Corporate Financial Distress and CEO Networks

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Abstract

We study if positional embeddedness, specifically local degree and eigenvector centrality for CEOs, has an impact on the likelihood of the firm experiencing financial distress. Examining the impact three, two and one year prior to the event we conclude that an increase in CEO degree and eigenvector centrality ranking increases the likelihood of financial distress. Additionally, we find that this effect could be mitigated for CEOs with a longer tenure in the firm prior to attaining the position of CEO. Using measures of attribute based centrality, we find that appointed CEOs with more within-group connections face lower likelihood of financial distress for firms with specialty knowledge. Finally, we find that less homophilous board members with respect to educational achievements increases the likelihood of financial distress.

Corporate Financial Distress and CEO Networks

1. Introduction

In this paper we examine how a CEO's positional embeddedness affects the likelihood of the firm experiencing a financial distress event. Drawing from social network analysis that focuses on the relationships among entities or actors that make up a social system, we employ measures of CEO embeddedness based on his/her centrality in the network. In a social network, actors (or nodes) are linked to each other by a set of characteristics or attributes (Borgatti, et al., 2013). In our context, the social networks could consist of entities who are either individuals or firms.

When firm performance deteriorates to a point where it has difficulties fulfilling its fixed financial obligations, the firm is considered to be in a state of financial distress. Some signals include credit rating downgrades, violations of debt covenants, and reductions and omission of dividend payments (Baldwin and Mason, 1983). Corporate financial distress is often coupled with organizational decline, which occurs when there is a consistent decline in firm performance (Trahmas, et al., 2013). Firm's executives and directors are expected to respond to this decline in an environment of scarce organizational and environmental resources, increased stakeholder conflicts and diminished managerial discretion. Often times, firms face difficulties in attracting new directors due to the greater risks on director reputation in the state of continued decline, or the greater time and workload required to manage firms in decline or distress. In addition, firms could also find it difficult to preserve key executives. The stigma of crisis could also have a detrimental effect on director reputations and credibility to valuable stakeholders.

The extant finance literature has extensively covered formal structures (both internal and external) such as board size, board composition, executive compensation and shareholder rights, and their effectiveness on monitoring managerial actions. Despite the growth in recent

years of institutionalized governance structures, the complexities of the business environment today limits the ability of the board of directors to control information flows and effectively manage risk. Boards fail to manage risk if they are not able to access, control or process informational flows, specially in a volatile and complex business environment. Additionally boards might lack the ability and power to influence managerial decision making (Pirson and Turnbull, 2011). Nanda, et al. (2013) examine the effectiveness of powerful CEOs when responding under pressure and find that powerful CEOs perform significantly worse than other CEOs during industry downturns, possibly because powerful CEOs are less likely to receive independent advice.

There is little work on how behavioral structures and processes, that often extend beyond the organization itself, can play a meaningful and effective role in firm oversight, prevent decline and financial distress. We utilize the framework presented in Zajac and Wesphal (1998), Hambrick et al. (2008) and Westphal and Zajac (2013) to examine the impact of two dimensions of behavioral structure on the likelihood of a firm experiencing financial distress. The first dimension examines how the CEOs interfirm professional networks hold information of potential value to the firm, while the second dimension examines how intrafirm relations enable individuals to access and process information.

While on the one hand strong professional ties could mitigate the likelihood of financial distress through acquisition of better information and by enhancing a firm's ability to tap into much needed additional resources, at the same time individual behavioral biases could have an opposite effect. Additionally, Casciaro et al. (2015) propose that when examining the impact of network positions and structures on a specific organizational outcome, we must not ignore the fact that positional, relational or structural properties of actors in a network do not work in

isolation of actor psychological motives and outcomes. This motivates us to employ the behavioral processes of corporate governance dimension in Hambrick et al. (2008) along with the behavioral structure dimension. In times of distress and threats of failure, CEOs could resist change driven by emotional and cognitive biases or heuristics like hubris, narcissism, self-attribution bias and confirmation bias. More specifically, the threat-rigidity effect theory argues that managers in threatening situations, such as a crisis or failure, tend to behave with rigidity, abusing their power and authority and continuing to escalate their commitment leading to a downward spiral of corporate performance. This could inhibit managers from undertaking the required corporate policies to address the situation (Staw et al., 1981; Daily and Dalton, 1994; and Mellahi, 2005).

In our context, central CEOs with such biases could perpetuate firm decline. In declining or crisis periods, organizations often engage in a shift which results in centralization of authority (Daily and Dalton, 1994). Larger networks and networks with individuals who enjoy large networks could justify or rationalize a specific corporate finance action or policy leading to a specific commitment and slowing corporate reorganization in times of decline or threats of failure. On the other hand, larger networks and networks of prominent alters could as well facilitate a quick collection and diffusion of information on corporate actions or policies leading to a shift in organizational policies and performance (Davis, 1991). We assume that the main source of business related advice is channeled to the CEO through his formal professional employment links in public and private firms. For robustness, we also consider the vast network of CEOs including their social ties, like memberships in nonprofit organizations and charities.

In addition to CEO network size and how influential these connections are, self-categorization theory suggests that individuals are more likely to seek and rely on advice,

information and seek conformity and approval from alters or connections who share a specific attribute. These members are considered in-group members in the CEOs network. Macdonald and Westphal (2003) conclude that low firm performance often prompts CEOs to seek advice more from their friends and associates who have similar views as their own and less advice from those with dissimilar opinions, which can adversely affect his/her ability to process valuable information. In addition to that, in-group members are more likely to share similar backgrounds and experiences on which affinity between members of one group is based. This effect increases the chances of redundant informational flows provided to advice seekers within the group.

The discussion above suggests that the relation between the size of the CEO's network and how influential it is, and CEO information processing could take two different directions. A central CEO with extensive professional corporate networks could use the network to disseminate, collect and process new information impacting firm performance positively and avoid further decline and imminent financial distress. On the other hand, the threat-rigidity effect suggests that CEOs are more likely to centralize decision making under adverse conditions. The magnitude of this effect could be amplified by the size of an executive's network, the extent of informational flows resulting from the size of the networks, and how prominent the executive's alters are, which could amplify the first affect due to its certification role.

The dissection of CEO alters in groups based on a common attribute could assist in understanding how CEOs relate differently to one connection from another. Could sharing a common attribute impact information delivery and processing? Would a CEO with the same network size but more in-group alters react and process information differently than another CEO with similar network size and position? Additionally there has been extensive research on

the role strong and weak ties in disseminating and collecting knowledge across and among organizations (Zander and Kogut, 1995), and among divisions within a specific organization. Could the type of knowledge required by the CEO from his advice network moderate the relationship between in-group ties and the likelihood of decline and potential signals of financial distress?

Empirical evidence indicates that strong ties between actors are essential to transmitting complex knowledge among actors within subunits of organizations (Hansen, 1999). We follow Coles et al. (2008) and utilize R&D expenditures as a measure of firm specialty knowledge. CEOs don't take R&D related decisions independent of the board or other executives. Attributes of executives and directors within an organization might act as moderating factors (Heyden et al., 2015).

Our empirical findings can be summarized as follows. First, we find that firms with more central CEOs are more likely to experience a financial distress event than firms with less central CEOs. Second, firms with central CEOs but longer Non-CEO tenure are less likely to experience a financial distress event. Longer organizational tenure for CEOs assists the CEO in developing and gaining intrafirm networks with members of the organization. Embeddedness in intrafirm networks could facilitate and help the CEO in processing and gathering information from different divisions of the organization. Third, firms with CEOs who derive their centrality more from in-group members are less likely to experience financial distress under higher use of R&D expenditure. Finally, investigating director homophily with respect to age and education, we find that firms with less homophilous directors with respect to academic achievements are more likely to experience a financial distress event.

2. Social Networks and Positional Embeddedness

A network is a set of nodes (vertices) connected by a set of links (edges). Concerning organizational or business network research, nodes could be a set of directors linked by a common attribute or a relationship. Nodes could also be represented by a set of firms connected by sharing a director. Links between different actors could be weighted depending on the intensity or duration of the link between the actors, or they could unweighted. Links could also be directed indicating a certain direction of informational flow between actors of the network, or they could be undirected. Networks could be thought of in a form an adjacency matrix where in its simplest unweighted undirected form, each row simply indicates the presence or absence of a link between a specific actor and the rest of the network actors. The sum of each row is then the total number of nodes a specific actor is connected to.

Positional embeddedness is concerned with the position a specific node or actor has in a network. In this paper the network is defined by the professional links between directors in public firms. Additionally, we also examine an expanded network showing all professional business links between directors in public and private firms. Measures of positional embeddedness focus on both direct and indirect links between the actors making up the network. Positional embeddedness differs from relational and structural networks which focuses on ties between pairs of individuals, or common ties between pairs of individuals and the intensity or duration of the relationship between the actors (Provan and Lemaire, 2015; Moran, 2005).

We focus on direct links between actors and utilize two measures of centrality, degree and eigenvector. Centrality is a property of a node's position in a network. Degree is simply the

number of direct links or connections a specific actor has.[1] We can define degree centrality as follows:

$$d_i = \sum_j a_{ij} \quad (1)$$

where A is an adjacency matrix and a_{ij} takes a value of 1 if director i is connected to director j. a_{ij} indicates the presence or absence of a link in unweighted graphs, or a specific weight to a relationship in weighted graphs.

Eigenvector centrality, the second measure of centrality, is the number of nodes adjacent to an individual or actor weighted by each adjacent node centrality. In this sense, both measures might diverge if an individual with less degree centrality is connected to more influential individuals than the actor with the higher degree centrality score but belonging in a separate isolated component. We can define eigenvector centrality as:

$$e_i = \lambda \sum_j a_{ij} e_j \quad (2)$$

where e is the eigenvector centrality score and λ is the eigenvalue.

In further analysis, we utilize the framework provided in Everett and Borgatti (2012) and examine the composition of a node alters, by grouping actor or node alters according to a specific categorical attribute. Centrality measures of each CEO will then be derived from the number of links the CEO has from in-group or within- group ties and out-group or between group ties. This measure is formally identified as an attribute based centrality measure. We can determine the relative contribution of the different groups to centrality. We calculate attribute-based centrality using the E-I index, which is the difference between the number of individuals

[1] As Explained in (Borgatti, et al., 2013), Degree is not specifically a centrality measure since it can be calculated for an individual without knowing the full network in which the individual is embedded in , however out of tradition it is considered in social network analysis as a centrality measure .

between- group and the number of individuals within group as a ratio of the total number of alters.

We can then define the E-I index as follows:

$$E - I\ index = \frac{E-I}{E+I} \quad (3)$$

where E is the number of between group links and I is the number of within group links. The value of the index ranges from 1 indicating that a specific actor's direct connections are all between group links, and -1 indicating that the actor is only connected to within group alters.

3. Literature Review and Research Hypotheses

3.1 Corporate Financial Distress

Literature on the determinates of corporate financial distress has mainly focused on financial and accounting information. However, recently more studies are examining the role of corporate governance characteristics and ownership in order to improve the power of the financial models. Simpson and Gleason (1999) find that the combination of the CEO and chairman of the board into one position (duality) reduces the probability of financial distress in banking firms. They conclude that having a single powerful manager who has control over operations and the board would lead the CEO to pursue his own interest, which could mean less risk taking to protect human capital. Regarding the role of shareholders. Lee and Yeh (2004) find that the more directors and supervisors that were controlled by the largest stakeholder, the greater the likelihood of distress. Wang and Deng (2006) find evidence from Chinese listed companies that CEO duality has no impact, while the proportion of independent directors reduces the probability of distress. Donker et al. (2009) conclude that higher levels of managerial ownership stakes and large outside shareholders and trustees reduce the likelihood of financial

distress. Elloumi and Jean-Pierre (2001) find that boards of financially distressed firms have significantly fewer outside members. More recently, Manzaneque et al. (2016) examine the likelihood of financial distress for a sample of listed Spanish firms and conclude that CEO duality and ownership concentration have no impact on the likelihood of financial distress while the proportion of independent directors and board size reduce the likelihood of financial distress.

We can summarize that the literature mainly examines the roles of board (size, composition), ownership structure and the influence of stakeholders. Taking a network perspective, studies like Bruderl and Preisendorfer (1998) find evidence for the network success hypothesis in newly founded firms. Entrepreneurs who can refer to a broad and diverse social network and who receive much support from their network are more successful. Baum and Oliver (1991) find that institutional linkages for organizations in the child care service increased their survival chances. Miner (1990) investigates if inter-organizational linkages can act as a source of organizational buffering, insulating the organization from its environment and reducing the effects of environmental uncertainty. Uzzi (1996) argues that organizational networks operate in an embedded exchange that can promote economic performance through interfirm resource sharing and cooperation. However this could have adverse effects on firms leading to overembeddedness, which could limit an organization's ability to access resources outside the network.

In a follow up study, Uzzi (1997) focused on the role of firm networks for a sample of firms in the apparel industry in the New York area .The study argues that interfirm networks are important mechanisms by which resources are allocated and valued by actors. The level of embeddedness in an exchange system creates opportunities, constraints and outcomes that are not predicted by standard explanations. To our knowledge, following these two studies, the role

of firm and director level networks on firm performance during periods of organizational decline remains unexplored.

3.2 Finance and Social Network Analysis

Social capital is a concept that is used to explain how individuals mobilize their resources through relations with others, or it is the networked resources that the individual does not own, but to which he has access to through friends and acquaintances (Kadushin, 2012). Colman (1990) defines social capital as a resource for individuals that emerges from social ties. Social ties help firms gain access to information about potential employees or new innovations. Lin (1999) simply states the notion of social capital as investment in social relations with expected returns. These returns are expected because these relations and networks facilitate the flow of information. Social ties in strategic locations or hierarchical positions can provide an individual with useful information about opportunities and choices otherwise not available. Another source of return is influence. Some social ties due to their strategic locations and positions carry more valued resources and exercise greater power in organizational decision making. The last source of return, as Lin (1999) explains, is additional social credentials. Social tie resources and their acknowledged relationships to the individual may be conceived by the organization and its agents as certifications of the individual's social credentials. Firm and director networks could bring benefits to the firm in the form of reduced information asymmetry when designing contracts, better access to information and useful business relationships. On the other hand, well-connected individuals and firms could also propagate value decreasing management practices, or misleading or incorrect information may spread resulting in value decreasing investments and strategies. Well-connected directors may also devote limited attention to the monitoring and advising of each company.

In a rapidly growing research area, academic literature in finance has recently[2] examined the impact of social and professional ties between business professionals on the corporate finance policies and operating performance. Renneboog and Zhao (2011) find that strong direct and indirect networks of CEOs are rewarded by higher compensation and lower levels of pay-for-performance sensitivity. Brown et al. (2012) also conclude that the size of the CEO network is positively related to the level of compensation and inversely related to pay-performance sensitivity. However in firms where shareholders rights are protected, the impact of the CEO network over pay arrangements diminishes. This implies that governance reduces managerial power in pay negotiation. Chuluun et al. (2014) find that firms with central boards benefit by having lower borrowing costs. Greater connectedness is associated with lower yield spreads. The transmission of soft information for connected firms lowers information asymmetries of such firms, lowering the riskiness of the bonds. This relationship is higher for firms with higher levels of information asymmetry.

Engelberg et al. (2012) examine the presence of links or ties between firms and banks (pair wise connections) and conclude that social connections between borrowers and lenders decrease the borrowing costs. Fogel et al. (2015) use CFO centrality and examine its effects on the cost and structure of private debt. The study concludes that firms with more central CFOs issue loan debt with lower spreads and fewer covenant restrictions. Concerning venture capital syndication, Bhagwat (2013) examines the role of educational ties. The paper concludes that two VC firms are three times as likely to syndicate an investment together if their managers are connected by an educational institution. More recently, El-Khatib et al. (2015) finds that central CEOs are more likely to initiate M&A deals while corporate governance plays a minor role in

[2]For financial and economic networks; Goyal (2012) and Jackson (2008, 2009, 2010, 2015).

mitigating the impact of CEO centrality. Finally, Bajo et al. (2016) observe that more central lead IPO underwriters have larger IPO initial returns, better long-run stock returns and larger analyst coverage post IPO.

3.3 Hypotheses Development

a) CEO Networks, Flattery and Opinion Conformity

CEOs in particular, and corporate elite in general, are subject to and tend to be targets of flattery statements. Many managers are prone to a conformity bias where they are more inclined to accept opinions from peers, other leaders or subordinates that are in line with their own thinking. This could reduce the likelihood that the CEO would make the required strategic changes in response to declining performance (Park et. al, 2011). CEOs are also more likely to reciprocate conformity and flattery statements. For example, Westphal and Stern (2006) find that directors offering flattery and opinion conformity to their CEO are more likely to receive a board seat at the same firm the CEO serves or a seat in a firm the CEO is indirectly connected to. Among other factors used to measure power and social status of the corporate elite is the number of corporate board appointments. While some studies in the power/corporate elite literature use the number of board appointments or presence of a specific attribute like elite education, or a mix of factors (Finkelstein, 1992), we believe that using a concrete measure of embeddedness, specifically positional embeddedness is more relevant, and offers a clear understanding if CEOs are located in strategic network positions, giving them power and control over informational flows that pass through their extensive networks. In this case Degree and Eigenvector centrality as measures of positional embeddedness gives us a clear number and rank of the CEO relative to his alters or neighbors and the global network of directors, which reflects the advice network of the CEO. In addition to that, as previously defined, eigenvector centrality will reflect the

influence of CEO direct links. Receiving flattery and conformity statements, from those who are already of high social status in the network could amplify CEO confidence in the ongoing strategic direction of the organization and make changing the firm's strategic direction more difficult than if the CEO was connected to less influential individuals, with less direct connections. We, therefore, hypothesize that firms with CEOs with increasing changes in eigenvector centrality increases the likelihood of financial distress.

Hypothesis 1: The likelihood of firm financial distress is higher with higher CEO Eigenvector centrality.

The relation between the likelihood of distress and degree centrality is not as clear as eigenvector centrality, and despite the fact that both measures are generally highly correlated, one cannot immediately make this assumption. Additionally, individuals with massive direct links could result in redundant information generated from the different informational channels and make it even more difficult for the CEO to process vast amounts of information. This could impact firm performance negatively, independent of flattery and opinion conformity or threat rigidity effects. Disentangling the two effects remains a challenge. We consider two additional factors that could explain why an increase in Degree centrality would increase the likelihood of financial distress. The first is self-categorization. An increase in the number of links the CEO has directly increases the chances that the CEO will identify with a group or increase the chances of merely depending on in-group advice, resulting in biases in advice seeking and further organizational decline. The second factor again relates to flattery and opinion conformity. CEOs with extensive professional networks are more likely to be targets of such flattery from a larger pool of potential candidates seeking director appointments. This suggests that firms with CEOs with increasing changes in degree centrality increases the likelihood of financial distress.

Hypothesis 2: The likelihood of firm financial distress is higher with higher CEO Degree centrality.

b) CEO Networks and Intra-firm Relations

CEOs who know more members of the organization, and know them well, are more likely to develop intrafirm networks. Longer organizational tenure for CEOs assists the CEO in developing and gaining intrafirm networks with members of the organization (Cao et al., 2006). Embeddedness in intrafirm networks could facilitate and help the CEO in processing and gathering information from different divisions of the organization, or combine various sources of knowledge within the organization. Social capital accumulated from the CEOs social network within the firm facilitates the execution of the firm's strategy. One example is presented in Duchin and Sosyura (2013) where CEOs develop social ties to divisional managers, and under higher levels of informational asymmetry, investment efficiency and firm value increases. Additionally, Smith et al. (2005) conducted a study on 72 technology firms and concluded that the rate of new product and service production was a function of tie strength and social network size. Could these possible positive effects of developing strong intrafirm level ties act as a moderating factor on the effect of the CEOs external links? CEOs gain these external links through board appointments, non-board appointments, memberships in social and educational institutions and others. If information generated from these external networks is new for the organization, or in an extreme case irrelevant, a CEO with intrafirm ties can facilitate the dissemination of this information within the organization, which can be used to consider a different direction in its strategic decision making (Cao et al., 2006). This suggests that powerful central CEOs with interfirm level connections could lead to collecting and processing of information on industry and general market trends more rapidly. Strong intrafirm networks are

developed through greater and longer exposure to organization members which includes tenure in the organization before attaining the formal position of CEO.

Hypothesis 3: The likelihood of firm financial distress is lower with higher CEO Degree centrality and longer Non-CEO tenure years.

c) CEO within-group links, specialty knowledge and financial distress

After examining CEO network size, influence and intra-organizational ties, we ask the question if the decomposition of CEO alters could impact decision making and making CEOs exercise corrective actions. CEOs with higher portions of within- group links are more likely to frequently communicate, process and disseminate information to members of the group. People are also more likely to communicate to others based on affinity, seeking approval and conformity from others. This confirmation seeking and reciprocity of conformity from members of the group could prevent members from taking corrective actions. This is amplified by the fact that individuals are more likely to seek in-group identification and advice when faced with uncertainty (McDonald and Westphal, 2003). On the other hand, repeated advice seeking and communication with with-in group members could foster trust and reciprocal advice flows between members of the group. This could be advantageous for the firm in periods of decline or for complex firms with numerous business segments and intensive R&D expenditures. One way for firms to adapt to this is by increasing the number of inside directors with firm specialty knowledge Coles et al. (2008) we argue here that CEOs could assist in the advising role by holding networks with in-group members through which trust and reciprocating advice ties could lead to rapid and trusted information allocation and processing. This could lead to the building of strong ties between group members, facilitating the transfer of tacit knowledge.

Individuals could be classified based on various categorical attributes they hold, like gender, age, ethnicity or education. In our main analysis in the next section we focus on education as a source of kinship since schools facilitate homogeneity with respect to other underlining attributes like age and educational level (McPherson, et al., 2001; Kalmijn, et al. 2001). Setting different groups, we use three different classifications. The first classification includes a director into the group if he was granted a degree from an Ivy League school. The second classification includes Ivy League schools and other top universities and we call it top university group.[3] The third group utilizes the Carnegie school classification, which divides universities and schools into 33 different groups.

Hypothesis 4(a) The *likelihood of firm financial distress is higher with lower CEO Degree E-I*

Hypothesis 4(b) The likelihood of firm financial distress for firms with specialty knowledge is higher with higher CEO Degree E-I

d) Director Homophily and Corporate Financial Distress

In times of financial distress the role of powerful, independent board members becomes even more crucial in curtailing shareholder value destroying decisions and maintaining the firm's solvency. From an agency perspective, the greater the degree of independence the more the board can challenge the CEO and top management team if there is a disagreement over the correct course of action to take. Agency theory posits that the divergent interests of management and owners often leads to shareholder value destroying decisions. Too much power in the hands of a CEO exacerbates this problem giving incentive to the CEO to pursue an agenda that is against the best interests of shareholders (Jensen and Meckling, 1976). Director interlocks created through director appointments leads to reduced monitoring by directors, and the

[3] We include the same top schools as explained in Gompers, et al. (2016)

propagation of harmful governance practices and managerial opportunism (Davis, 1991; Mizruchi, 1996; Barzuza and Curtis, 2014; Zona, et al, 2015). On the other hand, resource dependency theory scholars maintain that networks link the firm to external resources, which are important for its effectiveness. These resources include links to business elites, access to capital, access to suppliers and connections to regulators and policy makers (Pfeffer and Salnick, 1972; Pfeffer and Salnick 1973; Hillman, et al., 2009). Previous literature on the determinates of financial distress mainly focused on formal structures. Board size, board composition and director level measures like ownership, tenure and compensation have been investigated. These measure look at the board in a static sense and not as a group dynamic that changes over time. Group dynamics are influential actions, processes and changes that occur within and between groups. (Forsyth, 2014). Board members influence each other through their communication and share a unique relation to each other since they belong to the board of a specific company. One tenet of group formation in societies is the similarity principle, which is the tendency of individuals to seek out and affiliate with other individuals who are similar to them in one characteristic or another. These attributes could be age, gender, religion, education, and others. This often causes groups to be homogenous. This similarity principle is also referred to as homophily (Mcpherson et al., 2001) .

We focus on homophily with regard to age and education. Regarding the joint effect of age and education on forming friendship ties, Verbrugge (1977) finds that the highest bias for same – status friends appears for people of the highest education, followed by the youngest age. (Marsden, 1988) finds that confiding relations between pairs of individuals are patterned by religious preference and age, specifically all age groups below 60. Louch (2000) concludes that when individuals share education as an attribute, the likelihood of contact between them

increases by 35%. More recent studies in the finance literature examines if homophily or homophilous ties play a role in outside director selection process,. Berger et al. (2013) conclude that homophily with respect to age increases the chances of outside appointment, while homophily with respect to education reduces these chances. Based on previous work, we argue that heterophily with respect to age and education could increase the likelihood of financial distress. Homophily with regard to general characteristics like having or coming from similar age groups or academic achievement could result in effective communication between board members and greater levels of familiarity in other characteristics. Also cognitive and emotional conflict due to age or educational gaps could impact the board in forming kinship links and networks, hindering informational flows and not making timely corporate decisions.

Our fifth hypothesis is therefore, stated as follows:

Hypothesis 5: The likelihood of firm financial distress is higher with higher variability in director age and director academic achievements.

4. Data and Sample Selection

We collect data for firms that have experienced a financial distress event from New Generation Research. New Generation offers data on U.S public and private firm bankruptcy filings as well as U.S public and private firm financial distress events. Our sample starts with the coverage of New Generation and ends by the end of 2015, making our sample period January 2003 to December 2015. Events of financial distress include audit concern, credit rating downgrades, and violations of debt covenants. New Generation also covers for each distressed firm the bankruptcy date if the firm files for bankruptcy protection at a later period, total assets, number of employees, city and state of incorporation of the firm.

Corporate governance data and director data are obtained from BoardEx. The data provided by BoardEx has been extensively used recently by academics in the corporate finance area seeking to examine how executive/director social and professional connections impact firm performance or corporate finance policies. The database covers approximately 750,000 directors/executives for about 15,000 North American firms. Relational data between individuals span from current and historical common employment in public and private firms to memberships and board seats in clubs, charities and academic institutions. We do not specify a specific boundary regarding the type or duration of the link between the directors in the network. Links between directors in one board were weighted equally as links between a board member and an advisor. In forming the links between each director we assume that the relationship continues after the end of the official overlap period until one director dies. We follow Fogel et al. (2015) and El Khatib et al. (2015) in setting this boundary for our network. Measures for Degree centrality and Eigenvector centrality were computed for each director in the network spanning the period January 2000 to December 2014. We form three networks, one including only employment links between executives in public firms, a second network adding links between private firms to the first network, giving us the (public & private) employment network, and a third network including memberships in social institutions or what we call the full network. The full network size for 2014 includes 671,783 unique executives and directors connected by approximately 73 million ties.

Our sample initially has 1,850 unique financially distressed firms over the 13 year period. After dropping firms not covered in the BoardEx firm universe, firms covered but with missing data items and finally firms covered but with missing network data for the CEO, we end up with 706 unique financially distressed firms. For the distressed firm sample for which data is

available, we identify the 4 digit SIC code for the distressed firm and match it with a non-distressed firm three years prior to the year of distress and closest in total assets. The matched firm is kept as long as we can obtain at least one year of data on the pair for each lag. This results in a total sample of 696 distressed firm year observations 3 years prior to the year of distress event, 762 distressed firm year observations 2 years prior to the year of distress event and 689 distressed firm year observations 1 year prior to the year of distress event. Data for financial variables were collected from Compustat. Variables include profitability, liquidity, leverage and Tobin's Q. Board Size, CEO Tenure, Director Role in the company, variability of director age and variability of the number director academic achievements were collected from BoardEx. Institutional and Block ownership data were collected from Thomson Reuters' 13F dataset. The sample reported above is after excluding financial firms and utilities (SIC codes 6000-6999 and 4900-4949).

Data on CEO education was collected primarily from BoardEx. Educational affiliations on CEOs not covered in BoardEx were collected from publically available sources such as Relationship Science, Zoominfo, Crunchbase and LinkedIn. Our final sample of CEOs with full education data is 1,851 CEOs out of our total sample of 1,992 unique CEOs. Regarding the directors the CEOs are directly connected to, we rely on BoardEx and collect education data on 89,459 directors from the total sample of 125,085 unique directors connected to the CEOs in our sample. We collect this for the sample of distressed and matched firms one year prior to the year of distress and limit it to the second network which includes public and private firms' employment links. CEOs are then classified according to a specific group depending on their educational affiliation. We use three different groupings. The first classification is the Ivy League classification. We consider the CEO and the directors connected to each CEO part of this

group if they graduated from an Ivy League school. Since we do not differentiate between undergraduate or graduate degrees, earning any degree from an Ivy League school classifies the CEOs and directors into the group. The second classification includes the first classification, but adds a number of top schools to the Ivy League school list. We follow Gompers, et al. (2016) in our selection of top schools to be included. The third and final classification we use is the Carnegie classification of institutions of higher education. This classification consists of 33 groups. Universities and schools are classified mainly into colleges, special focus professions, research universities and special four year focus professions. One advantage of using this classification over the first two is that the classification is designed to categorize schools that are uniform with respect to the characteristics of students. Also, it also allows us to exploit the differences between groups, given the number of classifications. Additionally, this classification allows us to identify members as being part of more than one group.[4] For example, a director with a degree from the CUNY School of law and another degree from Yale University is considered to be part of two groups, 31 and 15 according to the Carnegie classification. Each CEO is then matched to the directors with a direct link to the CEO in the public and private employment network one year prior to the year of distress to calculate the number of in-group and out-group links.

Summary statistics of our main independent variables for both the distressed and the non-distressed matched sample are provided in Table 1. As expected, distressed firms exhibit more negative profitability and lower liquidity ratios compared to the non-distressed firms. Also, distressed firms have higher leverage and lower Tobin's q compared to the matched sample.

[4] More information on the Carnegie classification is available at http://carnegieclassifications.iu.edu/

With respect to corporate governance variables, we note that both the mean CEO tenure and Non CEO tenure are shorter for distressed firm sample, while the board sizes are comparable.

The t-tests for the mean difference for some key variables are reported in Table 2. The Degree centrality of the CEO is significantly higher using both public, private networks for the distressed sample. The same holds true for the Eigenvector centrality. The shorter tenure for the CEO and greater external connectedness for distressed firm CEOs suggest that they are more likely to be affected by behavioral biases associated with flattery and opinion conformity.

5. Empirical Results

5.1 Centrality and the Likelihood of Financial Distress

In testing the impact of centrality, degree and Eigenvalue, on the likelihood of financial distress, the dependent variable is a dichotomous variable equal to 1 if a firm is in distress and 0 otherwise. We follow Jandik et al. (2015) and El-Khatib et al. (2015) and use the percentile ranking of the centrality measure since the size of the network tends to vary over the years. Year variations result in the degree centrality of a director depending upon the size of the graph, not allowing us to compare local centrality measures when the graphs differ in size. The natural logarithm of the percentile ranking is then used to take into account the diminishing marginal effects of the percentile rankings.

Results in Table 3 for one year prior to the year of distress indicate a positive and strong significant relation between degree centrality percentile ranking and the likelihood of firm financial distress. We observe the same with respect to Eigenvector centrality percentile ranking. The results are very similar regardless of the network boundary or type of network we examine.

An increase in Degree percentile in the Public/Private network from the 50th percentile to the 90th percentile increases the likelihood of financial distress by 20.62%, while an increase in Eigenvector percentile in the Public/Private network from the 50th percentile to the 90th percentile increases the likelihood of financial distress by 16.11%.

All financial variables are significant and signs are as predicted. The result we get for the impact of CEO duality on the likelihood is similar to Simpson and Gleason (1999). This could go against our understanding on the negative impact of power or the accumulation of power in the hands of the CEO by occupying both seats. However, one explanation for this is the offsetting benefits of autonomy over agency problems for the sample firms. CEO Duality is negative and significant, suggesting that CEOs who have a high degree of concentration of power and are well-connected more likely to suffer from behavioral biases. The higher degree of rigidity bias in these CEOs is more likely to prevent them from considering alternative options, thereby leading firms towards greater financial distress.

With respect to regression results for two years prior to the year of distress, in Table 5 we observe that the two centrality measures for the three different networks are statistically significant with the exception of Eigenvector centrality in the Public employment network. An increase in degree and eigenvector centrality ranking increases the likelihood of distress. An increase in Degree percentile in the public/private network from the 50th to the 90th percentile increase the likelihood of distress by 12.22%, while an increase in Eigenvector centrality percentile in the public/private network increases the likelihood of distress by 11.06% All financial variables are significant and with the expected signs. Consistent with the stream of research examining the importance of diversity on the boardroom, we find that increasing the fraction of female directors with a board seat reduces the likelihood of financial distress.

Interestingly we find at both the 1 year and 2 year lag specifications that board independence is positively associated with the occurrence of a financial distress event. This could in part be explained by the fact that central CEOs with extensive links and positional advantages are more likely to take an active role in the appointment of independent directors to avoid public scrutiny, stakeholder pressure for independence or to comply with regulations. Social or educational ties, or past employment links might all act to impair this formal state of independence (Hwang and Kim, 2009; Zajac and Wesphal, 1996).

5.2 CEO Networks and Intra-firm Relations

In Tables 5 and 7, we find that Non-CEO tenure reduces the likelihood of corporate finance distress. This result indicates that CEOs who spend more time in the company before formally acquiring the position of CEO are more likely to reduce the likelihood of financial distress. In order to test the joint effect of CEO centrality and the number of years the CEO has spent in the firm (Non-CEO) Tenure, we include an interaction term of the two variables. These results are presented in Tables 4, 6 and 8. For three years prior to the year of the distress event the interaction term is not statistically significant. However, for lags of two years and one year prior to the year of the distress event and in at least two of the three networks, we find that for the eigenvector centrality in public/private network the coefficient is negative and significant, indicating a reduction in the likelihood of corporate financial distress for firms with the joint effects of acquiring powerful networks reflected in high centrality scores and a higher Non-CEO tenure period. This result could indicate the advantages of central CEOs who had spent longer time in the company before acquiring the position of CEO in building intrafirm ties which facilitate informational flows after acquiring the formal position. Their strong external links

allow them access to valuable information on business and industry trends and the strong internal links allow them to process the vast amounts of information they are able to gather.

5.3 CEO Attribute Based Centrality and Financial Distress

We observe in Table 9 that in top school and Carnegie school classifications, a decline in the E-I index, indicating more in-group members in a given CEO network increases the likelihood of financial distress. However, the relation is not statistically significant for both classifications. Results are also not significant for Ivy league classification. In Table 10 we show that when interacting Degree E-I index for the three classifications with R&D expenditures scaled by total assets, we find that an increase in the index, reflected in more out-group connections, increases the likelihood of financial distress for R&D intensive firms. The result is significant for both Ivy and top school classifications, while insignificant for the Carnegie school classification. Additionally we add a dummy variable specification for each grouping and give a specific CEO a value of 1 if his E-I score is below 0, indicating that the majority of the CEO alters are within group members. Interaction effects are consistent with previous results, an increase in E-I dummy for ivy and top education classifications are associated with a reduction in the likelihood of financial distress.

5.4 Director Homophily and Corporate Financial Distress

We observed in Tables 3 through 8 that the variability of director age and education increases the likelihood of financial distress. Variability in director education, measured by the number of undergraduate and postgraduate qualification, is significant at the 2 year lag specification, Two years prior to the distress event, increasing age variability of directors from 1 to 10 increases the probability of distress by 13.60 %, while increasing education variability from

1 to 2 increases the probability of distress by 17.21%. Greater variability in director age on the board increases the differences in cognitive processes, leading to increasing the likelihood of distress. However, the relation is not significant. Boards with directors where the number of educational achievements vary significantly can lead to greater difficulties in building consensus on strategic corporate policies. Prolonged delays in arriving at a strategic decision, especially for firms experiencing performance decline, can prove to be costly in the long-term.

6. Conclusions

The question we try to answer in this paper is does CEO power reflected in his/her position in the network of corporate directors enhance decision making, firm policy and changes in the strategic direction of the firm or not? Could some factors mitigate the negative consequences of CEO power? We conclude in this study that firms with CEOs occupying central locations in the vast network of corporate directors are more likely to experience an event of financial distress than a similar firm with a less central CEO.

To measure this, we utilize two measures of centrality, degree and eigenvector, which are common measure of positional embeddedness. Our findings contribute to the growing evidence on the role of professional networks on firm performance and corporate finance policies, and the literature examining the centralization of power in organizations. We conclude that individuals with these central network positions are usually targets of flattery and opinion conformity from others, amplifying the negative consequences of occupying a central position. Additionally, we find that firms with CEOs who spent more time employed at the firm prior to acquiring the formal CEO position are less likely to experience an event of financial distress. Dissecting degree centrality measure further, we examine how within group and between group connections

contribute to the measure. We find that for complex and R&D intensive firms, CEOs with more within group connections reduce the likelihood of financial distress. Finally with respect to boards, while most studies focused on formal structures of corporate governance which include internal and external mechanisms, we investigate if individual director attributes, matched on kinship between individual members, enhance informational flows and effective communication between the members. Finally, we find that heterophily with respect to education increases the likelihood of a financial distress event for a firm.

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Table 1

Summary Statistics for the distressed and non-distressed matched sample one year prior to the year of distress. All variables reported are one year prior to the year of distress for the sample period beginning January 2003 and ending December 2015.
(N=689)

Summary Statistics	Distressed Sample				NonDistressed Sample			
	Mean	Std.Dev	P25	P95	Mean	Std.Dev.	P25	P95
Profitability	-0.30	0.56	-0.40	0.07	-0.08	0.40	-0.07	0.16
Liquidity	0.15	0.20	0.02	0.64	0.22	0.27	0.03	0.89
Leverage	0.83	0.55	0.56	1.52	0.55	0.34	0.31	1.09
Tobin's Q	2.00	5.47	1.00	4.68	2.06	1.85	1.09	5.11
Age Var.	8.29	2.56	6.60	13.30	8.01	2.56	6.00	12.50
Edu Var.	0.99	0.39	0.70	1.70	0.95	0.34	0.70	1.50
CEO Tenure	4.24	4.70	1.10	13.50	6.11	6.88	1.60	18.90
Non CEO Tenure	5.43	7.76	0.00	23.30	7.01	8.98	0.00	26.40
Duality	0.90	0.30	1.00	1.00	0.94	0.23	1.00	1.00
Board size	7.84	2.21	6.00	12.00	7.93	2.14	6.00	12.00
Independent	0.73	0.14	0.63	0.90	0.72	0.13	0.63	0.90
Female	0.07	0.09	0.00	0.25	0.08	0.11	0.00	0.27
CEO Age	54.05	7.89	49.00	68.00	54.97	8.19	49.00	69.00
Institutional	0.47	0.33	0.17	1.00	0.55	0.32	0.27	1.00
Blockholder	2.20	1.98	1.00	6.00	2.29	1.80	1.00	5.00
Degree Percentile (Public)	66.78	21.19	49.91	96.87	64.12	20.56	47.90	95.63
Degree Percentile (Public &Private)	68.95	19.45	53.40	96.65	66.01	19.78	50.12	96.41
Degree Percentile (Full Network)	69.57	19.86	54.36	96.91	65.85	20.16	49.86	96.44
Eigenvector Percentile(Public)	63.39	22.32	47.31	96.07	59.94	23.12	43.58	93.50
Eigenvector Percentile(Public&Private)	69.65	19.28	55.48	96.87	66.20	19.88	52.95	94.94
Eigenvector Percentile(Full Network)	69.69	19.51	56.87	95.98	65.89	20.07	52.56	95.09
Degree E-I(Ivy)	-0.51	0.62	-0.87	0.81	-0.54	0.62	-0.90	0.81
Degree E-I (Top)	-0.37	0.57	-0.76	0.73	-0.36	0.68	-0.80	0.76
Degree E-I (Carnegie)	0.30	0.39	-0.01	0.93	0.31	0.40	0.00	1.00

Table 2

Test of statistical differences in means across two groups (Distressed and Non Distressed samples) one year prior to the year of distress for each centrality measure percentile ranking in each of the three different networks. ***p<0.01, **p<0.05

Centrality	Distressed Sample (N=689)	NonDistressed Sample(N=689)	T Test T-Value
Degree Centrality (Public)	66.78	64.12	-2.36**
Degree Centrality(Public &Private)	69.29	66.01	-3.10***
Degree Centrality (Full Network)	69.57	65.84	-3.45***
Eigenvector Centrality (Public)	63.39	59.94	-2.81***
Eigenvector Centrality (Public&Private)	69.65	66.20	3.27***
Eigenvector Centrality (Full Network)	69.69	65.88	3.56***

Table 3

This table represents the logit regression estimates. The dependent variable is a dummy variable that takes a value of 1 if a firm is identified as financially distressed. Matched non-distressed firms take a value of 0. All independent variables are measured one year prior to the year of distress. Degree is the natural logarithm of the percentile ranking of degree centrality. Eigen vector is the natural logarithm of the percentile ranking of Eigenvector centrality Profitability is ratio of net income/loss to total assets. Liquidity is the ratio of cash and short-term investments to total assets, Leverage is the ratio of total liabilities to total assets and Tobin's Q is calculated as the sum of the market value of equity, total liabilities and liquidating value of preferred stock divided by book value of assets. Director Age variability is the standard deviation of age of board members, Educational variability is the standard deviation of the number of under and postgraduate degrees of board members, and Non CEO Tenure is the difference between the time the CEO has spent in the company and his tenure as CEO. CEO Duality is a dummy variable that takes the value of 1 if the CEO is also chairman of the board. Board size is the natural logarithm of the number of director on the board. Independent is the percentage of independent directors with a board seat, female is the percentage of female directors with a board seat, Institutional ownership is the percentage of share outstanding owned by institutional shareholders and block ownership is the number of block holders with more than 5% of the shares outstanding. Robust standard errors correcting for heteroscedasticity are reported in parentheses. .*p<0.1, **p<0.05, ***p<0.01

	1	2	3	4	5	6
Dependent Var.(Distress=1)	Degree (Public)	Degree (Public&Private)	Degree(Full Network)	Eigenvector(Public)	Eigenvector(Public &Private)	Eigenvector(Full Network)
Degree	0.485***	0.583***	0.679***			
	(0.195)	(0.212)	(0.207)			
Eigenvector				0.304**	0 .384**	0.441**
				(0 .132)	(0.181)	(0 .182)
Profitability	-1.649***	-1.640***	-1.643***	-1.633***	-1.640***	-1.638***
	(0.529)	(0.530)	(0.531)	(0.533)	(0..531)	(0.531)
Liquidity	-2.406***	-2.445***	-2.473***	-2.412***	-2.379***	-2.392***
	(.454)	(0.457)	(0.456)	(0 .453)	(0.450)	(0.448)
Leverage	1.701***	1.676***	1.661***	1.711***	1.690***	1.675***
	(0.302)	(0.302)	(0.302)	(0.300)	(0 .302)	(0.302)
Tobin's Q	-0.005	-0.005	-0.004	-0.007	-0.005	-0.004
	(0.047)	(0.048)	(0.047)	(0.053)	(0.050)	(0.048)
Age Variability	0.032	0.031	0.032	0 .035	0.031	0.032
	(0.023)	(0.023)	(0.023)	(0.023)	(0.023)	(0.023)
Education Variability	0 .224	0.239	0.240	0 .225	0.238	0.238
	(0.180)	(0.181)	(0.181)	(0.181)	(0.181)	(0.181)

Non CEO Tenure	-0.009	-0.008	-0.008	-0.009	-0.010	-0.010
	(.007)	(0.007)	(0 .007)	(0.006)	(0.007)	(0 .007)
CEO Duality	-0.448*	-0.461*	-0.477**	-0.475**	-0.472**	-0.479**
	(0.240)	(0 .241)	(0.242)	(0.240)	(0.239)	(0.239)
Board Size	-0.032	-0.033	-0.038	-0.028	-0.025	-0.028
	(0.031)	(0.031)	(0.031)	(0.031)	(0.031)	(0.031)
Independent	0 .967**	0.988**	0.957**	1.012**	1.063**	1.060**
	(0.477)	(0 .476)	(0.477)	(0.473)	(0.473)	(0.473)
Female	-0.922	-0.895	-0.911	-0.854	-0.792	-0.810
	(0.605)	(0.604)	(0.605)	(0.604)	(0.602)	(0.603)
CEO Age	-0.013*	-0.012*	-0.013*	-0.011	-0.011	-0.011
	(0.007)	(0.007)	(0.007)	(0.007)	(0.007)	(0.007)
Block ownership	0.200***	0.199***	0 .200***	0 .194***	0.199***	0.200***
	(0.049)	(0 .049)	(0.049)	(0 .049)	(0 .050)	(0.049)
Institutional ownership	-1.616***	-1.599***	-1.629***	-1.560***	-1.571***	-1.585***
	(0.347)	(0.345)	(0.343)	(0.343)	(0.347)	(0.345)
constant	-2.196**	-2.664**	-2.933***	-1.598*	-2.018**	-2.208**
	(0.955)	(-1.036)	-1.017	-0.836	(0.989)	(0.991)
N	1,378	1,378	1,378	1,378	1,378	1,378
R^2	17.36%	17.44%	17.60%	17.32%	17.28%	17.35%

Table 4

This table represents the logit regression estimates. The dependent variable is a dummy variable that takes a value of 1 if a firm is identified as financially distressed. Matched non-distressed firms take a value of 0. All independent variables are measured one year prior to the year of distress. Degree is the natural logarithm of the percentile ranking of degree centrality. Eigen vector is the natural logarithm of the percentile ranking of Eigenvector centrality Profitability is ratio of net income/loss to total assets. Liquidity is the ratio of cash and short-term investments to total assets, Leverage is the ratio of total liabilities to total assets and Tobin's Q is calculated as the sum of the market value of equity, total liabilities and liquidating value of preferred stock divided by book value of assets. Director Age variability is the standard deviation of age of board members, Educational variability is the standard deviation of the number of under and postgraduate degrees of board members, and Non CEO Tenure is the difference between the time the CEO has spent in the company and his tenure as CEO. CEO Duality is a dummy variable that takes the value of 1 if the CEO is also chairman of the board. Board size is the natural logarithm of the number of director on the board. Independent is the percentage of independent directors with a board seat, female is the percentage of female directors with a board seat, Institutional ownership is the percentage of share outstanding owned by institutional shareholders and block ownership is the number of blockholders with more than 5% of the shares outstanding.Robust standard errors correcting for heteroscedasticity are reported in parentheses. .*p<0.1, **p<0.05, ***p<0.01

	1	2	3	4	5	6
Dependent Var.(Distress=1)	Degree (Public)	Degree (Public&Private)	Degree(Full Network)	Eigenvector(Public)	Eigenvector(Public &Private)	Eigenvector(Full Network)
Degree	0.617***	0 .706***	0.813***			
	(0.229)	(0.255)	(0.251)			
Eigenvector				0.367**	0.601***	0.666***
				(0 .159)	(0.224)	(0.223)
Profitability	-1.654***	-1.641***	-1.645***	-1.629***	-1.634***	-1.634***
	(0.528)	(0.529)	(0.531)	(0.532)	(0.529)	(0.529)
Liquidity	-2.425***	-2.463***	-2.496***	-2.422***	-2.404***	-2.423***
	(0.457)	(0.460)	(0 .459)	(0.456)	(0.458)	(0.456)
Leverage	1.697***	1.680***	1.661***	1.715***	1.698***	1.680***
	(0.302)	(0 .303)	(0.302)	(0.301)	(0.304)	(0.304)
Tobin's Q	-0.006	-0.005	-0.004	-0.007	-0.005	-0.005
	(0 .048)	(0.048)	(0.046)	(0.054)	(0.053)	(0.050)
Age Variability	0.032	0.031	0.032	0.035	0.031	0.031
	(0.023)	(0.023)	(0.023)	(0.023)	(0.023)	(0.023)
Education Variability	0.220	0.235	0.232	0.225	0.232	0.227
	(0 .180)	(0.181)	(0.181)	(0.181)	(0.181)	(0.182)

Non CEO Tenure	0 .081	0.066	0.070	0.019	0 .097*	0.098*
	(0.071)	(0 .080)	(0 .076)	(0 .040)	(0 .057)	(0.058)
CEO Duality	-0.432*	-0.450*	-0.468*	-0.468*	-0.460*	-0.469*
	(0.240)	(0 .241)	(0.242)	(0 .241)	(0.239)	(0.240)
Board Size	-0.030	-0.032	-0.037	-0.028	-0.026	-0.029
	(0.031)	(0.031)	(0.031)	(0 .031)	(0.031)	(0.031)
Independent	0 .995**	0.995**	0.963**	1.025**	1.097**	1.094**
	(0.481)	(0.478)	(0.479)	(0.473)	(0.476)	(0.476)
Female	-0.883	-0.882	-0.885	-0.840	-0.768	-0.777
	(0.605)	(0.604)	(0.606)	(0.605)	(0.603)	(0.605)
CEO Age	-0.013*	-0.012*	-0.013*	-0.011	-0.012	-0.012
	(0.007)	(0.007)	(0 .007)	(0.007)	(0.007)	(0.007)
Block ownership	0.196***	0.195***	0 .197***	0 .194***	0.194***	0.196***
	(0.050)	(0.050)	(0 .049)	(0.049)	(0.050)	(0.050)
Institutional ownership	-1.598***	-1.581***	-1.617***	-1.558***	-1.560***	-1.579***
	(0.347)	(0.345)	(0.343)	(0 343)	(0.348)	(0.345)
Non-CEO Tenure* Degree	-0.022	-0.018	-0.019			
	(0.017)	(0 .019)	(0.018)			
Non-CEO Tenure *Eigenvector				-0.007	-0.026*	-0.026*
				(0.010)	(0.014)	(0.014)
constant	-2.788**	-3.187***	-3.497***	-1.864**	-2.922**	-3.132***
	(1.099)	(1.203)	(1.185)	(0.908)	(1.136)	(1.133)
N	1,378	1,378	1,378	1,378	1,378	1,378
R^2	17.43%	17.48%	17.65%	17.35%	17.42%	17.50%

Table 5

This table represents the logit regression estimates. The dependent variable is a dummy variable that takes a value of 1 if a firm is identified as financially distressed. Matched non-distressed firms take a value of 0. All independent variables are measured two years prior to the year of distress. Degree is the natural logarithm of the percentile ranking of degree centrality. Eigen vector is the natural logarithm of the percentile ranking of Eigenvector centrality Profitability is ratio of net income/loss to total assets. Liquidity is the ratio of cash and short-term investments to total assets, Leverage is the ratio of total liabilities to total assets and Tobin's Q is calculated as the sum of the market value of equity, total liabilities and liquidating value of preferred stock divided by book value of assets. Director Age variability is the standard deviation of age of board members, Educational variability is the standard deviation of the number of under and postgraduate degrees of board members, and Non CEO Tenure is the difference between the time the CEO has spent in the company and his tenure as CEO. CEO Duality is a dummy variable that takes the value of 1 if the CEO is also chairman of the board. Board size is the natural logarithm of the number of director on the board. Independent is the percentage of independent directors with a board seat, female is the percentage of female directors with a board seat, Institutional ownership is the percentage of share outstanding owned by institutional shareholders and block ownership is the number of blockholders with more than 5% of the shares outstanding.Robust standard errors correcting for heteroscedasticity are reported in parentheses. .*p<0.1, **p<0.05, ***p<0.01

	1	2	3	4	5	6
Dependent Var.(Distress=1)	Degree (Public)	Degree(Public&Private)	Degree(Full Network)	Eigenvector(Public)	Eigenvector(Public &Private)	Eigenvector(Full Network)
Degree	0.296*	0.403**	0.461**			
	(0.180)	(0.190)	(0.186)			
Eigenvector				0.197	0.288*	0.383**
				(0.121)	(0.155)	(0.160)
Profitability	-1.405***	-1.401***	-1.403***	-1.401***	-1.401***	-1.401***
	(0.477)	(0.479)	(0.479)	(0.476)	(0.478)	(0.477)
Liquidity	-0.991**	-1.020***	-1.028***	-1.009***	-0.988***	-1.004***
	(0.386)	(0.384)	(0.384)	(0.383)	(0.381)	(0.381)
Leverage	1.442***	1.438***	1.428***	1.447***	1.436***	1.416***
	(0.260)	(0.260)	(0.259)	(0.259)	(0.260)	(0.259)
Tobin's Q	-0.209***.	-0.210***	-0.209***	-0.213***	-0.212***	-0.210***
	(0.057)	(0.057)	(0.057)	(0.057)	(0.056)	(0.056)
Age Variability	0 .029	0.029	0 .029	0 .030	0.028	0.029
	(0.022)	(0.022)	(0.022)	(0.022)	(0.022)	(0.022)
Education Variability	0.336**	0.348**	0.353**	0.331**	0.346**	0.348**
	(0.167)	(0.167)	(0.167)	(0.167)	(0.167)	(0.167)

Non CEO Tenure	-0.022***	-0.021***	-0.021***	-0.022***	-0.022***	-0.022***
	(0.006)	(0.006)	(0.006)	(0.006)	(0.006)	(0.006)
CEO Duality	-0.236	-0.241	-0.250	-0.246	-0.247	-0.253
	(0.200)	(0.199)	(0.200)	(0.199)	(0.198)	(0.198)
Board Size	0.010	0.008	0.005	0 .012	0.013	0.010
	(0.030)	(0.030)	(0.030)	(0.030)	(0.029)	(0.029)
Independent	0.917**	0 .915**	0.889**	0.907**	0.907**	0.879**
	(0 .432)	(0.431)	(0.432)	(0.433)	(0.432)	(0.433)
Female	-1.082*	-1.088*	-1.095*	-1.026*	-1.016*	-1.050*
	(0.604)	(0.603)	(0.602)	(0.598)	(0.599)	(0.601)
CEO Age	-0.011	-0.010	-0.010	-0.010	-0.010	-0.010
	(0.006)	(0 .006)	(0.006)	(0 .006)	(0.006)	(0.006)
Block ownership	0.126***	0.124***	0 .125***	0.125***	0.125***	0.128***
	(0.047)	(0 .047)	(0.047)	(0.046)	(0.046)	(0.047)
Institutional ownership	-0.910***	-0.907***	-0.918***	-0.886***	-0.894***	-0.922***
	(0.309)	(0.307)	(0.306)	(0.306)	(0 .306)	(0 306)
constant	-1.766*	-2.219**	-2.409**	-1.390*	-1.787**	-2.114**
	(0 .920)	(0.973)	(0.953)	(0.781)	(0.873)	(0.882)
N	1,524	1,524	1,524	1,524	1,524	1,524
R^2	11.24%	11.31%	11.39%	11.25%	11.27%	11.38%

Table 6

This table represents the logit regression estimates. The dependent variable is a dummy variable that takes a value of 1 if a firm is identified as financially distressed. Matched non-distressed firms take a value of 0. All independent variables are measured two years prior to the year of distress. Degree is the natural logarithm of the percentile ranking of degree centrality. Eigen vector is the natural logarithm of the percentile ranking of Eigenvector centrality Profitability is ratio of net income/loss to total assets. Liquidity is the ratio of cash and short-term investments to total assets, Leverage is the ratio of total liabilities to total assets and Tobin's Q is calculated as the sum of the market value of equity, total liabilities and liquidating value of preferred stock divided by book value of assets. Director Age variability is the standard deviation of age of board members, Educational variability is the standard deviation of the number of under and postgraduate degrees of board members, and Non CEO Tenure is the difference between the time the CEO has spent in the company and his tenure as CEO. CEO Duality is a dummy variable that takes the value of 1 if the CEO is also chairman of the board. Board size is the natural logarithm of the number of director on the board. Independent is the percentage of independent directors with a board seat, female is the percentage of female directors with a board seat, Institutional ownership is the percentage of share outstanding owned by institutional shareholders and block ownership is the number of blockholders with more than 5% of the shares outstanding.Robust standard errors correcting for heteroscedasticity are reported in parentheses. .*p<0.1, **p<0.05, ***p<0.01

Dependent Var.(Distress=1)	1 Degree (Public)	2 Degree(Public&Private)	3 Degree(Full Network)	4 Eigenvector(Public)	5 Eigenvector(Public &Private)	6 Eigenvector(Full Network)
Degree	0.520**	0.580**	0.649***			
	(0.213)	(0.232)	(0.228)			
Eigenvector				0.256*	0.461**	0.609***
				(0.150)	(0.205)	(0.209)
Profitability	-1.414***	-1.406***	-1.408***	-1.395***	-1.412***	-1.415***
	(0 .478)	(0.479)	(0.480)	(0.475)	(0.479)	(0.479)
Liquidity	-1.024***	-1.047***	-1.060***	-1.021***	-1.016***	-1.041***
	(0.389)	(0.386)	(0.385)	(0.382)	(0.382)	(0.382)
Leverage	1.429***	1.436***	1.423***	1.446***	1.431***	1.407***
	(0.260)	(0.260)	(0.260)	(0.259)	(0.260)	(0.260)
Tobin's Q	-0.204***	-0.208***	-0.206***	-.0211***	-0.210***	-0.207***
	(0.057)	(0.057)	(0.057)	(0.057)	(0.056)	(0.056)
Age Variability	0.029	0.029	0.029	0.030	0.028	0.029
	(0.022)	(0.022)	(0.022)	(0.022)	(0 .022)	(0.022)
Education Variability	0.339**	0.350**	0.355**	0.335**	0.348**	0.352**
	(0.166)	(0.167)	(0.167)	(0.167)	(0.166)	(0.166)

Non CEO Tenure	0.128*	0.086	0.092	0.006	0.078	0.103
	(0.072)	(0.079)	(0 .077)	(0.044)	(0.069)	(0.069)
CEO Duality	-0.222	-0.233	-0.245	-0.241	-0.241	-0.247
	(0.199)	(0.199)	(0.199)	(0.200)	(0.199)	(0.199)
Board Size	0.014	0.008	(0.005)	0.012	0.013	0.009
	(0.030)	(0.030)	(0.030)	(0.030)	(0.029)	(0.029)
Independent	0 .952**	0.927**	0.900**	0 .916**	0.925**	0.897**
	(0.437)	(0.433)	(0.434)	(0.434)	(0.434)	(0.435)
Female	-1.065*	-1.088*	-1.093*	-1.022*	-1.017*	-1.053*
	(0.604)	(0.603)	(0.602)	(0.597)	(0.600)	(0.601)
CEO Age	-0.011	-0.010	-0.010	-0.010	-0.010	-0.010
	(0.006)	(0.006)	(0 .006)	(0 .006)	(0.006)	(0.006)
Block ownership	0.126***	(0 .123)***	0.124***	0.125***	0.124***	(0.126)***
	(0.047)	(0.047)	(0 .047)	(0.046)	(0.046)	(0.047)
Institutional ownership	-0.902***	-0.896***	-0.909***	-0.892***	-0.888***	-0.912***
	(0.309)	(0.308)	(0.307)	(0.307)	(0.307)	(0.307)
Non-CEO Tenure* Degree	-0.037**	-0.026	-0.027			
	(0.017)	(0.019)	(0 .019)			
Non-CEO Tenure *Eigenvector				-0.007	-0.024	-0.030*
				(0.011)	(0.016)	(0.016)
constant	-2.752***	-2.974***	-3.203***	-1.636*	-2.509**	-3.055***
	(1.057)	(1.137)	(1.116)	(0.871)	(1.055)	(1.066)
N	1,524	1,524	1,524	1,524	1,524	1,524
R^2	11.43%	11.39%	11.49%	11.27%	11.36%	11.53%

Table 7

This table represents the logit regression estimates. The dependent variable is a dummy variable that takes a value of 1 if a firm is identified as financially distressed. Matched non-distressed firms take a value of 0. All independent variables are measured three years prior to the year of distress. Degree is the natural logarithm of the percentile ranking of degree centrality. Eigen vector is the natural logarithm of the percentile ranking of Eigenvector centrality Profitability is ratio of net income/loss to total assets. Liquidity is the ratio of cash and short-term investments to total assets, Leverage is the ratio of total liabilities to total assets and Tobin's Q is calculated as the sum of the market value of equity, total liabilities and liquidating value of preferred stock divided by book value of assets. Director Age variability is the standard deviation of age of board members, Educational variability is the standard deviation of the number of under and postgraduate degrees of board members, and Non CEO Tenure is the difference between the time the CEO has spent in the company and his tenure as CEO. CEO Duality is a dummy variable that takes the value of 1 if the CEO is also chairman of the board. Board size is the natural logarithm of the number of director on the board. Independent is the percentage of independent directors with a board seat, female is the percentage of female directors with a board seat, Institutional ownership is the percentage of share outstanding owned by institutional shareholders and block ownership is the number of blockholders with more than 5% of the shares outstanding.Robust standard errors correcting for heteroscedasticity are reported in parentheses. .*p<0.1, **p<0.05, ***p<0.01

Dependent Var.(Distress=1)	1 Degree (Public)	2 Degree(Public &Private)	3 Degree(Full Network)	4 Eigenvector(Public)	5 Eigenvector(Public& Private)	6 Eigenvector(Full Network)
Degree	0.223	0.312	0.301			
	(0.177)	(0.192)	(0.188)			
Eigenvector				0.178	0.226	0.260
				(0.120)	(0.158)	(0.159)
Profitability	-0.753**	-0.752**	-0.754**	-0.743**	-0.753**	-0.751**
	(0.342)	(0.344)	(0.344)	(0.341)	(0.341)	(0.341)
Liquidity	-1.289***	-1.314***	-1.304***	-1.304***	-1.288***	-1.291***
	(0.315)	(0.317)	(0.316)	(0.314)	(0.314)	(0.314)
Leverage	0.424***	0.425***	0.425***	0.429***	0.421***	0.416***
	(0.153)	(0.153)	(0.153)	(0.153)	(0.153)	(0.153)
Tobin's Q	-0.006	-0.004	-0.004	-0.007	-0.004	-0.003
	(0 .032)	(0.032)	(0.032)	(0.032)	(0.032)	(0 .032)
Age Variability	0.014	0 .014	0.014	0.016	0.014	0.014
	(0.022)	(0 .022)	(0.022)	(0.022)	(0.022)	(0.022)
Education Variability	0.211	0 .208	0 .211	0.208	0.208	0.207
	(0.147)	(0.148)	(0.148)	(0.148)	(0.147)	(0.147)

Non CEO Tenure	-0.026***	-0.025***	-0.025***	-0.026***	-0.026***	-0.026***
	(0.007)	(0.007)	(0.007)	(0.007)	(0.007)	(0.007)
CEO Duality	-0.238	-0.237	-0.244	-0.245	-0.243	-0.246
	(0.212)	(0.212)	(0.211)	(0.211)	(0.211)	0.211
Board Size	0.063**	0.062**	0 .062**	(0.064)**	(0.065)**	0.064**
	(0.030)	(0.030)	(0.030)	(0.030)	(0.030)	(0.030)
Independent	0.280	0.284	0.277	0.273	0.290	0.280
	(0.401)	(0.400)	(0.401)	(0.401)	(0.401)	(0.401)
Female	-0.561	-0.548	-0.540	-0.543	-0.507	-0.515
	(0.630)	(0.628)	(0.628)	(0.626)	(0.628)	(0.628)
CEO Age	0.003	0.003	0.004	0.004	0.004	0.004
	(0.007)	(0.007)	(0.007)	(0.007)	(0.007)	(0.007)
Block ownership	0.135***	0.138***	0.137***	0.133***	0.135***	0.137***
	(0.049)	(0 .049)	(0.049)	(0.049)	(0.049)	(0.049)
Institutional ownership	-0.766***	-0.785***	-0.779***	-0.751**	-0.753**	-0.768***
	(0.297)	(0.297)	(0.296)	(0.291)	(0.292)	(0.293)
constant	-1.694*	-2.069**	-2.020**	-1.547**	-1.796**	-1.910**
	(0.889)	(0.951)	(0.937)	(0.766)	(0.882)	(0.876)
N	1,392	1,392	1,392	1,392	1,392	1,392
R^2	5.10%	5.15%	5.15%	5.14%	5.12%	5.15%

Table 8

This table represents the logit regression estimates. The dependent variable is a dummy variable that takes a value of 1 if a firm is identified as financially distressed. Matched non-distressed firms take a value of 0. All independent variables are measured three years prior to the year of distress. Degree is the natural logarithm of the percentile ranking of degree centrality. Eigen vector is the natural logarithm of the percentile ranking of Eigenvector centrality Profitability is ratio of net income/loss to total assets. Liquidity is the ratio of cash and short-term investments to total assets, Leverage is the ratio of total liabilities to total assets and Tobin's Q is calculated as the sum of the market value of equity, total liabilities and liquidating value of preferred stock divided by book value of assets. Director Age variability is the standard deviation of age of board members, Educational variability is the standard deviation of the number of under and postgraduate degrees of board members, and Non CEO Tenure is the difference between the time the CEO has spent in the company and his tenure as CEO. CEO Duality is a dummy variable that takes the value of 1 if the CEO is also chairman of the board. Board size is the natural logarithm of the number of director on the board. Independent is the percentage of independent directors with a board seat, female is the percentage of female directors with a board seat, Institutional ownership is the percentage of share outstanding owned by institutional shareholders and block ownership is the number of blockholders with more than 5% of the shares outstanding.Robust standard errors correcting for heteroscedasticity are reported in parentheses. .*p<0.1, **p<0.05, ***p<0.01

Dependent Var.(Distress=1)	1 Degree (Public)	2 Degree(Public&Privat)	3 Degree(Full Network)	4 Eigenvector(Public)	5 Eigenvector(Public &Private)	6 Eigenvector(Full Network)
Degree	0.339*	0.379*	0.393*			
	(0.203)	(0.225)	(0.222)			
Eigenvector				0.137	0.265	0.293
				(0.144)	(0.189)	(0.191)
Profitability	-0.751**	-0.750**	-0.751**	-0.746**	-0.752**	-0.751**
	(0.342)	(0.344)	(0.343)	(0.341)	(0.341)	(0.341)
Liquidity	-1.291***	-1.318***	-1.311***	-1.304***	-1.288***	-1.291***
	(0.315)	(0.317)	(0 .316)	(0.314)	(0.314)	(0.314)
Leverage	0.426***	0.427***	0.427***	0.427***	0.423***	0 .418***
	(0.153)	(0.153)	(0.153)	(0.153)	(0.153)	(0.153)
Tobin's Q	-0.005	-0.003	-0.003	-0.006	-0.004	-0.003
	(0.032)	(0.032)	(0.032)	(0.032)	(0.032)	(0.032)
Age Variability	0.014	0.015	0.014	0 .016	0.014	0.014
	(0.022)	(0.022)	(0.022)	(0.022)	(0.022)	(0.022)
Education Variability	0.212	0.208	0.211	0.210	0.208	0.207
	(0.148)	(0.148)	(0.148)	(0.147)	(0.147)	(0.147)

Non Ceo Tenure	0.054	0.018	(0.034)	-0.048	-0.001	-0.005
	(0.071)	(0.081)	(0.079)	(0.042)	(0.067)	(0.067)
CEO Duality	-0.227	-0.233	-0.238	-0.249	-0.242	-0.245
	(0.212)	(0.212)	(0.212)	(0.211)	(0.211)	(0.211)
Board Size	0 .065**	0.063**	0.063**	0.063**	0.066**	0.064**
	(0.030)	(0 .030)	(0.030)	(0.030)	(0.030)	(0.030)
Independent	0.300	0.292	0.287	0.269	0.293	0.282
	(0.402)	(0.401)	(0.401)	(0.402)	(0.401)	(0.401)
Female	-0.555	-0.544	-0.537	-0.543	-0.510	-0.518
	(0.630)	(0.628)	(0.628)	(0.627)	(0.627)	(0.628)
CEO Age	0.004	0.004	0.004	0.004	0 .004	0.004
	(0.007)	(0.007)	(0.007)	(0.007)	(0.007)	(0.007)
Block ownership	0.132***	0.136***	0.136***	0.134***	0.134***	0.136***
	(0.049)	(0.049)	(0.049)	(0 .049)	(0.049)	(0.049)
Institutional ownership	-0.748**	-0.776***	-0.770***	-0.753**	-0.750**	-0.765***
	(0.297)	(0.297)	(0.296)	(0.291)	(0.292)	(0.293)
Non-CEO Tenure* Degree	-0.020	-0.010	-0.014			
	(0.017)	(0.020)	(0 .019)			
Non-CEO Tenure *Eigenvector				0.005	-0.006	-0.005
				(0.010)	(0.016)	(0.016)
constant	-2.222**	-2.365**	-2.427**	-1.371	-1.961**	-2.052**
	(0.989)	(1.077)	(1.063)	(0.834)	(0.987)	(0.983)
N	1,392	1,392	1,392	1,392	1.392	1,392
R^2	5.17%	5.17%	5.18%	5.15%	5.13%	5.15%

Table 9

This table represents the logit regression estimates. The dependent variable is a dummy variable that takes a value of 1 if a firm is identified as financially distressed. Matched non-distressed firms take a value of 0. All independent variables are measured three years prior to the year of distress. E-I is the attribute based degree centrality based on three groupings, Ivy League grouping, top university grouping and Carnegie school classification grouping. E-I Dummy is equal to 1 if E-I < 0 and zero otherwise for each classification Profitability is ratio of net income/loss to total assets. Liquidity is the ratio of cash and short-term investments to total assets, Leverage is the ratio of total liabilities to total assets and Tobin's Q is calculated as the sum of the market value of equity, total liabilities and liquidating value of preferred stock divided by book value of assets. Director Age variability is the standard deviation of age of board members, Educational variability is the standard deviation of the number of under and postgraduate degrees of board members, and Non CEO Tenure is the difference between the time the CEO has spent in the company and his tenure as CEO. CEO Duality is a dummy variable that takes the value of 1 if the CEO is also chairman of the board. Board size is the natural logarithm of the number of director on the board. R&D is R&D expenditures scaled by total assets .Robust standard errors correcting for heteroscedasticity are reported in parentheses. .*p<0.1, **p<0.05, ***p<0.01

	1	2	3	4	5	6
Dependent Var.(Distress=1)	E-I (Ivy)	E-I(Top)	E-I(Carnegie)	E-I(Ivy) Dummy	E-I(Top) Dummy	E-I(Carnegie) Dummy
Degree E-I	0.054	-0.041	-0.124	-0.070	0.134	0.057
	(0.091)	(0.089)	(0.151)	(0.147)	(0.132)	(0.143)
Profitability	-1.780***	-1.789***	-1.789***	-1.782***	-1.791***	-1.788***
	(0.427)	(0.429)	(0.425)	(0.427)	(0.429)	(0.427)
Liquidity	-2.196***	-2.172***	-2.203***	-2.191***	-2.159***	-2.192***
	(0.775)	(0.775)	(0.772)	(0.775)	(0.773)	(0.771)
Leverage	1.676***	1.691***	1.681***	1.678***	1.701***	1.685***
	(0.299)	(0.299)	(0.297)	(0.299)	(0 .300)	(0.297)
Tobin's Q	-0.062	-0.062	-0.063	-0.062	-0.063	-0.063
	(0.290)	(0.290)	(0 .289)	(0.289)	(0 291)	(0.290)
Age Variability	0 .032	0.032	0.033	0.033	0.032	0.033
	(0.022)	(0.022)	(0.022)	(0.022)	(0.022)	(0.022)
Education Variability	0.042	0.042	0.044	0 .042	0 .042	0.040
	(0.176)	(0.176)	(0.176)	(0.175)	(0.175)	(0.176)
Non Ceo Tenure	-0.009	-0.009	-0.009	-0.009	-0.009	-0.009
	(0.007)	(0.007)	(0.007)	(0.007)	(0.007)	(0 .007)

CEO Duality	-0.521**	-0.521**	-0.530**	-0.528**	-0.514**	-0.523**
	(0.233)	(0.233)	(0.234)	(0.233)	(0.233)	(0.233)
Board Size	-0.053*	-0.053*	-0.056*	-0.052*	-0.052*	-0.054*
	(0.030)	(0.030)	(0.031)	(0.030)	(0.030)	(0.030)
R&D	0.723	0 .708	0 .700	0 .693	0.693	0.698
	1.052	1.057	1.046	1.062	1.062	(1.047)
constant	-0.312	-0.312	-0.217	-0.412	-0.412	-0.289
	(0 .588)	(0 .587)	(0.599)	(0.600)	(0.600)	(0.579)
N	1,354	1,354	1,354	1,354	1,354	1,354
R^2	14.48%	14.47%	14.50%	14.47%	14.52%	14.47%

Table 10

This table represents the logit regression estimates. The dependent variable is a dummy variable that takes a value of 1 if a firm is identified as financially distressed. Matched non-distressed firms take a value of 0. All independent variables are measured three years prior to the year of distress. E-I is the attribute based degree centrality based on three groupings, Ivy League grouping, top university grouping and Carnegie school classification grouping. E-I Dummy is equal to 1 if E-I < 0 and zero otherwise for each classification.Profitability is ratio of net income/loss to total assets. Liquidity is the ratio of cash and short-term investments to total assets, Leverage is the ratio of total liabilities to total assets and Tobin's Q is calculated as the sum of the market value of equity, total liabilities and liquidating value of preferred stock divided by book value of assets. Director Age variability is the standard deviation of age of board members, Educational variability is the standard deviation of the number of under and postgraduate degrees of board members, and Non CEO Tenure is the difference between the time the CEO has spent in the company and his tenure as CEO. CEO Duality is a dummy variable that takes the value of 1 if the CEO is also chairman of the board. Board size is the natural logarithm of the number of director on the board. R&D is R&D expenditures scaled by total assets .Robust standard errors correcting for heteroscedasticity are reported in parentheses. .*p<0.1, **p<0.05, ***p<0.01

	1	2	3	4	5	6
Dependent Var.(Distress=1)	E-I (Ivy)	E-I(Top)	E-I(Carnegie)	E-I(Ivy) Dummy	E-I(Top) Dummy	E-I(Carnegie) Dummy
Degree E-I	-0.029	-0.139	-0.209	0.051	0.282*	0.154
	(0.102)	(0.103)	(0.163)	(0.166)	(0.145)	0 .162
Profitability	-1.769***	-1.776***	-1.777***	-1.772***	1.784***	-1.767***
	(0.424)	(0.424)	(0.427)	(0.425)	(0.425)	(0.427)
Liquidity	-2.235***	-2.219***	-2.205***	-2.224***	-2.229***	-2.185***
	(0.769)	(0.794)	(0.757)	(0.772)	(0.782)	(0 .723)
Leverage	1.685***	1.711***	1.693***	1.687***	1.724***	1.716***
	(0.302)	(0.300)	(0.297)	(0.302)	(0.302)	(0.297)
Tobin's Q	-0.068	-0.063	-0.060	-0.068	-0.066	-0.061
	(0.300)	(0.300)	(0.288)	(0.299)	(0.296)	(0.279)
Age Variability	0.033	0.032	0.032	0.033	0.031	0.032
	(0.022)	(0.022)	(0.022)	(0 .022)	(0.022)	(0.022)
Education Variability	0.021	0.034	0.056	0.022	0.030	0.044
	(0.177)	(0.177)	(0.176)	(0.177)	(0.177)	(0.176)
Non Ceo Tenure	-0.009	-0.009	-0.009	-0.009	-0.009	-0.009
	(0.007)	(0.007)	(0.007)	(0.007)	(0.007)	(0.007)

CEO Duality	-0.524**	-0.516**	-0.543**	-0.526**	-0.515**	-0.528**
	(0.234)	(0.234)	(0.235)	(0.234)	(0.236)	(0.234)
Board Size	-0.054*	-0.053*	-0.059*	-0.053*	-0.050*	-0.057*
	(0.030)	(0.030)	(0.031)	(0.030)	(0.030)	(0.030)
R&D	1.658	1.397	0.444	2.653	2.655**	1.175
	(1.203)	(1.099)	(1.142)	(1.662)	(1.336)	(1.050)
R&D* E-I (Ivy)	1.603*			-2.168*		
	(0.826)			(1.248)		
R&D *E-V(top)		1.896**			-2.397**	
		(0.965)			(1.035)	
R&D*E-I(Carnegie)			1.188			-1.161
			(1.183)			(1.119)
constant	-0.270	-0.351	-0.179	-0.302	-0.526	-0.311
	(0.578)	(0.583)	(0.596)	(0.577)	(0.582)	(0.565)
N	1,354	1,354	1,354	1,354	1,354	1,354
R^2	14.72%	14.77%	14.58%	14.67%	14.86%	14.59%