractive alliance partners; on the other hand, a firm's size may simply reflect a history of good business decisions and/or information that allows it to sustain a competitive advantage. In either case, the estimates in the third column indicate only suggestive evidence that connections to large firms are more valuable than those to their smaller counterparts (0.073 vs. 0.054 percentage points respectively). However, these differences are not statistically significant.

Although we do not separately report these results in the table, in robustness checks, we note that when we run the regression in the third column of Table 4 only for small firms (those with market share below the sample median), the premium for connections to large firms is larger. This is intuitive, given that whatever advantages "large firm connections" offer are likely to be stronger for small firms. Additionally, in almost all specifications, the interaction between size (log of market share) and *rolodex* is negative, indicating that small firms tend to pay more for connectivity.

Local Connections

From Table 3, we have already seen some evidence that "close" connections are particularly worthwhile, although not in a geographic sense. *University* connections, formed early in a CEO's life and in a setting designed to promote networking (especially at professional schools like MBA programs), are roughly three times as valuable as those formed through common jobs or social organizations. Moreover, sharing both a *degree* and *university* increases the value of a connection further, even when university-decade or university-sub-decade fixed effects are included. This suggests that CEOs are rewarded not only for whom they claim to know but also for their ability to access these network members.

In this section, we pursue an additional measure of closeness: geographic proximity. Intuitively, people are most likely to come in contact with those that live or work nearby. This argument is not new. Bayer, Ross and Topa (2008), Bertrand, Kramarz, Schoar, and Thesmar (2005), and Faccio and Parsley (forthcoming) all argue that the basis of social and political connections is primarily based on geographic origin.[14] To the extent that such frequent interactions facilitate transfers of information,[15] we would expect a wage premium for a CEO's close rather than remote connections.

In addition to making information easier to transmit, geographic close connections may possess special information of a local variety. For example, firms that compete locally (e.g., geographically concentrated retail) may find that the information gleaned from local CEOs and directors especially useful.

We define a CEO's *local* connections as those to directors or executives of firms within 100 km (62 miles) of the CEO's firm headquarters. For example, consider a CEO whose firm is headquartered in Dallas, TX. A college classmate who serves as a director of a firm

[14] A large body of well-established sociology literature documents that individual social networks are local in a geographic sense. Bayer, Ross and Topa (2008) provide a thorough review of this topic.

[15] Many papers find evidence that geographic proximity facilitates information transfers. Duflo and Saez (2002) study individuals' retirement account decisions. Their findings indicate that co-workers in the same department significantly affect an individual's choice of mutual fund vendor. Hong, Kubik and Stein (2004) show how more "social" households–households that interact with their neighbors or attend church–are more likely to invest in the stock market, especially in the geographic area where the average stock market participation rates are high. Loughran and Schultz (2004) provide strong evidence of localized trading behavior among investors of NASDAQ stocks. Coval and Moskowitz (1999) find mutual fund managers prefer to hold companies close by ("localized holdings"). Coval and Moskowitz (2001) suggest that one of the reasons mutual fund managers prefer localized holdings is because of access to management and the ability to generate private information.

headquartered in Fort Worth, TX would be classified as a local connection (more specifically, a university *and* local connection). In contrast, we define *remote* connections as those to directors or executives over 2000 km (approximately 1250 miles), which are about one third as prevalent. We find similar results with other distance breakpoints.

The fourth column of Table 4 considers the effect of local vs. remote connections. When we include local and remote connections in the main specification, the coefficient on *local connections* is larger (.132%) than that on *remote connections* (.113%). However, as before, this difference is not statistically significant.

Combinations of Valuable Connections

In three of the first four columns in Table 4, the differences between the connection types are not statistically significant at conventional levels. The reason is not because the point estimates are similar, but rather, because multicollinearity reduces the power to make statistical inferences. For example, the correlation between a CEO's large and non-large connections (column 4) is 0.87, indicating that across CEOs, there is little variation in the composition of *rolodex* (in large vs. non-large) that would permit us to detect different prices for each.

The final six columns of Table 4 address this problem by aggregating the four types of important connections into pairs, e.g., *local* and *large*, *insider and same industry*, *etc.* This variable construction is appropriate for two reasons. First, it shows us whether or not these effects were independent (for example, one could imagine *industry* and *local* connections being highly correlated), and second it increases statistical power to make inferences. Examination of the coefficients now reveals much larger differences, and in most cases, the differences become statistically significant. For example, the fifth column indicates that *local-industry* connections are worth roughly five times more than *rolodex* elements that are not ($p<0.01$). The remaining pairwise combinations tell similar stories, as do (unreported) triple interactions, e.g., *local-industry-large.*

VI. Network Size and Matching Effects

Returning to the empirical framework in Equation (1), note that to this point, we have largely ignored the distinction between the first and third arguments. That is, we have identified only the *average* marginal effect of a CEO's *rolodex* on wages, which is a combination of individual and CEO-firm match effects. Here, we try to shed some light on this distinction, looking for firm-specific attributes that might change the marginal value of having a well-connected CEO. In other words, we want to partition the universe of firms into those that highly prize a CEO's external network, versus those that may not. One such split is a firm's geographic positioning, relative to its industry peers, with the idea that isolated firms likely have the greatest networking needs. The second cut is the "connectivity" of the firm's non-CEO employers and directors. Just like we formed the *rolodex* variable at the CEO level, we can construct it at the firm level, using everyone except the CEO. Similar to the idea of geographic isolation, we posit that firms already well connected will have a reduced incentive to pay for the CEO's network of external connections.

Isolated Firms

The first firm characteristic we consider is a firm's geographic position relative to its industry peers. Specifically, we distinguish between firms located within industry *clusters* from those more geographically isolated.[16] Via their location, we posit that a clustered firm is already privy to local information networks (e.g., DeMarzo et al. (2003)), and thus has a reduced need to be connected to the network via its CEO's *rolodex*.

[16] This is not the *local* vs. *non-local* distinction made in the previous section. *Local* connections are defined purely on distance between firm headquarters. Here, the distinction is based on industry concentration, i.e., the number of same-industry firms located within a specific radius (defined below). Nothing precludes a CEO of a geographically isolated firm from having multiple *local* connections. Likewise, a firm can be located within an industry cluster, even if the CEO has few (or no) *local* connections.

To construct industry clusters, we rank all firms within a given Fama-French 30 industry by the number of firms that are located within 100 km. We designate as *clustered* those firms above the median after such a ranking procedure. Our results are not sensitive to this definition of clustering.[17] For example, if we use each firm's industry rank variable rather than clustered vs. un-clustered dummies, the results are nearly identical.

Table 5 shows the effect of the *rolodex* variable both inside and outside of industry clusters. In the first column, it is seen that clustered firms pay .050% per *rolodex* connection, whereas in the second column, firms outside industry clusters pay almost .085% each. The third column shows the results when all firms are aggregated, with dummy variables for *cluster*, *rolodex*, and their interaction. Consistent with the first two columns, the coefficient on *Rolodex* remains positive at 0.098% per connection, and highly significant. However, our main interest is in the interaction between *cluster* and *rolodex*, which is *negative* and significant at the 1% level. Well-connected CEOs can extract higher wages, but more so if their firms are isolated from their industry peers.[18] Importantly, this disparity is not due to differences in industries (all regressions include industry dummies), or to differences in average total compensation inside and outside of clusters (each regression has its own intercept), or to differences in firm location (columns 4-6 include controls for the first two digits of each firm headquarter zip code).

Firms with Few Connections

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[17] In unreported results, we analyzed the effects of clustering under a number of alternative specifications. For example, we analyzed the cluster relationship across industries, and replicated our main within industry analysis for 500 km and 1000 km breakpoints. None of these alternatives change the basic nature of our results.

[18] In our current specification, the *Cluster* dummy variable captures the average effect across industries but does not allow for industry cluster effects to differ across industries. As a robustness check, we also estimate a set of regressions with industry-cluster fixed effects, and find the interaction term between *Rolodex* and *Cluster* dummy variable – the main variable of interest – remain statistically significant with similar magnitude (unreported).

Another way to measure a firm's need for external connectivity is its *existing* network, i.e., the degree to which the firm's other directors and executives are already connected. Presumably, firms with existing connections through non-CEO directors or board members already are afforded network benefits (see, for example, Perry and Peyer (2005) and Güner, Malmendier and Tate (2008)). If true, then firms with substantial existing networks will be less apt to pay for a CEO's network, similar to the distinction between clustered versus non-clustered firms.

We gain insight into this issue by decomposing *rolodex* into two mutually exclusive groups – *unique* and *duplicate.* These designations are made as follows. For each element *i* in the CEO's *rolodex*, we determine whether the firm has access to person *i* through another member of its executive management team or board of directors. If so (not), then this person is designated a duplicate (unique) connection.

The first column of Table 6 shows that it is the CEO's *unique* connections that firms appear to value. Each of these is worth over 9 basis points in total compensation (p=0.000), compared to *duplicate* connections, which are not statistically significant. This result is important because it shows that firms apparently recognize redundancy in the CEO's network.

The next three columns present evidence that further sharpens this distinction. We saw in column 1 that firms do not reward the CEO for redundant connections; here we ask whether the value of *unique* connections is related to the firm's existing connectivity. The idea is that if a firm is already well connected through its directors and non-CEO executives, then even *unique* connections offered by the CEO are not likely to be as valuable. As discussed earlier, a firm may find a connection to an investment banker valuable, but is unlikely to find a fifth banking connection equally so (even if this connection is unique).

The second and third columns split the sample by the average number of the firm's connections, excluding the CEO's network. We see that firms with existing *High connectivity* value *unique* elements of the CEO's *rolodex* much less so than their counterparts with *Low* *connectivity*. A firm above the median in terms of non-CEO connectivity pays only 3 basis points for a unique connection, significant at the 10% level. However, for firms below the median, the marginal effect is over four times as large (14 basis points), and is highly significant.

The final column shows these effects in an aggregated specification. Here, the coefficients of interests are the interaction terms, which indicates that although *duplicate* connections are never valued, *unique* connections are most rewarded when the firm itself is poorly connected. Note also that firms with high levels of existing connectivity are associated with higher levels of CEO compensation, as evidenced by the positive and significant coefficient on *firm connectivity*. This finding can be justified at least two ways. First, although our analysis has focused exclusively on "first-order" connections, i.e., those with whom the CEO him or herself has had direct contact, *firm connectivity* picks up newly formed "second-order" connections that forms when the CEO is hired. To the extent that these second-order connections make the CEO more productive, the same reasoning that applies to first-order connections would predict a wage premium. A second justification is simply that *firm connectivity* picks up a firm attribute correlated with CEO pay, similar to size or industry effects already included in the regression (the second term in Equation (1)). Regardless, neither threatens the interpretation on the interaction terms, which show that the specific composition of the CEO's rolodex matters for pay.

VII. Alternative Hypotheses and Robustness

The discussion surrounding Tables 2 through 6 has mostly emphasized the efficient contracting view – i.e., the idea that a CEO captures rents by allowing the firm to access to his or her network. Alternatively, there are a number of possible explanations for the network-pay relation, especially the possibility that the *rolodex* variable is correlated with some other CEO attribute such as intelligence, skill, charisma, etc. Such a concern is well founded for at least two reasons. First, we already know that the *rolodex* is correlated with some *observable* determinants like educational attainment. Second, and more fundamentally, there is a nearly endless list of *unobservable* personal characteristics that one might expect to be correlated with pay, and consequently, it will never be possible to control for these unobservable determinants of compensation in a regression.

For these reasons, most of our tests are designed to address non-specific endogeneity concerns. Table 3, for example, isolates the network-pay relation from time-series variation within each university; unless the average attributes of potential CEO *cohorts* exhibited similar time-series variation, a causal relation between network size and compensation can be inferred. We make similar arguments in our discussion of Tables 4, 5, and 6.

In this section, we revisit concerns that our tests remain mis-specified, but rather than addressing relatively non-specific alternatives, here we consider a smaller number of relatively specific hypotheses. We also perform a set of robustness checks concerning the way we define our connectivity measures.

Firm Governance and CEO Power

Consider the possibility that instead of measuring the value of a CEO's network, the *rolodex* variable instead measures the CEO's bargaining power in wage negotiations. To fix ideas, suppose that the CEO's reservation wage is R, and that his employment with the firm generates surplus $S>0$. Denoting the CEO's bargaining power ø, Nash bargaining results in a wage of R + øS. Implicitly, we have been thinking about *rolodex* affecting either R or S (depending on whether the returns to the *rolodex* are general or firm-specific), but it could just as easily manifest through ø. This would generate a positive correlation between pay and network size, but not because the CEO earns a rent on his or her network.

Unlike most other CEO attributes, we can address this possibility using a number of variables that other studies have used to measure the bargaining relationship between CEOs and their monitors. Because this is a relative comparison – a "powerful" CEO is the flipside of a "weak" monitor – we use information at both the executive and firm level in our analysis. The first four columns of Table 7 consider common firm-side measures of governance proposed in previous literature: 1) the presence of a staggered board (Bebchuk and Cohen, 2005), 2) the G-Index (Gompers, Ishii, and Metrick, 2003), 3) the E-index (Bebchuk, Cohen and Ferrell, 2009) and 4) the presence of concentrated institutional investors (Hartzell and Starks, 2003). We include each in our total pay regressions, along with *rolodex* and the relevant interaction.

Beginning first in column 1, we see that staggered boards are associated with neither higher nor lower levels of CEO pay. More importantly however, the slope on the *rolodex* is unrelated to this measure of CEO entrenchment, as indicated by the insignificant interaction. The same applies to the G-Index (second column) and E-Index (third column). The fourth column verifies Hartzell and Starks's (2003) result in a more recent sample, showing that CEO compensation levels are lower when a firm's stock is owned disproportionately by a small number of (presumably) active institutions. However, the interaction with *Rolodex* has a marginally significant and positive point estimate, suggesting that the CEO's connections are *most* valued when the firm has effective institutional monitoring. The fifth column of Table 7 includes all four governance measures and interactions simultaneously, with no qualitative change in the main result.

The last three columns of Table 7 consider the opposite (CEO) side of the executive-firm bargaining relationship, and quantifies relative bargaining strength using the "Role Name" field in BoardEx. Column 6 considers CEOs who are labeled "chairman" by BoardEx; Columns 7 considers CEOs who are labeled "president" by BoardEx; and Column 8 considers CEOs who are both chairman and president. The regression results shown in column include a dummy variable which takes the value 1 if the CEO has such a label, and an interaction between this dummy and *rolodex*. The evidence in the last three columns suggests that while CEO power has a positive relationship with pay, it has little to do with *rolodex*. In each specification *rolodex* remains highly significant and the interaction terms are insignificant.

Together, the evidence in Table 7 suggests that *Rolodex* is not simply a proxy for powerful CEOs or weak governance, which previous research has already shown can influence pay levels.

Labor Market Frictions

Consider the possibility that a CEO's network may be related to pay, not necessarily because it confers value to the firm, but because it allows the CEO to maximize his or her outside employment opportunities. For example, imagine the extreme case where a CEO's personal network confers no value to the firm, but simply allows the CEO to be "in the loop" about possible job offers. Here, a well-connected CEO might be able to capitalize on outside opportunities, whereas a lesser-connected CEO may not. In other words, perhaps connections simply reduce search frictions in the CEO labor market.

Table 6 indicates two pieces of evidence that the CEO's rolodex does more than reduce labor market frictions. First, it indicates that firms do not pay for a CEO's connections if they are redundant to those already possessed by the firm. This is easy to reconcile via an information-based story, but more difficult to justify from the alternative hypothesis. Presumably, if a CEO was using his or her network to capitalize on outside options, it makes little difference whether these external connections are redundant from the firm's perspective. Under this view, one would expect to find little or no difference between unique or redundant connections; and yet, Table 6 shows that *only* unique connections (from the firm's perspective) are valued in the labor market. Second, note that firms already well-connected pay the lowest wages for a well-connected CEO. Even if a CEO's network allows for him or her to solicit or capitalize on outside offers, it is unclear why the firm's existing connectivity would be systematically related to this -- let alone, why the observed relation should be negative.

Fixed Effects

A number of recent papers have emphasized the explanatory power of CEO fixed effects as they relate to management behavior and compensation. Specific examples include Bertrand and Schoar (2003), which shows that CEO fixed effects explain financial and dividend policy, and Graham, Li, and Qiu (forthcoming), which documents a substantial increase in R^2 when CEO fixed effects are added to panel regressions of compensation.

Our setting is not suitable to include CEO fixed effects. The reason is that a CEO's *rolodex*, while not completely constant over his or her tenure, exhibits very little time-series variation. To see why, consider that a CEO's *university* connections vary over time only as classmates enter and exit the BoardEx database (e.g., through being awarded new board seats, dying, etc.). Table 1 indicates that across all observations, the standard deviation of *university* connections is 17.9, but the *within-CEO* variation is only 1.2. This is similar for all connection measures. Combining this with our relatively short sample period (eight years), it is clear that the inclusion of CEO fixed effects makes identification of network effects very difficult.

A similar problem arises when attempting to identify *Rolodex* with firm fixed effects. The standard deviation of the *rolodex* variable, as indicated in Table 1, is 135. However, this is due almost entirely to variation between CEOs at different firms, i.e., cross-sectional variation. The standard deviation in *rolodex* for the median firm is only 14.1, nearly an order of magnitude smaller than the overall variation. Given that within-firm changes in *rolodex* are almost entirely due to CEO changes, it is unsurprising that this variation is small.

Despite this limitation, the first column of Table 8 shows that although the magnitude of *Rolodex* is cut roughly in half when firm fixed effects are included, it remains significant at the 10.2% level. The second and third columns show further evidence of robustness. These columns consider the natural logarithm of *Rolodex*, so that the interpretation of the coefficient is the pay-connection elasticity. While column 2 (without firm effects) shows that allowing for decreasing returns to network size via polynomial approximation in Table 2 is innocuous, column 3 shows that the effect is not robust to the inclusion of firm effects at conventional levels (*p=17.5%*).

We wish to point out however, that although the fixed effect specifications potentially provide superior identification, they run the risk of concealing the cross-sectional trade-offs that cause firms to make the choices they do. In particular, if firms balance the benefits of its CEO's connectivity against the cost of a higher wage, and if this trade-off is stable over time, then firm fixed effects are of little benefit for understanding the sources of these economic trade-offs.[22] for this reason, the evidence presented in Tables 4, 5, and 6 is a key counterpart to the fixed effects results presented here. The cross-sectional evidence tells us *when* and *why* networks appear to be so valued by firms, complementing the fixed effects specifications (here) that sacrifice economic intuition for identification.

Alternative Connectivity Measures

To this point, we have measured a CEO's network with the *sum* of his educational, workplace, and social connections. This is based on the simple notion that network size is a good proxy for its value. However, this is certainly not the only way to characterize a network, and indeed, a large literature on network theory has explored numerous alternatives. Columns 4 and 5 of Table 8 present two of these. In the first (column 4), we follow Hochberg, Ljungqvist, and Lu (2007), and calculate each CEO's *centrality*, which is his or her *rolodex* scaled by gross number of possible connections.[23] As seen, in this specification, the "scaled rolodex" remains a strong, positive determinant of CEO compensation. The fifth column shows the results when we adopt a non-parametric approach, using a CEO's *rolodex* percentile ranking, rather than the raw values the key independent variable. Like the previous column, the network-pay relation survives.

[22] See Lemmon, Roberts, and Zender (2007) for an analogous argument regarding the use of firm fixed effects in panel regressions of firm leverage.

[23] This maximum changes each year as the sample population changes.

VIII. Conclusion

We find that, on average, a CEO's personal connections to other directors and executives of public companies are strong predictors of both salary and total compensation. Moreover, we find that network connections likely to be most valuable–to those within the same industry, to those geographically close, or to executives involved in other firms' day-to-day operations–command the highest wage premium.

Additionally, we find that firms most likely to benefit from external connectivity pay the highest prices. Firms isolated from their industry peers pay more for each personal connection within the CEO's network; similarly, firms with poorly connected board members (i.e., those with fewer external connections) pay higher prices for their CEOs' networks. Each of these results holds for a variety of connection types, including prior connections formed during school years, and those formed from past working relationships.

Taken together, the evidence here supports the idea that CEOs are paid for their valuable, portable network of connections that bring information into the firm. Although this evidence is consistent with the literature on the information value of network, it does not specify the precise channels by which a CEO's network creates value for the firm. Identifying such channels remains a promising avenue for future research.

References

Adams, R., Ferreira, D., 2007, A Theory of Friendly Boards, *Journal of Finance*, 62 (1), 217-250.

Almazan, A., de Motta, A, and Titman, S., 2007, Firm Location and the Creation and Utilization of Human Capital, *Review of Economic Studies* 74(4), 1305-1327.

Barnea, A. and Guedj, I., 2006, 'But, Mom, All the Other Kids Have One!' - CEO Compensation and Director Networks, Working Paper, University of Texas at Austin.

Bayer, P., S. Ross and G. Topa, 2008, Place of work and place of residence: informal hiring network and labor market outcomes, *Journal of Political Economy* 116(6), 1150-1195.

Bebchuk, L., and A. Cohen, 2005, The costs of an entrenched board, *Journal of Financial Economics* 78, 409-433.

Bebchuk, L., A. Cohen, and A. Ferrell, 2009, What Matters in Corporate Governance? *Review of Financial Studies* 22, 783-827.

Bebchuk, L., and J. Fried, 2004, Pay without performance, Harvard University Press.

Bertrand, M., 2009, CEOs, *Annual Review of Economics*, Forthcoming.

Bertrand, M., F. Kramarz, A. Schoar, and D. Thesmar, 2005, Politically connected CEOs and corporate outcomes: Evidence from France, working paper, University of Chicago and M.I.T.

Bertrand, M., Mullainathan, S., 2000, Agents with and without Principals, *The American Economic Review*, 90, 2, 203-208.

Bertrand, M., Mullainathan, S., 2001, Are CEOs rewarded for luck? The ones without principals are, *Quarterly Journal of Economics*, 116, 901-932.

Bertrand, M. and Schoar, A., 2003, Managing with Style: The Effect of Managers on Firm Policies, *Quarterly Journal of Economics* 118(4), 1169-1208.

Butler, A., Gurun, U., Connected Companies' Compensation, working paper, 2008.

Carlin, B., and S. Gervais, 2008, Work ethic, employment contracts, and firm value, *Journal of Finance*, Forthcoming.

Clayton, M., J. Hartzell, and J. Rosenberg, 2005, the Impact of CEO Turnover on Equity Volatility, *Journal of Business* 78(5), 1779-1808.

Cohen, L., A. Frazzini, and C. Malloy, 2008b, The small word of investing: Board connections and mutual fund returns, *Journal of Political Economy* 116(5), 951-979.

Conyon, M., 1997, Corporate Governance and Executive Compensation, *International Journal of Industrial Organization*, 15, 493-509.

Core, J., Holthausen, R., Larcker, D., Corporate Governance, Chief Executive Officer Compensation, and Firm Performance, *Journal of Financial Economics*, Vol 51, No. 3 (March 1999), pp. 371-406.

Coval, J., and T. Moskowitz, 1999, Home Bias at Home: Local Equity Preference in Domestic Portfolios, *Journal of Finance* 54, 2045-2073.

Coval, J., and T. Moskowitz, 2001, The Geography of Investment: Informed Trading and Asset Prices, *Journal of Political Economy* 109, 811-841.

Cremers, K., J. Martijin, V. Nair, and U. Peyer, 2008, Takeover defenses and competition: the role of stakeholders, *Journal Empirical Legal Studies*, Forthcoming.

DeMarzo, P., D. Vayanos and J. Zwiebel, 2003, Persuasion bias, social influence, and unidimensional opinions, *Quarterly Journal of Economics* 118(3), 909-968.

Denis, D., and D. Denis, 1995, Causes of financial distress following leveraged recapitalizations, *Journal of Financial Economics* 37, 129-158.

Duflo, E. and E. Saez, 2002, Participation and investment decisions in a retirement plan: the influence of colleagues' choice, *Journal of Public Economics* 85, 121-148.

Faccio, M., 2006, Politically connected firms, *American Economic Review* 96, 369 – 386.

Faccio, M., Masulis, R., McConnell, J., 2006, Political connections and corporate bailouts, *Journal of Finance* 61, 2597 - 2635.

Faccio, M. and Parsley, D., 2007, Sudden Deaths: Taking Stock of Geographic Ties, *Journal of Financial and Quantitative Analysis*, Forthcoming.

Fernandes, N., M. Ferreira, P. Matos and K. Murphy, 2008, The pay divide: (why) are U.S. top executives paid more?, *Working Paper*, University of Southern California.

Fracassi, C., 2008, Corporate Finance Policies and Social Networks, *Working Paper*, University of California at Los Angeles.

Fracassi, C., and G. Tate, 2009, External Networking and Internal Firm Governance, 2009, *Working Paper*, University of California at Los Angeles.

Frydman, C., 2007, Rising Through the Ranks: The Evolution of the Market for Corporate Executives, 1936-2003, *Working Paper*, MIT.

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

Glaeser, Edward L., Hedi D. Kallal, Jose A. Scheinkman, and Andrei Shleifer, 1992, Growth in Cities, *Journal of Political Economy* 100 (6), 1126-1152.

Goldman, E., Rocholl, J., So, J., 2006, Does political connectedness affect firm value? *Review of Financial Studies*.

Gompers, P., J. Ishii and A. Metrick, 2003, Corporate governance and equity prices, *Quarterly Journal of Economics* 118, 107-155.

Güner, B., U. Malmendier, and G. Tate, 2008, Financial Expertise of Directors, *Journal of Financial Economics* 89(1), 20-43.

Hartzell, J., Starks, L., 2003, Institutional Investors and Executive Compensation, *Journal of Finance,* 58, 2351-2374.

Hochberg, Yael, Alexander Ljungqvist and Yang Lu, 2007, Whom you know matters: Venture capital networks and investment performance, *Journal of Finance* 62, 251-301.

Hochberg, Yael, Alexander Ljungqvist and Yang Lu, Networking as a Barrier to Entry and the Competitive Supply of Venture Capital, *Journal of Finance*, Forthcoming.

Hong, Harrison, Jeffrey D. Kubik and Jeremy C. Stein, 2004, Social interaction and stock-market participation, *Journal of Finance* 59(4), 137-163.

Hwang, B. and S. Kim, 2009, It pays to have friends, *Journal of Financial Economics* 93, 138 - 158.

Jaffe, Adam B., Manuel Trajtenberg, and Rebecca Henderson, 1993, Geographic Localization of Knowledge Spillovers as Evidenced by Patent Citations, The *Quarterly Journal of Economics* 108, 577-598.

Kaplan, S., M. Klebanov, and M. Sorensen, 2008, Which CEO Characteristics and Abilities Matter?, *Working Paper*, University of Chicago.

Larcker, D., S. Richardson, A. Seary and I. Tuna, 2005, Back door links between directors and executive compensation, *Working Paper*, University of Pennsylvania.

Lazear, E. and P. Oyer, 2010, Personnel economics, in R. Gibbons and J. Roberts (eds), *Handbook of Organizational Economics*, North-Holland, Amsterdam.

Loughran, T. and P. Schultz, 2004, Weather, Stock Returns, and the impact of localized trading behavior, *Journal of Financial and Quantitative Analysis* 39, 343-364.

Malmendier, Ulrike M. and Geoffrey Tate, 2009, Superstar CEOs, *Quarterly Journal of Economics* 124(4), 1953 – 1638.

Murphy, K., 1999, Chapter 38 Executive compensation, In: Orley C. Ashenfelter and David Card, Editor(s), Handbook of Labor Economics, Elsevier, 1999, Volume 3, Part 2, Pages 2485-2563.

Murphy, K., Zábojník, J., 2004, CEO Pay and Appointments: A Market-Based Explanation for Recent Trends, *American Economic Review*, Volume 94(2), pp.192-196.

Nguyen-Dang, B., 2008, Does the rolodex matter? Corporate elite's small world and the effectiveness of boards of directors, *Working Paper*, Chinese University of Hong Kong.

Perry, T., Peyer, U., 2005, Board seat accumulation by executives: a shareholder's perspective, *Journal of Finance* 60, 2083–2123

Ravina, E., and P. Sapienza, 2008, What do independent directors know? Evidence from their trading, *Review of Finance Studies*, Forthcoming.

Robinson, David T., and Toby E. Stuart, 2006, Network Effects in the Governance of Strategic Alliances, *Journal of Law, Economics, and Organization* 23, 242 – 273.

Schmidt, B., 2008, Costs and Benefits of "Friendly" Boards during Mergers and Acquisitions, *Working Paper*, University of Southern California.

Schoar, A., 2007, CEO Careers and Style, *Working Paper*, MIT.

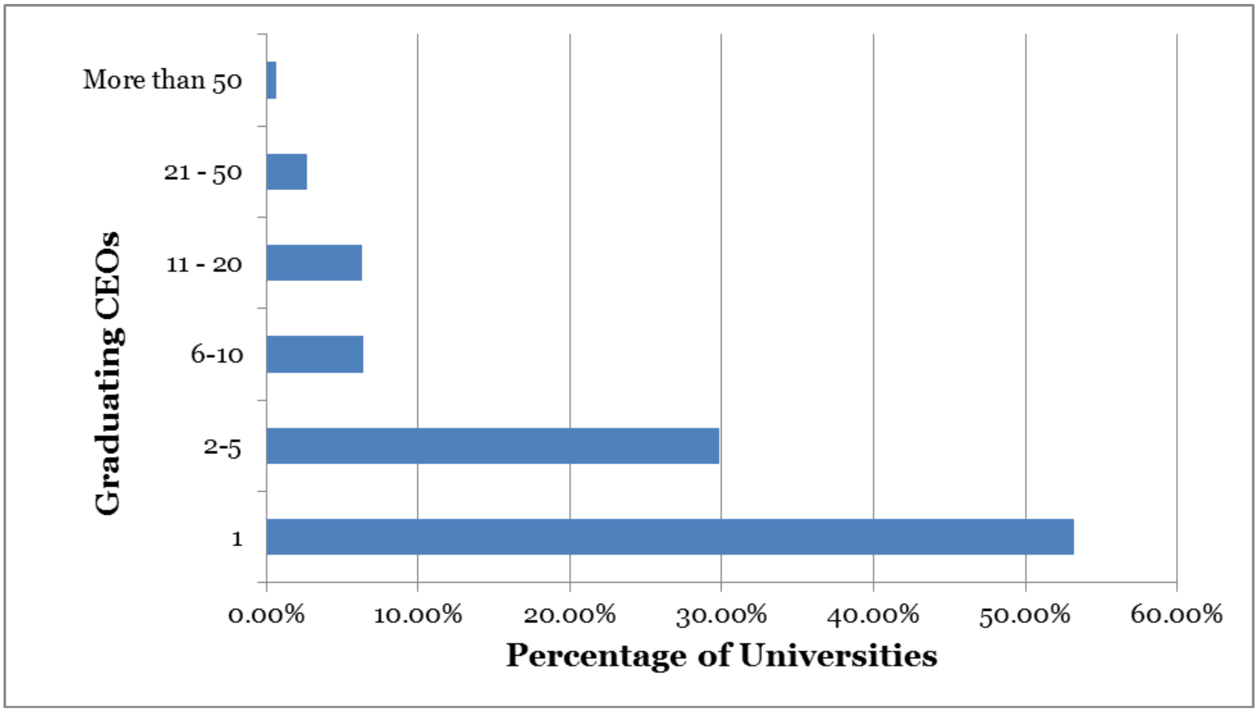
Weisbach, M., 1995, CEO turnover and the firm's investment decisions, *Journal of Financial Economics* 37, 159-188.

Yermack, D., 1996, Higher market valuation of companies with a small board of directors, *Journal of Financial Economics,* 40, 185-211.

Yermack, D., 2004, Renumeration, Retention, and Reputation Incentives for Outside Directors, *The Journal of Finance*, 59, 2281-2308.

Figure 1: CEOs and Universities

The top figure graphs the percentage of universities in our sample with different ranges of graduating CEOs in our sample. The bottom table displays the top 25 universities ranked by the number of graduating CEOs.



Top 25 Universities (# of CEOs in our sample)

1. Harvard University (318)	10. University of Texas (48)	18. UC Berkeley (31)
2. Stanford University (120)	11. Cornell University (46)	19. University of Illinois (30)
3. University of Pennsylvania (85)	12. University of Chicago (41)	20. University of Virginia (29)
4. MIT (71)	13. Purdue University (41)	21. UCLA (28)
5. Columbia University (66)	14. Princeton University (40)	22. Indiana University (27)
6. University of Michigan (54)	15. Dartmouth College (39)	23. University of North Carolina (27)
7. University of Wisconsin (53)	16. Yale University (37)	24. Duke University (25)
8. New York University (50)	17. USC (32)	25. Georgia Tech (25)
9. Northwestern University (49)		

Table 1: Summary Statistics

Total compensation (TDC1), Salary, Bonus and Option Pay are from ExecuComp. Tenure is the time (in years) since the executive became CEO at the firm. Age is the CEO's age according to ExecuComp. Assets and Sales are taken from Compustat. Last Year (Two Years) Return is the raw one-year (two-year) cumulative return ending on the fiscal year end date. Idiosyncratic volatility is the average squared error taken from a CAPM regression of monthly returns over the past 5 years. Market-to-Book is the ratio of market to book equity. Rolodex is the sum of University Connections, Social Connections and Past Professional Connections. Past Professional Connections are between executives who no longer work for the same firm, University Connections are between individuals who attended the same university and graduated within a year with the same degree and Social connections are between two people who are members of the same social organization. Following Fracassi (2008) and Fracassi and Tate (2008), we only form social connections among individuals who have "active roles" in social organizations which means we require the role description in the BoardEx database to be more than a "member" for all organizations except clubs.

	Mean	**Median**	**Standard Deviation**	**10th Percentile**	**90th Percentile**
Total Compensation (thousands)	5937.08	2937.52	245599.06	737.67	12627.77
Salary	697.51	650.00	367.08	322.92	1084.27
Bonus	794.95	332.00	1744.07	0.00	1867.32
Option Pay	4442.85	1655.69	24339.39	51.21	15718.07
Tenure	6.97	5.00	7.24	1.00	16.00
Age	55.51	56.00	7.43	46.00	64.00
Assets	16058.48	1751.50	80879.86	276.11	24153.00
Sales	5851.32	1351.39	17355.70	225.76	12959.25
Last Year Return	17.76%	10.61%	59.53%	-32.82%	67.05%
Last Two Years Return	40.66%	21.54%	123.56%	-39.98%	119.66%
Idiosyncratic Volatility	0.0043	0.0014	0.0085	0.0001	0.0117
Market-to-Book	2.86	2.05	2.78	0.90	7.71
Rolodex	117.56	69.00	134.69	4.00	301.00
University Connections	10.33	3.00	17.90	0.00	27.00
Social Connections	65.63	23.00	95.60	0.00	202.00
Past Professional Connections	41.60	16.00	66.39	0.00	118.00

Table 2: Connections, Salary and Total Compensation

The Rolodex is the sum of a CEO's past professional connections, university connections and social connections. Rolodex Squared is the square of the Rolodex. Prior Year (2-Year) Return is the 1-year (2- year) cumulative return ending at the firm's fiscal year-end. Idiosyncratic volatility is the variance from a CAPM regression of monthly returns over the prior 60 months. Tenure is the time (in years) the CEO has been with his firm. Industry refers to the Fama-French 49 industries. Robust standard errors clustered by firm are in parentheses. *, **, and *** represent significance at the 10%, 5% and 1% levels, respectively.

	Dependent Variable: Total Compensation				Dependent Variable: Log(Total Compensation)			
Rolodex	20.59*** (3.0120)	16.98*** (3.1910)	17.45*** (3.4970)	29.43*** (5.8320)	0.00300*** (0.0002)	0.000760*** (0.0002)	0.000656*** (0.0001)	0.00142*** (0.0002)
Rolodex Squared				-0.0244*** (0.0065)				-1.48e-06*** (0.0000)
Total Assets		0.0241*** (0.0034)	0.0232*** (0.0032)	0.0245*** (0.0028)				
Log(Assets)						0.355*** (0.0133)	0.417*** (0.0147)	0.413*** (0.0146)
Prior Year Return		-836.6* (472.2)	-658 (481.5)	-652.8 (480.5)		-0.0380* (0.0222)	-0.0123 (0.0223)	-0.0124 (0.0223)
Prior 2 Years Return		947.7*** (310.9)	923.3*** (313.5)	930.8*** (313.4)		0.0650*** (0.0146)	0.0676*** (0.0144)	0.0680*** (0.0144)
Idiosyncratic Volatility		101,049** (44633.0)	113,005** (52351.0)	114,302** (52275.0)	0.00300*** (0.0002)	7.964*** (3.0160)	5.478* (3.2830)	5.479* (3.2680)
Market to Book		520.7*** (100.1)	428.5*** (99.1)	424.8*** (98.9)		0.0718*** (0.0061)	0.0566*** (0.0056)	0.0562*** (0.0056)
Tenure		-31.3 (68.3)	-31.92 (68.3)	-33.49 (68.48)		0.0116** (0.0056)	0.0135** (0.0055)	0.0132** (0.0055)
Tenure Squared		-0.217 (1.69)	-0.396 (1.7)	-0.292 (1.7)		-0.000618*** (0.0002)	-0.000705*** (0.0002)	-0.000694*** (0.0002)
Year Fixed Effects	NO	NO	YES	YES	NO	NO	YES	YES
Industry Fixed Effects	NO	NO	YES	YES	NO	NO	YES	YES
Observations	11,078	10,579	10,579	10,579	11,070	10,571	10,571	10,571
Adjusted R^2	0.013	0.025	0.027	0.028	0.108	0.32	0.367	0.368

	Dependent Variable: Salary				Dependent Variable: Log(Salary)			
Rolodex	0.997***	0.892***	0.920***	1.360***	0.00121***	0.000342**	0.000369**	0.000749***
	(0.0752)	(0.0744)	(0.0677)	(0.1270)	(0.0001)	(0.0001)	(0.0002)	(0.0002)
Rolodex Squared				-0.000894***				-7.34e-07*
				(0.0003)				(0.0000)
Total Assets		0.000509**	0.000467**	0.000519**				
		(0.0002)	(0.0002)	(0.0002)				
Log(Assets)						0.134***	0.154***	0.152***
						(0.0133)	(0.0164)	(0.0166)
Prior Year Return	-9.781**	-6.491*	-6.321*	-9.781**		-0.00481	-0.00259	-0.00263
	(3.9050)	(3.7940)	(3.7870)	(3.9050)		(0.0094)	(0.0107)	(0.0107)
Prior 2 Years Return	-12.88***	-9.884***	-9.621***	-12.88***		-0.0175**	-0.0116	-0.0114
	(2.2320)	(2.2790)	(2.2810)	(2.2320)		(0.0080)	(0.0079)	(0.0079)
Idiosyncratic Volatility	-8,438***	-5,915***	-5,865***	-8,438***		-12.11***	-9.015***	-9.010***
	(627.9000)	(680.6000)	(671.0000)	(627.9000)		(2.2360)	(2.3880)	(2.3850)
Market to Book	2.394	2.13	2.004	2.394		0.000391	-0.0026	-0.0028
	(2.3760)	(2.3890)	(2.3810)	(2.3760)		(0.0055)	(0.0050)	(0.0050)
Tenure	5.112**	4.077**	4.004*	5.112**		0.00910**	0.00805*	0.00788*
	(2.1950)	(2.0540)	(2.0420)	(2.1950)		(0.0038)	(0.0042)	(0.0042)
Tenure Squared	-0.128	-0.095	-0.0901	-0.128	0.00121***	-0.000207	-0.000175	-0.000168
	(0.0843)	(0.0770)	(0.0762)	(0.0843)	(0.0001)	(0.0001)	(0.0001)	(0.0001)
Year Fixed Effects	NO	NO	YES	YES	NO	NO	YES	YES
Industry Fixed Effects	NO	NO	YES	YES	NO	NO	YES	YES
Observations	11,144	10,643	10,643	10,643	11,063	10,565	10,565	10,565
Adjusted R^2	0.134	0.194	0.267	0.273	0.036	0.121	0.153	0.154

Table 3: Total Compensation and Rolodex Components

Social connections are the sum of connections of individuals with "active roles" in the same social organization (Fracassi and Tate, 2008). Past professional connections are the sum of professional connections where the CEO and connected individual no longer work at the same firm. University connections count the number of individuals in the BoardEx database who attended the same university and graduated within a year of the CEO with the same degree. Controls are Log(Assets), Prior Year Return, Prior 2 Years Return, Idiosyncratic Volatility, Market to Book, Tenure and Tenure Squared as in Table 2. Robust standard errors clustered by firm are in parentheses. *, **, and *** represent significance at the 10%, 5% and 1% levels, respectively.

	Dependent Variable: Log(Total Compensation)						
Rolodex	0.000655*** (0.000146)						
Social Connections		0.00057** (0.000226)	0.000714*** (0.000224)				
Professional Connections		0.000534** (0.000258)		0.000739*** (0.000247)			
University Connections		0.00242*** (0.000741)			0.00289*** (0.000812)	0.00344*** (0.001030)	
University Connections: MBA and JD Only							0.00431*** (0.00127)
University Connections: Not MBA and JD Only							-0.00242 (0.00247)
Firm Controls (from Table 2)	YES	YES	YES	YES	YES	YES	YES
University-Decade Fixed Effects	NO	NO	NO	NO	NO	YES	YES
Degree Fixed Effects	NO	NO	NO	NO	NO	YES	YES
Year Fixed Effects	YES	YES	YES	YES	YES	YES	YES
Industry Fixed Effects	YES	YES	YES	YES	YES	YES	YES
Observations	10,571	10,571	10,571	10,571	10580	10580	10580
Adjusted R^2	0.371	0.371	0.369	0.369	0.368	0.483	0.483

Table 4: Important Connections

The Rolodex is the sum of old professional connections, university connections and social connections. The definition of important connections depends on the column heading: insider, local, same industry, large and various combinations. Other connections are the complement (e.g. for local connections the complement is non-local connections, for same industry connections the complement is out-of-industry connections, etc.). Local connections are equal to number of individuals in the Rolodex who work for firms with headquarters less than 100 kilometers apart. Industry connections are equal to number of individuals in the Rolodex who work in the same Fama-French 49 industry. Connections to insiders are equal to the number of individuals in the Rolodex that BoardEx classifies as an "Executive Director". Large connections are equal to the number of individuals in the Rolodex who work for firms in the upper-quartile of market share in their respective industry. Combinations of Industry, Local, Insider and Large connections are similarly defined. Controls are Log(Assets), Prior Year Return, Prior 2 Years Return, Idiosyncratic Volatility, Market to Book, Tenure and Tenure Squared as in Table 2. Robust standard errors clustered by firm are in parentheses. *, **, and *** represent significance at the 10%, 5% and 1% levels, respectively. The last row reports the p-value from a linear restriction test (F-test) testing whether the coefficients of the two variables in each column — important connections and its complement, other connections -- are equal.

	Dependent Variable: Log(Total Compensation)									
Important Connections =	Insider	Same Industry	Large	Local	Local & Same Industry	Local & Insider	Insider & Same Industry	Insider & Large	Local & Large	Large & Same Industry
Important Connections	0.00204***	0.0010	0.000736***	0.00132***	0.00319***	0.00239**	0.00344***	0.00164***	0.00140***	0.00142**
	(0.000713)	(0.00068)	(0.000230)	(0.000433)	(0.000844)	(0.000799)	(0.00165)	(0.000332)	(0.000397)	(0.000642)
Other Connections	-0.000787	0.000513***	0.000505	0.00110**	0.000614***	0.000480***	0.000531***	0.000180	0.000601***	0.000614**
	(0.000598)	(0.000163)	(0.000331)	(0.000458)	(9.00e-05)	(0.000189)	(0.000138)	(0.000229)	(0.000111)	(9.35e-05)
Firm Controls (from Table 2)	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES
Year Fixed Effects	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES
Industry Fixed Effects	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES
Observations	10580	10580	10580	10580	10580	10580	10580	10580	10580	10580
Adjusted R^2	0.371	0.370	0.370	0.370	0.371	0.370	0.370	0.370	0.370	0.370
p-value of Restriction Test	0.0290	0.5508	0.7662	0.7459	0.0099	0.0510	0.0867	0.0222	0.0752	0.3012

Table 5: Industry Clusters

The Rolodex is the sum of old professional connections, university connections and social connections. For each Fama-French 49 industry, we rank firms by the number of other firms in their industry that have headquarters within 100 kilometers. Inside (Outside) cluster refers to firms with more than (less than) the median number of firms in their industry within 100 kilometers. The Cluster Dummy takes the value 1 if a firm has more than the median number of firms in their industry within 100 kilometers. Controls are Log(Assets), Prior Year Return, Prior 2 Years Return, Idiosyncratic Volatility, Market to Book, Tenure and Tenure Squared as in Table 2. Robust standard errors clustered by firm are in parentheses. *, **, and *** represent significance at the 10%, 5% and 1% levels, respectively.

	Dependent Variable: Log(Total Compensation)					
	Inside Cluster	Outside Cluster	All Firms	Inside Cluster	Outside Cluster	All Firms
Rolodex	0.000500**	0.000853***	0.000977***	0.000405*	0.000668***	0.000854***
	(0.0002)	(0.0002)	(0.0002)	(0.0002)	(0.0002)	(0.0002)
Cluster Dummy			0.141***			0.0657
			(0.0431)			(0.0474)
Rolodex * Cluster Dummy			-0.000564***			-0.000523**
			(0.0002)			(0.0002)
Firm Controls (from Table 2)	YES	YES	YES	YES	YES	YES
Two-Digit Zip Code Fixed Effects	NO	NO	NO	YES	YES	YES
Year Fixed Effects	YES	YES	YES	YES	YES	YES
Industry Fixed Effects	YES	YES	YES	YES	YES	YES
Observations	5,354	5,217	10,571	4,690	4,488	9,178
Adjusted R^2	0.324	0.447	0.369	0.408	0.51	0.438

Table 6: Unique Connections and Firm Connectivity

The Rolodex is the sum of past professional connections, university connections and social connections for the CEO. Duplicate connections are the number of connections in the CEO rolodex that are also in a rolodex of a non-CEO executive or a director at the CEO's firm. Unique connections are the connections in the CEO's rolodex after removing duplicate connections. Firm connectivity is the average number of connections of non-CEO executives and directors after removing duplicate connections. High (Low) Connectivity firms are those with an above (low) median value for Firm Connectivity. Controls are Log(Assets), Prior Year Return, Prior 2 Years Return, Idiosyncratic Volatility, Market to Book, Tenure and Tenure Squared as in Table 2. Robust standard errors clustered by firm are in parentheses. *, **, and *** represent significance at the 10%, 5% and 1% levels, respectively.

	Dependent Variable: Log(Total Compensation)			
	All Firms	High Connectivity Firms	Low Connectivity Firms	All Firms
Unique Rolodex	0.000942*** (0.000195)	0.000290* (.000220)	0.001442*** (.000334)	0.001840** (0.000429)
Duplicate Rolodex	0.000320 (0.000239)	0.0002430 (0.000236)	0.000724 (.000471)	9.43e-05 (0.000598)
Firm Connectivity				0.00170*** (0.000383)
Unique Rolodex * Firm Connectivity				-6.32e-06*** (2.26e-06)
Duplicate Rolodex * Firm Connectivity				1.74e-06 (3.52e-06)
Firm Controls (from Table 2)	YES	YES	YES	YES
Year Fixed Effects	YES	YES	YES	YES
Industry Fixed Effects	YES	YES	YES	YES
Observations	10580	5063	5497	10580
Adjusted R^2	0.370	0.399	0.284	0.384

Table 7: Corporate Governance and CEO Power

The Rolodex is the sum of past professional connections, university connections and social connections for the CEO. Log(Rolodex) is the natural logarithm of the 1 + Rolodex. The GIM index value is the corporate governance index in Gompers, Ishii and Metrick (2003). The Entrenchment Index is the corporate governance index in Bebchuk, Cohen, and Ferrell (2009). Staggered Board is taken from the RiskMetrics Governance database. Institutional Ownership Concentration is the fraction of institutional ownership accounted for by the top-five institutional investors in each firm. Chairman is a dummy variable equal to one if the CEO is described as a chairman in BoardEx's role description. President is a dummy variable equal to one if the CEO is described as a president in BoardEx's role description. Controls are Log(Assets), Prior Year Return, Prior 2 Years Return, Idiosyncratic Volatility, Market to Book, Tenure and Tenure Squared as in Table 2. Robust standard errors clustered by firm are in parentheses. *, **, and *** represent significance at the 10%, 5% and 1% levels, respectively. Institutional Ownership Concentration is defined as the percentage of outstanding shares owned by the top five institutional owners.

	Dependent Variable: Log(Total Compensation)							
Rolodex	0.000678*** (0.000199)	0.000623*** (0.000231)	0.000799*** (0.000279)	0.000360* (0.000204)	0.000816** (0.000352)	0.000614*** (0.000159)	0.000623*** (0.000168)	0.000600*** (0.000149)
Staggered Board	0.00836 (0.0467)				-0.114** (0.0499)			
Staggered Board * Rolodex	8.63e-05 (0.000199)				0.000110 (0.000220)			
High GIM Index		0.0710 (0.0475)			-0.0321 (0.0512)			
High GIM Index * Rolodex		9.65e-05 (0.000222)			0.000220 (0.000237)			
Entrenchment Index			0.0643*** (0.0183)		0.0971*** (0.0212)			
Entrenchment Index * Rolodex			-4.88e-05 (7.71e-05)		-0.000196** (9.18e-05)			
Inst. Own Concentration				-0.109*** (0.00992)	-0.107*** (0.00993)			
Inst. Own Concentration * Rolodex				6.92e-05* (3.63e-05)	5.65e-05 (4.12e-05)			
Chairman						0.0543 (0.0411)		
Chairman * Rolodex						8.20e-05 (0.000223)		
President							0.0485 (0.0463)	
President * Rolodex							0.000125 (0.000243)	
Chairman & President								0.0952 (0.0573)
Chairman & President * Rolodex								0.000354 (0.000299)
Firm Controls (from Table 2)	YES	YES	YES	YES	YES	YES	YES	YES
Year Fixed Effects	YES	YES	YES	YES	YES	YES	YES	YES
Industry Fixed Effects	YES	YES	YES	YES	YES	YES	YES	YES
Observations	8,601	9,117	10,279	10,526	8,410	10,571	10,571	10,571
Adjusted R^2	0.366	0.361	0.367	0.382	0.379	0.371	0.372	0.372

Table 8: Robustness

The Rolodex is the sum of a CEO's past professional connections, university connections and social connections. Rolodex Squared is the square of the Rolodex. Log(Rolodex) is the natural logarithm of 1 + Rolodex. Scaled Rolodex is the Rolodex divided by the total number of possible connections in that year. Rolodex ranking is percentile rank of a CEO's rolodex. Controls are Log(Assets), Prior Year Return, Prior 2 Years Return, Idiosyncratic Volatility, Market to Book, Tenure and Tenure Squared as in Table 2. Robust standard errors clustered by firm are in parentheses. *, **, and *** represent significance at the 10%, 5% and 1% levels, respectively.

	Dependent Variable: Log(Total Compensation)				
Rolodex	0.000598				
	(0.000366)				
Rolodex Squared	-7.76e-07				
	(5.04e-07)				
Log(Rolodex)		0.0816***	0.0254		
		(0.0114)	(0.0188)		
Scaled Rolodex				34.77***	
				(7.14)	
Rolodex Ranking					0.00444***
					(0.000654)
Firm Controls (from Table 2)	YES	YES	YES	YES	YES
Year Fixed Effects	YES	YES	YES	YES	YES
Industry Fixed Effects	YES	YES	YES	YES	YES
Firm Fixed Effects	YES	NO	YES	NO	NO
School Decade Fixed Effects	NO	NO	NO	NO	NO
Degree Fixed Effects	NO	NO	NO	NO	NO
Observations	10,571	10,571	10,571	10,571	10,571
Adjusted R^2	0.647	0.375	0.706	0.373	0.384