The Price of a CEO's Rolodex*

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Abstract: CEOs with large networks earn more than those with smaller networks. An additional connection to an executive or director *outside the firm* increases compensation by over $17,000 on average, and accounts for about 10% of total pay. An additional premium is associated with "important" members: insiders at other firms (especially large ones), geographically local connections, or those within the same industry. Needy firms – those whose non-CEO executives are poorly connected and those geographically isolated from industry peers - pay the highest prices for a CEO's rolodex. Pay-for-external-connectivity is unrelated to several measures of corporate governance, evidence in favor of a market-based 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..."

BusinessWeek, October 1, 2008

I. Introduction

Two prevailing views continue to dominate research on the levels of CEO compensation. The first contends that CEOs are able to transfer wealth from shareholders through lax corporate governance (e.g., Bebchuk and Fried, (2004)), while, in the second, CEOs are worth what they are paid (e.g., Gabaix and Landier, (2008)). While an extensive literature has emerged to explore the lax governance 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 by the size and composition of a CEO's *rolodex* – a network of personal connections to those outside the firm. Then, we look for a causal link between the CEO's network and his or her compensation.

Such a causal relation requires two assumptions. First, networks must accrue value to the firm. This can be justified on a number of grounds, perhaps the simplest being that networks allow for the aggregation and diffusion of information, which ultimately improves the firm's competitive position. Companies constantly adjust strategies in response to innovations

[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).

in market conditions, competitive threats, macroeconomic factors, regulatory changes, legislation, input prices, etc. A manager with connections to lots of people or, more importantly, to the *right* people can be a source of information and influence that, in turn, allows the firm to make better decisions. However, networks can also create value via non-information based channels – e.g., the explicit granting of favors as shown in studies of politically connected firms (e.g., Faccio (2006) and Bertrand, Kramarz, Schoar, and Thesmar (2005)). Regardless of the specific reason, 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.[3] 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 among 2,700 CEOs of large, public firms during the period 2000-2007. The main explanatory variable of interest, the CEO's *rolodex*, we extract from BoardEx, a database that reports a CEO's past or current business relationships, affiliations with charitable or volunteer organizations, boards on which the CEO has served, and past schools attended. For every CEO in our sample, we construct the simplest possible measure for connectedness: a CEO's *rolodex* is 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 pay regressions, we find that an additional connection is worth roughly $17,700 in total compensation. A one-standard-deviation increase in the size of the *rolodex* changes the

[3] 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 involvement, contact one of his or her college classmates for advice.

CEO's pay by over 11%. Moreover, the effect of connections on pay is concave. Given that the information provided by network members is likely to contain some redundancy, this is expected. A capital-constrained firm may be willing to 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.

Although consistent with a model in which firms pay CEOs for value-creating network benefits, it is possible that the above regressions are mis-specified. Specifically, perhaps well-connected CEOs are of higher ability or skill, and it is the inability to control for these that lead to the observed relation. In other words, if ranking CEOs by *rolodex* corresponds closely to a ranking by IQ or general managerial ability, then we can infer little about the value of networks in the labor market.

To address this concern, we develop a number of tests related to a CEO's *school connections*, constructed when two people matriculate at the same university during overlapping years. By including fixed effects for each school, we allow for year-to-year variation in a given school's graduating class to determine the size of the CEO's network. This allows us, for example, to compare the number of "school ties" between two CEOs who graduated from Stanford a few years apart. Because the institution is fixed, we presume similarities in average ability as well. To the extent this is true, then variation in within-school network sizes is a clean way to distinguish between returns to networks and returns to general managerial ability. Empirically, we find that such within-school variation in network sizes is strongly related to pay. Moreover, this result holds even when we allow for time variation in school quality by including school-year (e..g, Stanford 1980-1984, Stanford 1985-1989, etc.) fixed effects.

Further dissection of the *rolodex* reveals that the labor market assigns higher prices to particularly "valuable" connections. To measure the importance of a connection, we make four designations: 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. In pay regressions, we find that such valuable connections are in fact associated with larger wage premia. Their interactions are associated with even stronger effects.

We then 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. When we compare CEO compensation between firms that are located inside and outside industry clusters, two interesting patterns emerge. First, we find that overall, CEOs in clusters command a substantial wage premium. This finding is consistent with the theoretical predictions in Almazan, de Motta, and Titman (2007), whereby more able workers locate in clusters to maximize their human capital. However, when we analyze the interaction term, we find that the *rolodex* effect is over 50% larger *outside* of clusters. This suggests that geographically isolated firms, with presumably reduced access to local information generated in clusters, attempt to compensate for this disadvantage in the labor market.

The second proxy is the firm's existing connectedness through its other (non-CEO) executives and/or directors. Similar to being geographically isolated, it is expected that a firm with few existing connections will place the highest marginal value on its CEO's *rolodex*. Confirming this intuition, when we interact the non-CEO's connections with the CEO's *rolodex*, the effect is always negative and highly significant. Firms that need connections the most, those with directors who themselves are *not* already well-connected, pay roughly three times as much for each of the CEO's connections.

Finally, in light of previous evidence (e.g., Hwang and Kim (2009)) that a CEO's connections to his or her own board members can weaken corporate governance and lead to increased pay, we formally consider the possibility that this channel is responsible for our results. The specific concern is that a larger network of *external* connections may increase the probability of having an *internal* connection to a board member (that between the CEO and a member of his or her own board), which may lead to a spurious relation between pay and external connections. We confirm prior work and find an economically significant relationship between own board-CEO connectivity and CEO pay, especially pay that is not incentive-based (salary). However, when we add the CEO's external connections to our main regression with total compensation as the dependent variable we find that own board-CEO connectivity is not significant in most specifications, while external connections remain highly so. We conduct a number of additional robustness checks, and find no evidence that our results are related to the firm's governance environment.

The results contribute to our understanding of CEO compensation in three ways. First, we identify a *specific* CEO attribute that has a meaningful impact on pay, complementing recent work on CEO characteristics by Murphy and Zabojnik (2006), Frydman (2007), and Kaplan, Klebanov and Sorensen (2008). Second, given several recent studies indicating that a CEO's connections can harm shareholders, our evidence provides an alternative perspective on the role of a CEO's network as it relates to firm value, and more specifically, to rent extraction at shareholder expense. We find additional evidence of a market-value view when we see that more useful connections (e.g., those to important people within the same industry) are more expensive than those less useful, and firms with the highest networking needs pay the highest prices. Finally, we document two new facts: overall CEO pay is higher in industry clusters, although this is somewhat mitigated by the fact that isolated firms pay more for each element of the CEO's *rolodex*.

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. The Value of Networks

An increasing number of studies demonstrate that social interactions and the networks they generate can have meaningful effects on economic outcomes. This has been demonstrated both at the personal level as well as among organized groups such as firms. In either case, a key economic driver behind such network effects is 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. However, because we expect the types and frequency of information exchanges between network members to differ, most academic studies focus 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.

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.

The real economic benefits of networks are recognized beyond academics. A Google search including the terms "CEO" and "network" reveals hundreds of professional groups whose stated mission is to facilitate the transmission of information between top business executives. One such group targeting financials, the Bank CEO Network, boasts explicitly that its members "access information", "establish working relationships", and "interact with industry experts on topics dealing with current issues and opportunities". A number of public bank CEOs are quoted, including Guaranty Bank and Trust CEO Huey Townsend who describes the network's value for his bank:

"...One of the most beneficial parts of [the CEO Bank Network] is getting to know others in similar size banks that you can talk with, share ideas with, and use as a resource as things happen in your bank. I have many times called upon other members of the group that I am in, and I have always been able to get information that is helpful to my situation."

A number of similar examples exist for other industries as well. Presumably, participation in such organizations is sponsored by the firm rather than the executives themselves (personal communication with the Bank CEO network suggests that this is almost always the case). Unless firms were ultimately benefiting such an expense would be wasteful.

Taking such observations and the academic literature, our study starts with the assumptions that a CEO's network, via information flow, potentially provides value for the firm. Obviously, there are a number of dimensions through which such benefits can manifest, and pinpointing specific channels is well beyond our intended scope. Our goal is simply to show evidence of a causal relation between a CEO's pay and features of his or her external network.

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 Financial / CDA 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 - 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, 2008), 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.[5] 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.[6] 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 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

[5] 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.

[6] 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.

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.

Unlike some prior studies, we do not require the CEO connections to be confined within the ExecuComp universe of firms. Therefore, this paper perhaps provides the most complete characterization of CEO connections among a large sample of publicly traded firms in the US.

In our analysis of CEO education and school connections, we use BoardEx's Institute ID to uniquely identify schools. Unfortunately, BoardEx does not have 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 attended the same school and received the same degree, we mean that they have the same Institute ID and 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 123 total connections, comprised of social connections (mean 66), old professional connections (mean 42) and school connections (mean 15). By construction, CEOs have fewer multi-dimensional connections. For example, the average number of school *and* degree connections a CEO has (i.e., the number of individuals in the linked BoardEx/CRSP database that went to school together with the CEO and received the same type of degree) is only 8. 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

We begin by estimating linear regressions of CEO total pay on the number of external connections we can infer from BoardEx. Table 2 shows the results of estimating a number of

such specifications, progressively increasing in the number of control variables. The variable of interest is called "*rolodex*," defined as

$$rolodex_i = past\_professional_i + school_i + social_i.$$

In the above definition, *rolodex* summarizes the total number of connections belonging to CEO *i*. *Past_professional* connections are those between executives who no longer work for the same firm, but who once did. A *school* connection is assigned between two people that attend the same university and have graduation years that are less than 2 years apart. By construction, connections made during school 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). Finally, we include a CEO's *social* connections as part of the *rolodex*. 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 social organizations, which means we require the role description in the BoardEx database to be more than a "member" for all organizations except clubs.

In Panel A of Table 2, we regress each CEO's total compensation on *rolodex*, along with a number of controls. With the exception of CEO fixed-effects, these are taken from Graham et al. (2008). 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.[7] Year and Fama-French 30 industry controls are added in columns 3, with little

[7] In no specification is CEO age a significant determinant of pay, so we exclude it.

change on the *rolodex* coefficient.[8] Standard errors are robust for heteroskedasticity, and are clustered by firm to allow for unobserved firm-level shocks to compensation to persist over time.

Interestingly, Column 4 presents evidence of diminishing returns to connectivity. When the square of *rolodex* is added to the specification in column 3, we find a positive, significant coefficient on *rolodex* but a negative, significant coefficient on *rolodex squared*.[9] In other words, although a larger network is always preferred, the marginal benefit to the firm decreases as the number of connections increases. One plausible interpretation is that whatever benefits the firm derives from the network, these are (at least partially) redundant across individual network members.

To see this, consider a CEO with a school connection to an investment banker specializing in his industry. The banker is likely to 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 similar benefit. Almost certainly, some of this information will be redundant, which will lead a rational firm to pay less for it. We return to this issue in more detail in Section VI.

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 nearly .3%. However, when firm attributes

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[8] Alternative definitions of industry (e.g., Fama-French 12, Fama-French 48) produce almost identical results.

[9] 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.

are included, the point estimates are reduced to between 0.08% and 0.10%. Taking column 7 as the most informative estimate, we find that a one-standard-deviation change in the size of the CEO's rolodex (137) is associated with an 11% increase in total compensation. Similarly, the mean rolodex size in our sample is 122, suggesting that at least 10% of the average CEO's compensation reflects a return on his investment in networking.[11]

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 fourth 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 (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.

[11] We say "at least" because our universe is not the entire universe of connections. See Section II for a description of the discrepancies between the universe of firms in BoardEx and the universe of firms in CRSP and COMPUSTAT.

Table 3 presents the results when the log of total compensation is regressed on the individual components of the *rolodex* variable: *school, 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.

For comparison, we replicate the main (aggregated) result for total pay in the first column. The second column of Table 3 includes each of three components of *rolodex* simultaneously in the regression. It demonstrates that each maintains economic and statistical significance in the regression. An additional *social* (professional, *school*) connection is worth .06% (.06%, .10%) in pay. When *social connections* are estimated separately in the regression in column 3, we find an additional relationship is worth roughly .08% in pay. The cross-sectional variability of social connections in our data is large, with a standard deviation of nearly 100 members, translating into an average effect on total pay of nearly 9%.

With social connections in particular, it is possible that our pay regressions are mis-specified via reverse causality: CEOs may be pursued by organizations and charities (where they form connections) *because they are well paid*. For example, one can imagine well-paid CEOs being asked to join charity boards, hoping for their financial support. This concern is especially troubling given the fact that we know very little about the timing of social connections. An unfortunate feature of social connections (not shared with past professional or school connections) is that we only rarely can tell from BoardEx when the connection was formed, admitting the possibility that some relationships may be formed during or after the CEO's tenure with his current firm. Accordingly, in the following analysis, we separately consider past professional connections and school connections. These are not subject to the reverse causality concern.

Column 4 of Table 3 provides direct evidence against reverse causality. It considers separately the impact of a CEO's *past professional* connections on current compensation, and indicates that each instance of having worked with or served on boards with other directors or CEOs has an impact of approximately 0.10% in total compensation. A single standard deviation in the number of past professional connections (66) increases pay by nearly 7%. Because current pay cannot create past connections, there is no potential for reverse causation.

The final columns of Table 3 are dedicated to *school connections*, which are seen to have the largest effect on pay of any connection type. Compared to the average marginal effect for an element of the *rolodex* variable (0.08%), *school connections* are roughly three times as important (0.23%), and highly significant (Column 5). The average CEO shares overlapping school ties with approximately fifteen other directors and executives, so that the average marginal effect translates to roughly 3-4% in total compensation, or roughly $200,000. Obviously, this evidence cannot be easily explained by reverse causality, as school connections are formed many years prior to his appointment as CEO.[12]

On the other hand, it is not only possible, but also quite likely that the number of a CEO's *school 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 marginal 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 schools 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 schools graduating the most CEOs- Harvard Business School, Stanford University, Harvard University, Wharton School, and MIT-

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

account for 497 chief executives, over 18% of the entire sample. Clearly, attending such an elite institution allows one to rub shoulders with a large number of future CEOs and directors, connections which may be valued in the labor market. However, these are not random settings. Elite schools 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 very different stories potentially explain the coefficient on *school* connections shown in Table 4, column 5.

Fortunately, our data are well-suited to address this problem. Because we observe the specific schools attended for most CEOs, we can sweep out all cross-sectional variation in average quality between any two schools by including dummy variables for each school. Critically, adding school fixed effects does not prevent the *school* connections variable from being separately identified. The reason is that although the school 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 school in a given year.[13] With school-fixed effects included, the coefficient on *school* connections is identified purely through this time-series variation.

To allow for time variation in school quality, columns 6 includes school-decade fixed effects, e.g., fixed effects for Stanford 1980-1989, Stanford 1990-1999, etc. Rather than reducing the returns to school connectivity, the coefficient increases slightly to 0.26, indicating that each *school connection* is associated with a .26% increase in CEO pay. 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 4, but note that they do not affect the coefficient on *rolodex*. Column 7 shows the results when we add controls for every five-year graduation

[13] 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.

period, e.g., Stanford 1980-1984, Stanford 1985-1989, etc. As before, this leads to a strengthening of the *school effects* coefficient, direct evidence of a return to the CEO's network.

The final two columns consider an even stronger measure of *school connections*, those in which both individuals also received the same degree (*school and degree* connections). We see that the coefficient on *school and degree connections* is substantially larger, at .39% and .45% in the presence of school-decade (column 8) and school-sub-decade fixed effects (column 9). In addition to robustness, this evidence is helpful in addressing measurement error, given that we are requiring connections to fulfill two requirements (school and common degree). In situations where it is more likely that two people actually know one another, we would expect a stronger effect, which we find.

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 the 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 particularly likely to transmit high quality information: 1) those to firm insiders (executive) at other firms, 2) those to those within the same Fama-French-30 industry classification, and 3) those to large firms, relative to these industry classifications. For transmission, we use geographical proximity. As we show, each of these is associated with an additional wage premium, consistent with the idea that firms do in fact 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.[14]

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). When *rolodex* is replaced by these two variables in column 1, we find that the coefficient on *Connections to Insiders* is .237% 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 .017.

Industry Connections

It seems rather obvious that a bank would find information about credit markets more relevant than information about demand for paper pulp. 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 30 industry as the CEO. The coefficient on *industry* connections (.111%) is twice the size of the coefficient on *out-of-industry* connections

[14] 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).

(.0542%). However, the large standard error on the coefficient estimate for *industry* connections makes it statistically insignificant (p=.115), and a linear restriction test also fails to statistically distinguish the magnitudes of the two coefficients.

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 numerous 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 (0.076 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 (e.g., 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. *School* connections, formed early in a CEO's life and in a setting designed to promote networking (especially at graduate business

schools), are roughly three times as valuable as those formed through common jobs or social organizations. Moreover, sharing both a *degree* and *school* increases the value of a connection further, even when school-decade or school-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.[15] To the extent that such frequent interactions facilitate transfers of information,[16] 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 headquartered in Fort Worth, TX would be classified as a local connection (more specifically, a

[15] 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.

[16] 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.

school *and* local connection). In contrast, we define *remote* connections as those to directors or executives over 2000 km (approximately 1250 miles). 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 (.151%) than that on *remote connections* (.113%). Combining location with other dimensions magnifies the effect. For example, Column 4 shows that local industry connections are worth far more (.438%) than remote out-of-industry connections (.151%), a difference that is 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 sidestep this problem by aggregating the four types of important connections into pairs, e.g., *local* and *large*. 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 maximizes statistical power and improves our ability to make inferences. Examination of the coefficients now reveals much larger differences, and in most cases, the differences are 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. Firm Determinants of Network Value

The evidence in the last section indicates that not all names in the CEO's *rolodex* are equally valued. As we saw, firms pay the highest prices for connections to other executives, to those within the same industry, and to those located nearby. Here, we consider a further set of cross-sectional predictions, but instead of the properties of the *rolodex*, we examine properties of *firms* that influence their willingness to pay for a CEO's connectivity.

Isolated Firms

The first 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.[17] 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*.

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

[17] Note that this is a different classification than 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. Similarly, a firm can be located within an industry cluster, even if the CEO has few (or no) *local* connections.

of clustering.[18] 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 slightly above .04% per *rolodex* connection, whereas in the second column, firms outside industry clusters pay almost .07% each. Importantly, this disparity is due neither to differences in industry dynamics (all regressions include industry dummies), to differences in average total compensation inside and outside of clusters (each regression has its own intercept), or to differences in firm location (each regression includes dummy variables for each two-digit zip code).

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 *cluster* remains positive at 0.09% per connection, and highly significant. However, our main interest is in the interaction between *cluster* and *rolodex*, which is seen to be negative and significant at the 2% level. Well-connected CEOs can always extract higher wages, but more so if their firms are isolated from their industry peers.[19]

The large point estimate on the cluster variable is suggestive of a different labor market environment for firms in and outside of industry clusters. Although not significant in column 3, when we remove the zip code dummy variables in column 4, we see that the *cluster* dummy variable is associated with an 8.6 percent increase in pay. (The zip code dummy variables can almost be combined to form the *cluster* variable, which makes its interpretation in the presence of these difficult.) Although not the main focus of our analysis, we note that this finding is new.

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[18] 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.

[19] 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).

Further, it is consistent with theories of firm and worker location choice based on investments in human capital, e.g., Almazan, de Motta, and Titman (2007). In their model, a firm's ability to profit from its growth opportunities depends on its proximity to other firms, from which it can pool labor resources. Competition for labor drives wages upward, leading to higher compensation in industry clusters.

However, column 5 suggests that at least part of the *cluster* effect is due to network effects. If industry clusters provide more opportunities for connections to be formed, and if our *rolodex* variable is not exhaustive (it certainly is not), then *cluster* may be picking up residual connections that may be rewarded by the labor market. Two pieces of evidence provide support for this interpretation. First, the number of elements in a CEO's *rolodex* is about 17% higher in clusters than not (average 132 vs. 113). This relation holds even for each component of the *rolodex* variable: *school*, *past professional*, and *social* connections are 14%, 28%, and 12% higher in clusters, respectively. The positive correlation between connectedness and clustering means that any omitted connections in the *rolodex* variable may manifest through the *cluster* variable, providing another reason why firms in clusters pay higher overall levels.

The second piece of evidence is what happens to the *cluster* variable when we add the CEO's *local* connections to the regression. Shown in the fifth column, when *local* connections are included, the magnitude of *cluster* drops by a third, and becomes significant at only the 7% level. Thus, although there are likely cluster effects on CEO compensation that are unrelated to the CEO's personal network, local connections also appear to play an important role in explaining the stark differences in compensation between clustered and isolated firms.

The final three columns examine only the effect of a CEO's *local* connections, both in and out of industry clusters. Consistent with our earlier results on the aggregated *rolodex* variable, columns six and seven show that it is *local* connections that make the biggest difference when comparing firms in and out of clusters. Columns five and six demonstrate that a CEO's total pay increases by .16% for each local connection if the CEO's firm is inside an industry cluster, but by

over .27% if the firm is outside an industry cluster. The final column shows that this difference is significant at the 2% level.

Firms with Few Connections

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 (2007)). 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 worth about a third as much (p=0.177). This result is important because it shows that firms 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 *new* or *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 4 basis points for a unique connection, significant at the 6% level. However, for firms below the median, the marginal effect is over three times as large (15 basis points), and is highly significant. The final column shows these effects in an aggregated specification.

Although not the coefficient of main interest, we also note that the effect of *firm connectivity* alone is positive and highly significant in column 4. Our analysis exclusively focuses on the CEO's first-order connections, people we have reason to believe the CEO knows personally. In contrast, *firm connectivity* is a measure of second-order connections, people through which the CEO likely has access though an intermediary at his or her own firm. Though we might expect more distant connections to be somewhat less valuable, to the extent that these still affect the CEO's marginal productivity, we would nevertheless expect them to be positively related to pay. However, given that our analysis focuses nearly entirely on the CEO's direct network, we simply note this result, and that it is consistent with the remainder of the evidence.

VII. Alternative Hypotheses and Robustness

Poor Governance

Several papers have recently posited that a CEO's "connectedness" may have undesirable externalities, particularly if it weakens corporate governance. For example, Hwang and Kim (2009) find that when CEOs are socially connected to their own board members, compensation is higher and exhibits lower pay-for-performance sensitivity. Similar arguments are found in

Butler and Gurun (2008) and Nguyen-Dang (2008), which also argue that CEOs can leverage personal relationships with their presumed monitors to extract rents.

By contrast, our study exclusively focuses on a CEO's connections to those *outside* his or her own firm. Because a positive relation between compensation and external networks is difficult to square with poor governance, our findings provide an alternative perspective on the role and function of a CEO's network, particularly as it relates to those outside the firm. However, we have yet to consider the possibility that our *Rolodex* variable is simply a proxy for a captured board. The specific concern is that CEOs with more external connections may be more likely to have one or more connections to a board member or other monitor, which given previous findings, could lead to spurious positive correlation between our *rolodex* variable and the CEO's compensation.

Table 7 makes this comparison explicitly. In the first three columns, we consider only how the CEO's pay changes with the number of connections to members of his or her own board. As with *Rolodex*, we aggregate *school, past professional,* and *social connections* when forming the CEO's network of "inside" connections. The first column shows that total compensation is related to the number of inside connections, albeit weakly. To allow for a non-linear relation between inside connections and log pay, column 2 presents the results from a discrete representation (i.e., taking a value of one if an inside connection exists). The point estimate of over 3% gives suggestive evidence that a CEO connected to a member of his or her own board boosts pay. Finally, a log-log specification is shown in column 3, which from a statistical significance perspective, is seen to be the most favorable for inside connections, although still not significant at conventional levels.

The next three columns repeat these specifications but add the *Rolodex* variable, which, by construction, includes no overlapping connections with those insider connections considered in the first three columns. In each case, the addition of external connections (*Rolodex*) drives the coefficient on internal connections to almost zero. Only in the discrete specification shown

in the fifth column does the inside connection variable maintain a positive sign, but relative to the second column, its magnitude is reduced by over 95%. By contrast, *Rolodex* remains strongly related to total pay in each specification.[20]

The final three columns of Table 7, Panel A considers only salary, the portion of the CEO's pay that is (other than via termination) least sensitive to firm performance. Although representing only 12% of the CEO's total compensation on average, we would expect for weak governance effects to show up most strongly in this dimension. Columns seven through nine show some evidence supporting this idea. In the seventh column for example, inside connections are significantly related to the salary component of CEO pay at the 10% level. The eighth column shows no evidence for a relation between inside connections, but in the ninth column, the log-log specification shows that inside connections are *more* important than external connections, and unlike *Rolodex*, is very close to conventional significance levels. Together, the evidence in Panel A appears to suggest that external connections are reliably related to total CEO pay, but that in salary regressions where pay-for-performance incentives are weakest, inside connections also have some explanatory power as well.

Three possible interpretations come to mind. First, given that inside and external connections are positively correlated (ρ=0.41 in our sample), each will provide a noisy proxy for the other. Thus, is it possible that studies considering only inside connections may be picking up the effect of external connections, which Tables 2 through 6 show is robustly related to compensation. A second possibility is that our method of classifying connections differs somewhat from previous work, e.g., Hwang and Kim, who in addition to mutual alma mater and common industry also consider military service and regional origin. While such variation in methodology may account for differences, we note that our results are not sensitive to any

[20] Additionally, we also note that if we run our main specification on the subset of firms with no internal connections, the effect of *rolodex* is over 50% stronger, the opposite of what one would expect if external connections were simply an additional proxy for weak governance.

particular type of connection (e.g., school, common work experience, social organization), as shown in Table 3.

As a final alternative, we note that the positive relation documented in previous work need not be solely attributed to compromised governance and/or rent extraction. Adams and Ferreria (2007) describe a model in which board members serve two roles; they monitor the CEO for misbehavior, but also advise the CEO regarding the firm's strategy. The upshot of the model is that there is a well-defined tradeoff between being "friendly" with the CEO (which encourages the CEO to share with the board information and improve overall decision making) and being "hostile" (which prevents shirking). To the extent that personal relationships between a CEO and his would-be advisors promote trust and disclosure, shareholders may be well served by these as well.

For robustness, the second panel of Table 7 considers several alternative measures of governance proposed in previous literature: 1) the G-Index (Gompers, Ishii, and Metrick, 2003), 2) the E-index (Bebchuck, Cohen and Ferrell, 2009), 3) the presence of absence of a staggered board (Bebchuck and Cohen, 2005), 4) board size (Yermack, 1996), and 5) 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.

In Column 1, we split firms into two equal groups by their *GIM* indices, designating the upper half as *High GIM*. As seen, *Rolodex* remains nearly unaffected by the inclusion of *High GIM*, and the interaction is insignificant. Similarly, we see that while firms with weak governance as measured by a high *Entrenchment Index* pay their CEOs more, this bears little significance on the interaction with *rolodex*. Staggered boards, as shown in column 3, are neither associated with higher CEO pay, nor with a differential premium for the CEO's network. In column 4, we see that although smaller boards pay CEOs approximately 1.5% less (consistent with better governance), they pay *more* for each of the CEO's external connections. The fifth column verifies Hartzell and Starks (2003) in a more recent sample, showing 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 positive point estimate (p=0.097), suggesting that the CEO's connections are *most* valued when the firm has effective institutional monitoring. Together, the evidence in Panel B of Table 4 suggests that *Rolodex* is not simply a proxy for weak corporate governance, which previous research has already shown can influence pay levels.

Macroeconomic Conditions

Recent work by Schoar (2007) suggests that labor market conditions when a CEO begins his or her career may have lasting impacts on career outcomes. For example, entering the job market in a recession appears to impede a CEO's progression through the promotion process, lengthening the time until being appointed chief executive.[21] Although Schoar (2007) does not analyze CEO pay specifically, her general insight is that becoming CEO is highly path dependent, so that starting conditions can influence the eventual productivity of those that become CEOs.

Conceivably, such path dependence could also affect the size of a CEO's *rolodex*. With school connections for example, we are able to identify "pure" network effects by focusing on the year-to-year variation in the number of graduates of any particular school that go on to become executives or directors. If, however, recessions influence graduates' labor market outcomes (e.g. who is hired, how quickly they are promoted, how much companies invest in their human capital, etc.), then our causal interpretation of the *rolodex* variable is less satisfying.

To address this concern, we follow Schoar (2007), and identify recession years from the National Bureau of Economic Research.[22] Also following Schoar (2007), we code as "recession

[21] Schoar (2007) is careful to point out that while her findings are consistent with this interpretation, her population necessarily excludes candidates that did not eventually become CEOs. This alters neither the significance nor interest of the findings, but does mean that such "recession" effects cannot be interpreted as marginal probabilities of eventually becoming CEO.

[22] NBER recession years are reported at http://wwwdev.nber.org/cycles/cyclesmain.html

CEOs'' those who were 25 years old during an NBER-identified recession.[23] When we analyze our main specification (untabulated), we find no meaningful differences between CEOs that began in recession years (coefficient on *rolodex* is 7 basis points) versus those that began in non-recession years (8 basis points). In the full sample, a dummy variable indicating whether the CEO entered the labor market in a recession year remains insignificant, as is the interaction between the recession indicator and the *rolodex* variable. Additionally, we have conducted the identical exercise for all our tests (particularly *school connections*), and find that none of our results are weakened. We conclude that the connection result we document is distinct from the economic conditions prevailing at the time CEOs begin their management careers.

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 Qui (2008), 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 appreciate this, consider that a CEO's *school* 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 *school* connections is 22.5, but the *within-CEO* variation is only 1.3. This is similar for all connection

[23] There are at least two reasons for this convention, as opposed to using the CEO's graduating year. First, the decision of when to attend school is endogenous, and is conceivably correlated with the CEO's ability or outside opportunities. Second, a substantial number of CEOs graduated from multiple institutions, making it difficult to precisely identify a single "event year" for the beginning of their management careers.

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 infeasible.

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 137. 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 14.5, 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 7% 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 also robust to the inclusion of firm effects. Although (as in column 1) firm effects cut the coefficient substantially (from 6.2% to 3.9%), the effect of *Rolodex* on pay remains highly significant (p=0.017).

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.[24] This is why 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

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

be so valued by firms, complementing the fixed effects specifications (here) that sacrifice economic intuition for identification.

Alternative Connectivity Measures

Columns 4 and 5 show the results of additional robustness checks on how we measure a CEO's connectivity. In the fourth column, 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. This maximum number changes each year to account for changes in the sample population. As seen, this scaling makes little difference in terms of statistical significance. Neither, as shown in the fifth column, does ranking CEOs by their *rolodex* values, and using percentiles rather than the raw values as independent variables.

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 literally *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.

Although this reasoning would appear capable of generating a positive relation between pay and networks, the simple search framework described above will not. The reason is because although connected CEOs are better informed about outside opportunities, these are, on average, the same as those of their less-connected counterparts (by the assumption that connections confer no value). Thus, in the same way that a connected CEO will report a high outside offer to the board expected a raise, a connected CEO who learns negative information

will not report. Unless the board is not rational, or is in some other way constrained, the latter would justify a pay reduction or even termination. In such an environment, there would be no correlation between network size and pay.[25] This is not a formal model, but is merely meant to illustrate that a simple search problem will not deliver positive correlation between network size and pay, when the former confers no value. More complex models may.

Besides theoretical considerations, 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).

Before concluding, we note that although our analysis is limited to the labor market implications of the CEO's network, firms with connected CEOs perform better in a number of dimensions. For example, in untabulated results, we find that firms with well-connected CEOs have higher ex-post stock returns, ROE and Tobin's Q. However, this is merely suggestive evidence. Demonstrating a causal relation between networks and firm value is beyond the scope of the paper (although see Section II for examples of papers that share this goal).

[25] Note that making the CEO's rolodex unobservable to the board will not change the equilibrium. Here, every board can force the CEO to reveal his outside opportunities by paying him an initial wage of zero, so that every CEO has in incentive to be truthful.

VIII. Conclusion

We find that, on average, a CEO's personal connections to other directors and executives of public companies ("external connections") are strong predictors of both salary and total compensation. In aggregate, the returns to a CEO's network account for over 10% of total pay. 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 confer information into the firm. Although this evidence is consistent with the networking literature described in Section II, it does not specify the precise channels by which a CEO's network accrues benefits to the firm. Identifying such channels remains a promising avenue for future research.

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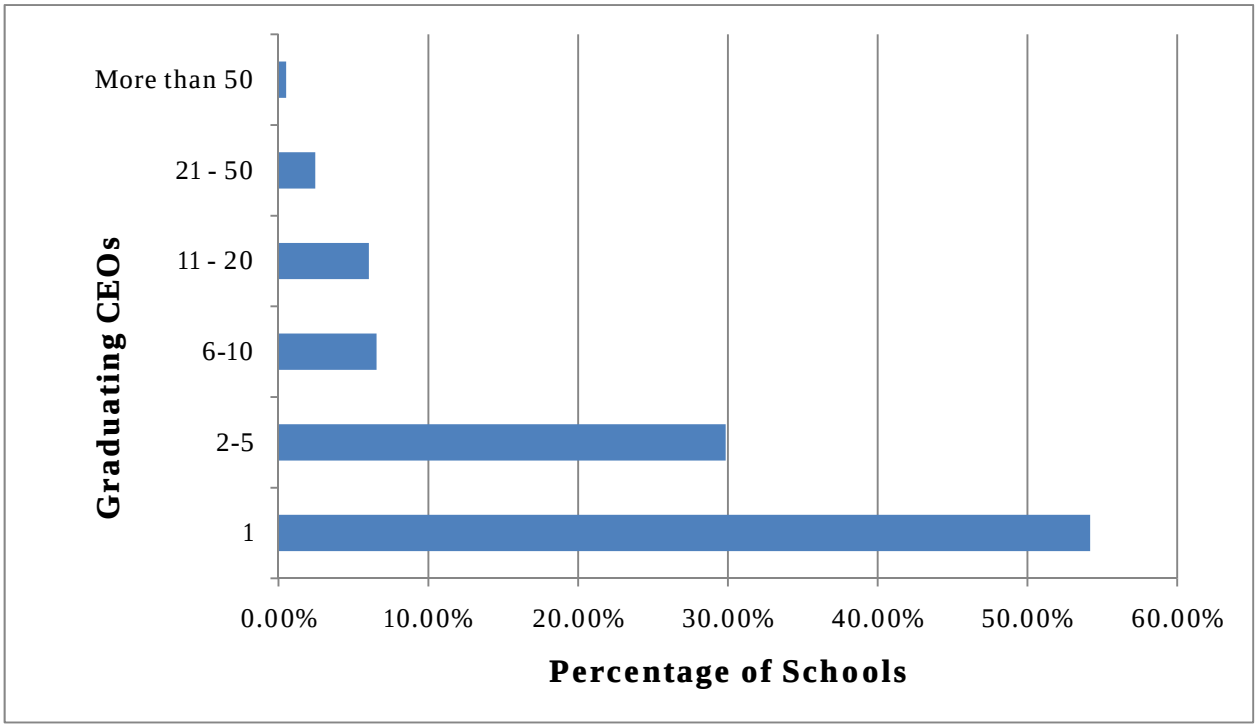
Figure 1: CEOs and Schools

The top figure graphs the percentage of schools in our sample with different ranges of graduating CEOs in our sample. The bottom table displays the top 25 schools ranked by the number of graduating CEOs. NOTE: BoardEx makes a distinction between professional schools and underlying institutions (e.g., Harvard Business School is distinct from Harvard University).



Top 25 Schools (# of CEOs in our sample)

1. Harvard Business School (202)	10. Columbia University (38)	18. University of Chicago (26)
2. Stanford University (91)	10. Princeton University (38)	18. UCLA (26)
3. Harvard University (81)	12. Stanford University, GSB (37)	20. Northwestern University (25)
4. Wharton School of Business (63)	13. New York University (35)	20. University of Illinois (25)
5. MIT (60)	14. Dartmouth College (33)	20. University of Notre Dame (25)
6. Cornell University (44)	15. USC (32)	23. University of Texas (24)
7. University of Michigan (43)	16. Yale University (31)	23. Kellogg School of Management (24)
8. University of Wisconsin (41)	17. UC Berkeley (27)	25. Indiana University (23)
9. Purdue University (40)		

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 School Connections, Social Connections and Past Professional Connections. Past Professional Connections are between executives who no longer work for the same firm, School Connections are between two people that attend the same university and have graduation years that are less than 2 years apart, 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. A Local connection is made between two people whose firms have headquarters that are less than 100 kilometers apart. An Industry connection is made between two people who work in the same Fama-French 30 industry. A Degree connection is made between two people who received the same degree type. The Robust Rolodex is the sum of School Connections and Old Professional Connections. The Local Rolodex is the sum of local school connections, local social connections and local past professional connections.

	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	122.61	75.00	137.00	4.00	308.00
School Connections	15.39	6.00	22.45	0.00	46.00
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
Local Rolodex	26.91	12.00	38.69	0.00	73.00
Robust Rolodex	56.98	30.00	74.20	2.00	148.00
School & Degree Connections	8.16	2.00	14.42	0.00	21.00
Industry Social Connections	12.77	3.00	23.43	0.00	40.00
Local Profession Connections	21.31	9.00	33.76	0.00	57.00

Table 2: Connections, Salary and Total Compensation

The Rolodex is the sum of a CEO's past professional connections, school 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 30 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	19.99***	16.39***	16.84***	28.55***	0.00294***	0.000739***	0.000684***	0.00148***
	(2.893)	(3.061)	(3.096)	(5.884)	(0.000156)	(0.000147)	(0.000147)	(0.000232)
Rolodex Squared				-0.0233***				-1.51e-06***
				(0.00710)				(3.39e-07)
Total Assets		0.0243***	0.0232***	0.0245***				
		(0.00344)	(0.00337)	(0.00294)				
Log(Assets)						0.355***	0.412***	0.408***
						(0.0133)	(0.0151)	(0.0151)
Prior Year Return		-838.6*	-668.8	-665.8		-0.0380*	-0.00989	-0.0101
		(472.7)	(479.4)	(478.7)		(0.0222)	(0.0221)	(0.0222)
Prior 2 Years Return		944.2***	920.4***	926.8***		0.0649***	0.0685***	0.0689***
		(310.4)	(312.2)	(312.1)		(0.0146)	(0.0145)	(0.0145)
Idiosyncratic Volatility		99511**	110339**	111029**		7.913***	6.309*	6.275*
		(44560)	(51385)	(51313)		(3.006)	(3.262)	(3.248)
Market to Book		522.1***	427.7***	424.1***		0.0719***	0.0569***	0.0565***
		(100.5)	(98.26)	(98.28)		(0.00605)	(0.00574)	(0.00576)
Tenure		-37.45	-52.24	-54.95		0.0113**	0.0121**	0.0117**
		(69.17)	(74.03)	(74.44)		(0.00556)	(0.00544)	(0.00541)
Tenure Squared		-0.0530	0.155	0.279		-0.000610***	-0.000646***	-0.000633***
		(1.715)	(1.845)	(1.866)		(0.000204)	(0.000200)	(0.000199)
Year Fixed Effects	NO	NO	YES	YES	NO	NO	YES	YES
Industry Fixed Effects	NO	NO	YES	YES	NO	NO	YES	YES
Observations	11078	10579	10579	10579	11070	10571	10571	10571
Adjusted R^2	0.012	0.024	0.025	0.026	0.107	0.320	0.358	0.360

	Dependent Variable: Salary				Dependent Variable: Log(Salary)			
Rolodex	0.977***	0.874***	0.916***	1.295***	0.00119***	0.000342**	0.000385**	0.000747***
	(0.0740)	(0.0736)	(0.0720)	(0.135)	(0.000130)	(0.000147)	(0.000161)	(0.000243)
Rolodex Squared				-0.000754***				-6.87e-07*
				(0.000282)				(3.75e-07)
Total Assets		0.000513**	0.000447*	0.000491**				
		(0.000230)	(0.000236)	(0.000236)				
Log(Assets)						0.134***	0.151***	0.149***
						(0.0133)	(0.0181)	(0.0184)
Prior Year Return		-9.820**	-6.831*	-6.745*		-0.00481	-0.000699	-0.000799
		(3.917)	(3.835)	(3.834)		(0.00944)	(0.00961)	(0.00962)
Prior 2 Years Return		-12.99***	-9.827***	-9.631***		-0.0175**	-0.0115	-0.0113
		(2.231)	(2.240)	(2.243)		(0.00800)	(0.00775)	(0.00773)
Idiosyncratic Volatility		-8508***	-6169***	-6145***		-12.14***	-9.064***	-9.076***
		(630.3)	(670.9)	(666.3)		(2.238)	(2.405)	(2.400)
Market to Book		2.414	2.175	2.064		0.000367	-0.00302	-0.00321
		(2.387)	(2.434)	(2.425)		(0.00544)	(0.00502)	(0.00501)
Tenure		4.775**	3.773*	3.672*		0.00897**	0.00826**	0.00807**
		(2.194)	(2.053)	(2.044)		(0.00379)	(0.00402)	(0.00405)
Tenure Squared		-0.118	-0.0878	-0.0828		-0.000203	-0.000174	-0.000167
		(0.0842)	(0.0768)	(0.0763)		(0.000135)	(0.000140)	(0.000141)
Year Fixed Effects	NO	NO	YES	YES	NO	NO	YES	YES
Industry Fixed Effects	NO	NO	YES	YES	NO	NO	YES	YES
Observations	11144	10643	10643	10643	11063	10565	10565	10565
Adjusted R^2	0.133	0.194	0.255	0.259	0.036	0.121	0.149	0.150

Table 3: Total Compensation and Rolodex Components

School connections count the number of individuals in the BoardEx database who attended the same school and graduated within a year of the CEO. School and Degree connections are the same as school connections with the additional requirement that the CEO and individual acquired the same degree (degrees are classified into 6 categories as in Cohen, Frazzini and Malloy, 2008). Past professional connections are the sum of professional connections where the CEO and connected individual no longer work at the same firm. Social connections are the sum of connections of individuals with "active roles" in the same social organization (Fracassi and Tate, 2008). 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	0.000684***							
	(0.000147)							
Social Connections		0.000642***	0.000786***					
		(0.000226)	(0.000224)					
Old Professional Connections		0.000574**		0.000773***				
		(0.000273)		(0.000263)				
School Connections		0.00154**			0.00262**	0.00279***		
		(0.000628)			(0.00109)	(0.000984)		
School and Degree Connections							0.00392***	0.00456***
							(0.00124)	(0.00139)
Firm Controls (from Table 2)	YES	YES	YES	YES	YES	YES	YES	YES
School Decade Fixed Effects	NO	NO	NO	NO	YES	YES	YES	YES
School Sub-Decade Fixed Effects	NO	NO	NO	NO	NO	YES	NO	YES
Degree Fixed Effects	NO	NO	NO	NO	NO	YES	NO	YES
Year Fixed Effects	YES	YES	YES	YES	YES	YES	YES	YES
Industry Fixed Effects	YES	YES	YES	YES	YES	YES	YES	YES
Observations	10571	10571	10571	10571	10571	10571	10571	10571
Adjusted R^2	0.358	0.358	0.356	0.355	0.491	0.515	0.491	0.515

Table 4: Total Compensation and Important 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 30 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	0.00237***	0.00111	0.000763***	0.00151***	0.00332***	0.00223**	0.00310**	0.00146***	0.00131***	0.00136**
	(0.000763)	(0.000707)	(0.000207)	(0.000425)	(0.000985)	(0.000872)	(0.00153)	(0.000369)	(0.000334)	(0.000626)
Other Connections	-0.000996	0.000542***	0.000535	0.00113**	0.000589***	0.000538***	0.000551***	0.000165	0.000575***	0.000610***
	(0.000660)	(0.000164)	(0.000359)	(0.000480)	(9.24e-05)	(0.000171)	(0.000156)	(0.000254)	(0.000110)	(9.93e-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	10571	10571	10571	10571	10571	10571	10571	10571	10571	10571
Adjusted R^2	0.359	0.358	0.358	0.357	0.358	0.358	0.358	0.358	0.358	0.358
p-value of Restriction Test	0.0167	0.4761	0.6724	0.5893	0.0075	0.0756	0.1057	0.0315	0.0644	0.2664

Table 5: Total Compensation and Industry Clusters

The Rolodex is the sum of old professional connections, school connections and social connections. For each Fama-French 30 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. Local are equal to number of individuals in the Rolodex who work for firms with headquarters less than 100 kilometers apart. 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	All Firms	All Firms	Inside Cluster	Outside Cluster	All Firms
Rolodex	0.000442*	0.000665***	0.000859***					
	(0.000230)	(0.000175)	(0.000177)					
Cluster Dummy			0.068	0.0860**	0.0598*			0.103***
			(0.0478)	(0.0357)	(0.0353)			(0.0393)
Rolodex * Cluster Dummy			-0.000504**					
			(0.000216)					
Local Connections					0.00146***	0.00132**	0.00257***	0.00303***
					(0.000484)	(0.000581)	(0.000796)	(0.000743)
Local Connections Cluster Dummy								-0.00204**
								(0.000838)
Firm Controls (from Table 2)	YES	YES	YES	YES	YES	YES	YES	YES
Two-Digit Zip Code Fixed Effects	YES	YES	YES	NO	NO	NO	NO	NO
Year Fixed Effects	YES	YES	YES	YES	YES	YES	YES	YES
Industry Fixed Effects	YES	YES	YES	YES	YES	YES	YES	YES
Observations	4,690	4,488	9,178	10571	10571	5354	5217	10571
Adjusted R^2	0.396	0.493	0.426	0.355	0.356	0.316	0.431	0.357

Table 6: Total Compensation, Unique Connections and Firm Connectivity

The Rolodex is the sum of past professional connections, school 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	0.000906***	0.000418*	0.001487***	0.00177***
	(0.000188)	(.000225)	(.000312)	(0.000396)
Duplicate Rolodex	0.000327	0.0002465	0.000695	9.89e-05
	(0.000242)	(0.000242)	(.000458)	(0.000570)
Firm Connectivity				0.00188***
				(0.000355)
Unique Rolodex * Firm Connectivity				-6.35e-06***
				(2.41e-06)
Duplicate Rolodex * Firm Connectivity				1.38e-06
				(3.39e-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	10571	5065	5497	10571
Adjusted R^2	0.358	0.385	0.266	0.363

Table 7: Total Compensation, Connectivity and Corporate Governance

The Rolodex is the sum of past professional connections, school connections and social connections for the CEO. Connections to Board Members is the sum of a CEO's past professional connections, school connections and social connections to board members at his firm. Connection to Board Dummy is a dummy variable that takes the value of 1 if Connections to Board Members is greater than zero. Log(Rolodex) is the natural logarithm of the 1 + Rolodex. Log(Connections to Board Members) is the natural logarithm of 1 + Connections to Board Members. 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). Board Size is the size of the board of the CEO's firm. 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. 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)						Dependent Variable: Log(Salary)		
Rolodex		0.000691***		0.000684***			0.000337**	0.000380**	
		(0.000143)		(0.000149)			(0.000164)	(0.000170)	
Connections to Board Members	0.00411	-0.000686					0.00504*		
	(0.00338)	(0.00316)					(0.00302)		
Connection to Board Dummy			0.0322	0.000875				0.00876	
			(0.0318)	(0.0320)				(0.0258)	
Log(Rolodex)						0.0628***			0.0147
						(0.0121)			(0.0119)
Log(Connections to Board Members)					0.0304	-0.00426			0.0316*
					(0.0193)	(0.0211)			(0.0163)
Firm Controls (from Table 2)	YES	YES	YES	YES	YES	YES	YES	YES	YES
Year Fixed Effects	YES	YES	YES	YES	YES	YES	YES	YES	YES
Industry Fixed Effects	YES	YES	YES	YES	YES	YES	YES	YES	YES
Observations	10571	10571	10571	10571	10571	9954	10565	10565	9949
Adjusted R^2	0.354	0.358	0.354	0.358	0.354	0.351	0.150	0.149	0.140

	Dependent Variable: Log(Total Compensation)				
Rolodex	0.000700***	0.000625***	0.000793***	0.00149***	0.000406**
	(0.000202)	(0.000241)	(0.000293)	(0.000341)	(0.000205)
Staggered Board	-0.0125				
	(0.0461)				
Staggered Board * Rolodex	8.21e-05				
	(0.000200)				
High GIM Index		0.0580			
		(0.0491)			
High GIM Index * Rolodex		0.000116			
		(0.000230)			
Entrenchment Index			0.0516***		
			(0.0189)		
Entrenchment Index * Rolodex			-3.46e-05		
			(8.13e-05)		
Board Size				0.0144*	
				(0.00788)	
Board Size * Rolodex				-8.80e-05***	
				(3.17e-05)	
Inst. Own Concentration					-0.118322***
					(0.0096104)
Inst. Own Concentration * Rolodex					0.0000958*
					(0.0000359)
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
Observations	8601	9117	10279	10571	10526
Adjusted R^2	0.352	0.353	0.356	0.359	0.380

Table 8: The Rolodex and Robustness

The Rolodex is the sum of a CEO's past professional connections, school 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. Industry homogeneity measures are calculated as in Parrino (1997). See the text for details. 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	0.000592* (0.000327)					0.000726*** (0.000246)	0.000725*** (0.000243)
Rolodex Squared	-7.25e-07* (4.35e-07)						
Log(Rolodex)		0.0623*** (0.0113)	0.0388** (0.0162)				
Scaled Rolodex				32.63*** (7.024)			
Rolodex Ranking					0.00428*** (0.000622)		
Rolodex * Industry Homogeneity (All-firm average)						-0.000203 (0.000999)	
Industry Homogeneity (All-firm average)						1.171 (0.712)	
Rolodex * Industry Homogeneity (Bootstrap)							-0.000213 (0.00101)
Industry Homogeneity (Bootstrap)							0.657 (0.724)
Firm Controls (from Table 2)	YES	YES	YES	YES	YES	YES	YES
Year Fixed Effects	YES	YES	YES	YES	YES	YES	YES
Industry Fixed Effects	YES	YES	YES	YES	YES	YES	YES
Firm Fixed Effects	YES	NO	YES	NO	NO	NO	NO
Observations	10571	9954	9954	10571	10571	10571	10571
Adjusted R^2	0.704	0.351	0.697	0.358	0.361	0.358	0.358