Powerful Independent Directors

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Kathy Fogel
Suffolk University and CEO of Zinoplex Inc.

Liping Ma
University of Texas

Randall Morck
University of Alberta, NBER and ECGI

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Abstract

Shareholder valuations are economically and statistically positively correlated with independent directors' power, gauged by social network power centrality. Powerful independent directors' sudden deaths reduce shareholder value significantly; other independent directors' deaths do not. More powerful independent directors Granger cause higher valuations; the converse is not true. Further tests associate more powerful independent directors with less value-destroying M&A, less free cash flow retention, more CEO accountability, and less earnings management. We posit that more powerful independent directors better detect and counter CEO missteps because of better access to information, greater credibility in challenging errant top managers, or both.

Keywords: Corporate Governance, Director Independence, Agency Problem, Social Networks, Power Centrality, Behavioral Finance

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Kathy Fogel
Chief Executive Officer
Zinoplex Inc.
745 Atlantic Avenue
Boston MA 02111, United States
phone: +1 (859) 250-8000
e-mail: kathy@zinoplex.com

Liping Ma
Clinical Assistant Professor of Finance and Managerial Economics
University of Texas at Dallas, Naveen Jindal School of Business
P.O. Box 830688
Dallas TX 72701, United States
e-mail: lpingma@gmail.com

Randall Morck*
Stephen A. Jarislowsky Distinguished Professor of Finance and
Distinguished University Professor
University of Alberta, Business School
2-32C Business Building
Edmonton AB T6E 2T9, Canada
phone: +1 (780) 492-5683, fax: +1 (780)-492-3325
e-mail: randall.morck@ualberta.ca

*Corresponding Author

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Kathy Fogel[a], Liping Ma[b], and Randall Morck[b]

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a. *Chief Executive Officer, Zinoplex, Inc., 745 Atlantic Avenue, Boston, MA 02111. Email: kathy@zinoplex.com. Phone: (859)250-8000.*
b. *Clinical Assistant Professor of Finance and Managerial Economics, Naveen Jindal School of Business, University of Texas at Dallas, Dallas TX 75080. Email: liping.ma@utdallas.edu.*
c. *Stephen A. Jarislowsky Distinguished Professor of Finance and Distinguished University Professor, University of Alberta Business School, Edmonton AB Canada T6E 2T9; Research Associate, National Bureau of Economic Research; Research Fellow, Bank of Canada. E-mail: randall.morck@ualberta.ca. Phone: +1(780)492-5683.*

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1. Introduction

Using network theory (Proctor & Loomis 1951; Sabidussi 1966; Bonacich 1972; Freeman 1977 1979; Watts & Strogatz 1998; Hanneman & Riddle 2005; Jackson 2008) we map a social network comprising over 12 million connections between over 300,000 directors and top executives of listed US firms from 1998 to 2009. We say two individuals become connected when they serve at the same firm in the same year, and that connections, once created, persist.

Using a supercomputer, we gauge each person's social power by combining four standard power centrality measures: *degree centrality* (number of direct connections), *closeness centrality* (mean degrees of separation[1] from all others in the network), *betweenness centrality* (number of shortest paths of connections linking other pairs of people that pass through her), and *eigenvector centrality* (a recursive measure in which each individual's social power as a weighted average of the social power of her direct connections). We interpret greater power centrality as more access to information and more capacity for influencing others – that is, as more power.

We say an individual is *powerful* if and only if at least three of her four power centrality measures fall within the top quintiles of their respective distributions. This is justifiable for three reasons. First, requiring at least three centrality measures in their top quintiles excludes pathological cases, such as a director whose many connections all go through her well-connected CEO. Such a director might have high closeness and eigenvector centralities, but her low degree and betweenness centralities would preclude her being classified as powerful. Second, the different centrality measures are differently robust to incomplete data (Borgatti et al. 2006). Third, differences in interpreting these alternative measures are incompletely understood, so requiring a majority of them to concur constitutes a conservative approach to defining power. We say a firm has a powerful independent board if a majority of its directors are legally independent and a majority of these are powerful.

We find that firms with powerful independent boards have economically and statistically significantly higher firm valuations. A baseline panel regression point estimate links a powerful independent board to a 6.58% higher Tobin's Q all else equal. An event study reveals significant negative abnormal returns on news of powerful independent directors' sudden deaths, but not on

[1] Milgram (1967) famously reports the mean closeness centrality between random pairs of Americans as "6º of separation". That is, the average American is connected to every other American by a six-person chain of acquaintances of acquaintances. Closeness centrality is the mean length of the shortest such chains linking the individual and every other individual.

the sudden deaths of other independent directors. Further tests show that more powerful independent boards also "Granger cause" shareholder valuations, and a rough exercise to quantify this corroborates the point estimate above. A final set of results link more powerful independent boards to significantly fewer value-destroying takeover bids, less free cash flow retention, more abnormal CEO turnover after poor performance, more performance-related CEO pay, and less earnings manipulation. These findings are collectively consistent with more powerful independent boards more effectively monitoring and disciplining errant CEOs.

The findings are highly robust. All panel regressions include industry and year fixed-effects and cluster by firm. The findings are robust to reasonable changes in key variables' definitions, control variables, and winsorization thresholds. Jointly or separately including controls for the social power of the CEO (Adams et al. 2010; El-Khatib et al. 2015; Fracassi & Tate 2012), the CEO not chairing the board (Fama & Jensen 1983; Jensen 1993), the social power and independence of a non-CEO chair, or the social power of inside directors does not materially change the main findings. Moreover, neither a powerful CEO nor a powerful non-CEO chair, independent or not, has a statistically robust correlation with valuation.[2] The findings are also robust to broader social networks. For example, recalculating the power centralities using an expanded network of all directors and top managers of all listed and unlisted generates results qualitatively similar to those in the tables. In contrast, redefining the network as current interlocks (connections disappear when the individuals are no longer at the same firm) generates generally insignificant results, with some signs inverted. Thus, director interlocks, elsewhere used to gauge director or CEO busyness (Ferris et al. 2003; Fich & Shivdasani 2006), do not capture the phenomenon we study. Controlling for director business or other characteristics – experience (Kang 2014) or intense monitoring (Faleye et al. 2012) likewise preserves our main results.

2. Controversies Regarding Independent Directors

Fama (1980, p. 294) entrusts self-interested independent directors, valued for their reputations for maximizing shareholder value, with informing and, if necessary, disciplining errant CEOs. Independent directors with damaged reputations hold fewer subsequent directorships and court

[2] Such a chair can be a strong voice of dissent against an errant CEO (Morck, Shleifer & Vishny 1989; Finkelstein & D'Aveni 1994), though CEOs as chairs add value in some firms (Anderson & Anthony 1986; Stoeberl & Sherony 1985; Rechner & Dalton 1991; Baliga et al. 1996; Brickley et al. 1997; Dalton et al. 1998; Goyal & Park 2002; Faleye 2007; Coles et al. 2013).

personal liability (Srinivasan 2005; Fos & Tsoutsoura 2013; Brochet & Srinivasan 2013). However, but empirical evidence linking more independent directors to higher shareholder valuations is inconsistent (Weisbach 1988; Daily & Dalton 1992; Yermack 1996; Dalton et al. 1998; Bhagat & Black 1999, 2002; Heracleous 2001; Shivdasani & Zenner 2004; Dulewicz & Herbert 2004; Erickson et al. 2005; Weir & Laing 2001; Cai et al. 2009; though see also Duchin, Matsusaka, & Ozbas 2010). Overall, Hermalin and Weisbach's (2003) assessment "there does not appear to be an empirical relationship between board composition and firm performance" remains generally accepted (Adams, Hermalin & Weisbach 2010).

If shareholder value maximization leaves all firms with optimal mixes of CEO incentives, no cross-sectional relationship need be evident between firms' governance characteristics and valuations (Demsetz & Lehn 1985; Hermalin & Weisbsch 1998, 2003). However, correlations between shareholder valuations and other aspects of governance are evident (Yermack 1996; Gompers et al. 2003; Faleye 2007; Bebchuk et al. 2009; Bhagat & Boulton 2013; and others), suggesting a balance between shareholder value maximization and insider utility maximization that varies across firms (Jensen & Meckling 1976; Stulz 1988; Hermalin & Weisbach 1998).

Such reasoning leads Bebchuk and Fried (2006), Cohen et al. (2013) and others to argue that corporate insiders gain utility by limiting outside shareholders' influence; and do so by compromising the actual independence of legally independent director. Mace (1971, p. 99) quotes CEOs explaining their preferences for directors who are "friendly, if you will" and "non-boat-rockers", and defending "selecting outside directors … much like a trial lawyer goes about the selection of a jury". Mace (1976) quotes a depiction of an ideal director thus:

> *"I have one friend that's just greatest agreer that there ever was, and he is on a dozen boards. I know other fellows that have been recommended to some of the same companies as directors, but have never gotten anywhere on the list to become directors. Because if a guy is not a yes man – no sir, he is an independent thinker – then they are dangerous to the tranquility of the board room. Company presidents are afraid of them – every damn one of them."*

In the UK, Higgs (2003, p. 39) reports that

> *"Almost half of the non-executive* [independent] *directors surveyed … were recruited to their role through personal contacts or friendships. Only 4% had had a formal interview, and 1% had obtained their job through answering an advertisement. This situation … can*

lead to an overly familiar atmosphere in the boardroom."

Bebchuk and Fried (2006), Cohen et al. (2013), and others view the US situation similarly. Regulations and best practice guidelines fill US boards with nominally independent directors, but if these are selected for timidity, they are unlikely to challenge a utility maximizing CEO.

Recent work thus uses criteria other than legal independence to gauge director effectiveness (Shivdansani & Yermak 1999; Ferris, et al. 2003; Faleye et al. 2012; Knyazeva et al. 2013; Coles et al. 2014). We further this line of research by gauging how powerful each director is, positing that more powerful directors are more likely to shift CEOs away from maximizing their private benefits and towards maximizing shareholder value.

Our findings also accord with Ngyuen and Nielsen's (2010) finding that share prices fall on news of independent directors' sudden deaths. We find larger and more significant negative abnormal returns on powerful independent directors' sudden deaths, and insignificant abnormal returns on the sudden deaths of non-powerful independent directors. Their weighted average approximates Ngyuen and Nielsen's price effect for all independent director sudden deaths.

We posit a behavioral theory of independent director effectiveness. Because more powerful independent directors have more, and more important, connections, they have better information and more influence. Mace (1971, p. 186) recounts directors explaining that they avoid criticizing the CEO "to avoid looking like idiot". Better information removes this impediment (Bouwman 2011). Mace cites CEOs explaining that they "do not want penetrating, issue-provoking questions, but only those that are gentle, supportive and an affirmation that the board approves of him" and how "board members should manifest by their queries, if any, that they approve of the management. If a director feels he has any basis for doubts or disapproval … he should resign." More powerful directors, with their more extensive webs of connections, can more effectively challenge an errant CEO, rally others to action, and (if necessary) resign without materially reducing their positions.

3. Data and Variables

3.1 Construction of the Social Network

A social network represents each of *N* individual as a *node* and each connection between two individuals as a *line segment* connecting their nodes. We use 1998 through 2009 BoardEx data to construct annual social networks, whose nodes represent the 305,904 top executives and directors of 5,947 listed US firms.

We infer a *connection* between two individuals if they ever served as a director or top executive at the same firm in the same year. Once a connection forms, we assume it persists. Formally, this makes the network a one-mode network: once lines form, they are permanent.[3] As a result, the network grows monotonically from 191,049 nodes and 5,438,006 connections between nodes in 1998 to 313,958 nodes and 11,639,006 connections in 2009.[4] About three fourths of these are identified from BoardEx; the rest are from computerized matching on career overlap based on itemized job histories from BoardEx director work history data. Including the latter was deemed necessary because inspection of how the initial network represented directors at randomly sampled large firms revealed prominent business leaders to be missing.

The network excludes non-business connections, such as shared alma maters, ethnicity, hometowns, or other common experiences because Chidambaran et al. (2012) find non-business ties qualitatively different from business connections. Another reason for using only business connections is that the data, from proxy statements and annual reports, are objective, comparable across individuals, and free of self-selection bias. A potential cost is that our representation of the network may miss many connections in individuals' true (unobservable) networks.[5] Of course, we cannot know if connected individuals are dear friends, mere acquaintances, or enemies, or if they talk daily, every ten years, or are not on speaking terms. Nonetheless, our network is far more extensive and dense than the network of current director interlocks, used elsewhere to define busy directors (Ferris et al. 2003; Fich and Shivdasani 2006).

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3 Robustness checks, discussed below, rebuild the network in various ways to account for the strength of links: dropping links that persist for fewer than three years, that were formed five or more years ago, or both. These exercises generate qualitatively similar to those shown.

4 See Appendix Table A1 for more details.

5 Robustness checks, discussed below, add connections formed at unlisted firms and non-profits. This denser network of some 21 million connections yields qualitatively similar results

3.2 Description of Power Centrality Measures

Social network theory (Milgram 1967; Proctor & Loomis 1951; Sabidussi 1966; Bonacich 1972; Freeman 1977, 1979; Watts & Strogatz 1998) provides measures of the power centrality of each individual in such a network. These measures are intuitively plausible representations of social power and are empirically validated in diverse contexts (Padgett & Ansell 1993; Banerjee et al. 2012). Each year, we calculate four power centrality measures for each individual. These are:

Individual i's *degree centrality* in year t ($D_{i,t}$) is simply the number of direct connections she has with other individuals. Thus, $D_{i,t}$ is an integer between 0 and $N_t - 1$, with N_t the number of nodes in the network in year t. A director with more direct connections plausibly has more direct sources of information and more contacts to influence.

The next two measures, closeness and betweenness centralities, turn on the concept of the shortest social distance, or *geodesic distance*, between two individuals. If i is directly connected with j in year t, the shortest path linking them is the single line segment connecting them, so the geodesic distance between i and j is $g_{i,j,t} = 1$. If i is not directly connected to j, but is connected with k, who is connected with j, then the shortest social path from i to j is $i - k - j$, which contains two line segments, so $g_{i,j,t} = 2$. In general, the shortest path between two individuals is the chain of line segments linking them that passes through the fewest nodes possible.[6] Shortest paths need not be unique, but the geodesic distance between them (the length of the shortest paths from one to the other) is always well defined.

Individual i's *betweenness centrality* in year t ($B_{i,t}$) is the fraction of the geodesics linking all ½($N_t - 1$)($N_t - 2$) pairs of other people in that year's network that contain her. Intuitively, a director with a higher $B_{i,t}$ has more power to connect people with each other or not, and more power to provide information about people to each other or not.[7]

An individual's *closeness centrality* ($C_{i,t}$) is the inverse of her mean degrees of separation from all other individuals; that is, one over the mean length of the $N_t - 1$ geodesics linking her to everyone else in the network. Intuitively, closer indirect connections to more people provide readier access to their information and more potential to influence them.

[6] Geodesic distance between two individuals is the smallest "*n*" in the "*n* degrees of separation" concept of Milgram (1967).

[7] Padgett and Ansell (1993) use high betweenness to explain Medici dominance in 15th century Florence: other elite families were generally connected to each other only via the Medici.

A fourth measure, *eigenvector* centrality ($E_{i,t}$) is recursively calculated. Intuitively, $E_{i,t}$ is a weighted average of the importance of the individual's direct contacts, with weights determined by the importance of their direct connections, with weights … and so on.

Together, these variables meaningfully measure an individual's power in a wide range of situations (Hanneman and Riddle 2005, Chapter 10). Higher power centrality lets individuals tap more information from more and better-informed connections, and then pass it along, or not, strategically. Higher power centrality also means more and stronger influence with more and better-positioned people from whom to draw support. All of this plausibly mitigates the costs of challenging an errant CEO.

3.3 Construction of Power Centrality Measures

Individual *i*'s *degree centrality* in year *t* is defined as the number of unique and direct connections she has with other individuals that year. That is,

[1] $$D_{i,t} \equiv \sum_{j \neq i} x_{ij,t}$$

where $x_{i,j,t} = 1$ if individuals *i* and *j* have a connection that year, and zero otherwise.

An individual's *closeness centrality* is one over the mean of the lengths of the $N_t - 1$ geodesics between her and the $N_t - 1$ other individuals in the network that year. This is

[2] $$Closeness_{i,t} = \frac{N_t - 1}{\sum_{i \neq j} g_{ij,t}}$$

if the entire network is *connected*; that is, if at least one path links every two nodes.

Our network contains some small sub-networks unconnected to the rest of the nodes. Setting the shortest distance between unconnected nodes to $g_{ij,t} = \infty$ in such cases is untenable because one infinite value in the denominator of [2] reduces all affected closeness measures to zero. Excluding infinite $g_{ij,t}$ is also problematic. Individual A in a small network might have a much higher *closeness* than individual B in a large network, but A might have much less power than B, whose influence extends across many more people. As an extreme case, consider a sub-network with two connected individuals. Dropping all unconnected nodes leaves each with the highest possible closeness of one; yet they have negligible social influence because they are unconnected to the remaining 300,000+ people.

To account for these issues, we modify [2] and instead define closeness centrality as

[3] $C_{i,t} \equiv \frac{N_t - 1}{\sum_{i \neq j} g_{ij,t}} \times \frac{n_t}{N_t}$

where n_t is the size of the connected sub-network individual i belongs to in year t, and N_t is the total number of individuals in the entire network that year. This modification rescales the closeness measure [2] by the size of each individual's connected subnetwork to more accurately reflect her overall social power. It follows that individuals in a larger connected subnetwork have higher closeness values than those in smaller connected subnetworks, all else equal.

Betweenness is the incidence of the individual being on the shortest path between pairs of other members of the network. For every possible triplet of individuals i, j and k in year t, define the indicator variables

[4] $m_{i,j,t}(k) = \begin{cases} 1 & \text{if } k \text{ is a node on a geodesic linking } i \text{ and } j \\ 0 & \text{otherwise} \end{cases}$

The *betweenness centrality* of k is then

[5] $B_{i,t} \equiv \sum_{i<j, i \neq k, j \neq k} \frac{m_{i,j,t}(k)/m_{i,j,t}}{\frac{1}{2}(N_t - 1)(N_t - 2)}$

where $m_{i,j,t}$ is the number of geodesics linking i and j that year. Scaling the numerator by $m_{i,j,t}$ is necessary because, although the length of the geodesics linking two individuals is unique, there can be more than one equally short path.

Eigenvector centrality is recursively calculated. Individual i's eigenvector centrality is her importance, weighed by the similarly calculated importance of all her direct contacts, each weighted by the importance of their direct connections, and so on. More formally, assume the existence of this measure for person i in year t, and denote it $E_{i,t}$. In matrix notation, with the vector of individuals' eigenvector centralities $\mathbf{E}_t \equiv [E_{1,t}, \ldots E_{i,t}, \ldots E_{N,t}]$, the recursions collapse into the condition that $\lambda_t \mathbf{E}_t' \mathbf{E}_t = \mathbf{E}_t' \mathbf{A}_t \mathbf{E}_t$. Thus, $\mathbf{E}_t$ is an eigenvector of the matrix of connections $\mathbf{A}_t$, and λ_t *is* its associated eigenvalue. To ensure that $E_{i,t} \geq 0$ for all individuals, the modified Perron-Frobenius theorem is invoked and the eigenvector centrality values of the individuals in the network are taken as the elements of the *eigenvector* $\mathbf{E}_t^*$ associated with $\mathbf{A}_t$'s *principal eigenvalue*, λ_t^* . Repeating this exercise for each individual each year generates the individual-year panel variable $E_{i,t}$.

To make the centrality measures comparable with each other and over time, we rank the raw values of each centrality measure of all individuals each year and assign a percentile value, with 1 the lowest and 100 the highest, to each individual's centrality measures each year. In other words, regardless of the size of the network, a person with a higher valued centrality percentile is more centrally positioned in the network than a person with lower value. We denote these normalized rank-transformations of $D_{i,t}$, $B_{i,t}$, $C_{i,t}$, and $E_{i,t}$ as $d_{i,t}$, $b_{i,t}$, $c_{i,t}$, and $e_{i,t}$ respectively. In some of the discussion below, we also consider the simple mean of the four percentile measures, and denote this $p_{i,t}$.

3.4 S&P 1500 Officers and Directors Sample

Hereafter, we focus on officers and directors with S&P 1500 firms in 1998 to 2009, as flagged by RiskMetrics. We retrieve annual data including firms' CUSIPs and GVKEYs from COMPUSTAT and match these with RiskMetrics data by CUSIP and year. We then merge these data with the power centrality measures described above, matching by GVKEY and year, and then by individuals' first and last names. This yields a 132,020 individual-year panel dataset of S&P 1500 officers and directors. The matching by names was first done electronically, then double checked (concatenating names and sorting by distance) to flag near misses, and then checked again by manually examining all non-matches to correct for nicknames and other name variant forms. Each observation then contains RiskMetrics data about the individual's position, legal independence, board committee membership, and other characteristics as of that year, as well as her power centrality measures as estimated above.

Table 1 presents summary statistics for the power centrality measures of all S&P 1500 officers and directors. Panel A summarizes the raw power centrality measures: $D_{i,t}$, $B_{i,t}$, $C_{i,t}$, and $E_{i,t}$. Their mean *betweenness* of 0.00973% means the typical director sits on about one in ten thousand shortest paths between pairs of other individuals in the full network (top executives and directors at listed firms). Note that, even within the S&P 1500, the distribution is skewed: the mean exceeds the 75th percentile and the maximum is 0.677%; so the most powerful person is on one of every 150 shortest paths between all pairs of other listed firm top managers and directors. The typical S&P 1500 director's mean closeness is 25.3%, indicating he is about four (1/0.253 = 3.94) degrees of separation from any other randomly chosen top manager or director of a listed firm. The median degree centrality of 197 indicates that the median S&P 1500 director has direct ties with 197 other individuals in the network. The raw eigenvector centrality measures are not amenable to intuitive explanation.

Panel B of Table 1 presents analogous summary statistics for S&P 1500 firm officers and directors' percentile social power measures: $d_{i,t}$, $b_{i,t}$, $c_{i,t}$, and $e_{i,t}$. The means of all four measures are in their top quartiles. Thus, S&P 1500 directors are more powerful on average than are officers and directors of listed firms in general – the larger sample used to construct individuals' percentile scores. Still, all four measures range from the lowest or second lowest to the top percentile, so S&P 1500 directors span the full range from negligible to paramount social power.

S&P 1500 CEOs and non-CEO chairs (not shown) are similarly more powerful than the average top manager or director, and likewise span the full range from slight to dominant social power. The mean social power measures of S&P 1500 directors uniformly exceed those of S&P 1500 CEOs, regardless of the power centrality measure used. Directors who chair the board have uniformly higher mean power centrality than directors in general.

3.5 Defining Powerful Independent Directors

We define a director as an *independent director* (ID) of a firm if she is so designated in the firm's SEC filings as tracked in RiskMetrics data. The legal definition of an independent director mandates "no relationship with the company, except the directorship and inconsequential shareholdings, that could compromise independent and objective judgment" (Securities and Exchange Commission 1972). Note that an individual's independence is a firm-dependent individual-level variable. The same person can be an independent director one firm's board and an insider director on another's board.

We define an individual as *powerful* in terms of a centrality measure in a given year if her value in that measure lies within the top quintile of its empirical distribution across all top executives and directors in the full network of top managers and directors of all listed firms. To operationalize this, we define four individual-year indicator variables, one for each percentile centrality measure. We set each indicator to one if the individual's percentile measure that year falls in the top quintile of its distribution across the full network, and to zero otherwise. Thus, we denote whether or not individual i is powerful in terms of her degree centrality using

[6] $$\delta(d_{i,t} \geq 80) \equiv \begin{cases} 1 & \text{if } d_{i,t} \geq 80 \\ 0 & \text{otherwise} \end{cases}$$

and define $\delta(b_{i,t} \geq 80)$, $\delta(c_{i,t} \geq 80)$, and $\delta(e_{i,t} \geq 80)$ analogously.

We must next combine the four power centrality measures to make composite individual-level social power measures. Table 1 Panel C presents the correlation matrix of the centrality measures across all S&P 1500 CEOs, non-CEO chairs, and directors. The four centrality measures are highly correlated, with correlation coefficients averaging 64%, and statistical significance under 0.01. Typical in this regard is Jeffrey Garten, who served at Blackstone and Lehman Brothers, and has high centrality by all four measures. His mean $d_{i,t}$ over the sample period is at the 94th percentile, his mean $b_{i,t}$ is at the 98th, his mean $c_{i,t}$, and $e_{i,t}$ are both at the 93rd percentile. This highly positive correlation justifies using the means of the four measures as in individual-level general social power measure.

However, the four measures disagree in other cases. Inspection of the data shows that these cases are often individuals with a small number of connections, but at least some of which to extremely powerful people. In such cases, low degree (few direct connections to other people) and betweenness centrality (she is an endpoint in most of the shortest that contain her) accompany high closeness (her powerful connections link her in a few steps to many other people) and eigenvector (her connections are powerful, as are theirs, and so on) centrality. For example, Ray Wilkins Jr., a director at H&R Block in 2000, ranked in the 83rd percentile by closeness and the 88th by eigenvector centrality, but only in the 66th percentile by degree centrality and the 68th by betweenness centrality. He is therefore not a PID in 2000 (though he does attain PID status subsequently).

The highest correlation for directors in the Table 1 Panel C is that between percentile closeness and percentile eigenvector power centrality ($\rho = 0.94$), the same pattern evident above. Moreover, betweenness correlates best with degree centrality ($\rho = 0.81$). However, individuals' power measures are not cleanly split along these lines, for degree centrality correlates most highly with closeness centrality.

Unfortunately, drawing nuanced distinctions between the four power centrality measures is problematic in this context. For example, connections might proxy for access to information (Freeman 1979; Freeman et al. 1980; Hossain et al., 2007; Kiss and Bichler 2008). If so, degree centrality implicitly assumes that information decays completely after one degree of separation (Bolland 1988), while the closeness and eigenvector measures assume a gradual decay as degrees of separation increase. Betweenness is then interpretable as capturing the number potentially distinct information flows the individual can tap. In contrast, if power is primarily ability to influence other people's decisions, different considerations arise. For example, Borgatti (2006) argues that individuals with higher closeness can better propagate information, but those with higher betweenness can better disrupt the flow of information to others. Thus, Lee et al. (2010) argue that betweenness best captures “power as influence”. However, the number of one’s direct connections might also count the number of people one can directly influence, and the closeness and eigenvector measures potentially then capture how easily one can persuade friends to influence friends. A range of strategic issues arises in either case, the modeling of which is beyond the scope of this study.

Also, sampling omissions can destabilize some measures more than others. Costenbader and Valente (2003, 2004) find degree centrality the most stable and eigenvector centrality the least stable. Because we may well miss some links between individuals in this network, sampling omission is a potential concern.

Given these conflicting and incompletely resolved issues, and the high empirical correlations between the four measures in our data, we follow Hossain et al. (2007) and employ composite measures. The two composite measures of an individual’s social power that we use in the tables include one dichotomous indicator and one continuous measure. The dichotomous composite social power measure requires a clear majority of the individual’s four centrality measure to concur that she is powerful. It therefore define individual i as *powerful* if three or more of her power centrality measures fall into the top quintiles of their distributions in year t.[8] That is,

$$[7] \qquad PD_{i,t} \equiv \begin{cases} 1 & \text{if } \delta(d_{i,t} \geq 80) + \delta(b_{i,t} \geq 80) + \delta(c_{i,t} \geq 80) + \delta(e_{i,t} \geq 80) \geq 3 \\ 0 & \text{otherwise} \end{cases}$$

If, in a given year, a firm’s director is both powerful ($PD_{i,t} = 1$) and independent, we say she is a powerful independent director (*PID*) at that firm that year.

The same individual’s continuous composite social power measure is the mean of her three highest power centrality percentile measures,

$$[8] \qquad p_{i,t} = \frac{1}{3}\left(b_{i,t} + c_{i,t} + d_{i,t} + e_{i,t} - min[b_{i,t}, c_{i,t}, d_{i,t}, e_{i,t}]\right).$$

The robustness section below shows that the results that follow are not dependent on these specific ways of combining the four individual power centrality measures into a composite measure. Reasonable alternatives to [7] and [8] generate very similar results. For example,

[8] All four of the centrality measures of 39.7% of directors in the firms we ultimately use in our regressions fall in the top quintiles of the centrality measures’ distributions based on all network nodes. This sample thus contains a disproportionate fraction of powerful directors. All four centrality measured tend to be high in unison. For example, only 6.7% of the directors in our sample make the top quartiles in only B_i, C_i and D_i; only 2% do so in only B_i, C_i and E_i; and a mere 1% do so in only B_i, D_i and E_i.

requiring all four individual measures to be in their top 20% in [7] and using the mean of all four measures in [8] generate identical patterns of signs and significance to those in the tables below. So does using the first principal component of $b_{i,t}, c_{i,t}, d_{i,t}$, and $e_{i,t}$. Using cut-offs slightly different from 20% also generates similar results.

3.6 Identifying Firms with Powerful Independent Boards

Aggregating to the firm-level, we designate firm *h*'s board as an *independent board* (IB) in year *t* if a majority of its directors are listed as independent directors in its disclosure documents, and record this with the firm-year indicator variable

[9] $$IB_{h,t} \equiv \begin{cases} 1 & \text{if a majority of firm } h\text{'s board are independent directors in year } t \\ 0 & \text{otherwise} \end{cases}$$

We then set the firm-level indicator variable $PIN_{h,t}$ to one if a majority of firm *h*'s independent directors are PIDs that year and to zero otherwise:

[10] $$PIN_{h,t} \equiv \begin{cases} 1 & \text{if a majority of firm } h\text{'s independent directors are PIDs in year } t \\ 0 & \text{otherwise} \end{cases}$$

The product of these is a third firm-level indicator variable flagging a *powerful independent board* (PIB) for firms with a majority of independent directors, a majority of whom are PIDs:

[11] $$PIB_{h,t} \equiv IB_{h,t} \times PIN_{h,t}$$

Thus, PIB_h is one in a given year for firm *h* if and only if most of its directors are *independent directors* and most of these are *powerful.*

The alternative continuous firm-level measure of *independent director centrality* is

[12] $$IDC_{h,t} = \frac{1}{m_{h,t}} \sum_{i=1}^{m_{h,t}} p_{i,t}$$

This variable is the mean across all $m_{h,t}$ of firm *h*'s independent directors in year *t* of the composite power centrality measure, $p_{i,t}$, as defined in [8]

Also, we say a firm has a non-CEO chair and set the indicator $NCC_{h,t}$ to one if firm *h*'s CEO does not chair its board that year, and to zero otherwise. To indicate whether or not firm *h* has a powerful non-CEO chair, we define

[13] $$PNC_{h,t} \equiv \begin{cases} 1 & \text{if individual } i, \text{not its CEO, chairs } h'\text{s board in year } t \text{ \& has} \\ & \delta(d_{i,t} \ \geq \ 80) + \delta(b_{i,t} \ \geq \ 80) + \delta(c_{i,t} \ \geq \ 80) + \delta(e_{i,t} \ \geq \ 80) \geq 3 \\ 0 & \text{otherwise} \end{cases}$$

Thus, firm *h* has a *powerful non-CEO chair* if the chair is powerful, in that at least three of her four centrality measures fall into the top quintiles of their distributions, and is not the CEO.

As a continuous analog of [13], we retain mean of the chair's top three individual power centrality measures, her $p_{i,t}$, if she is not also the CEO. We denote this firm-level variable $NCCC_{h,t}$, and set it to zero if the CEO chairs the board.

Finally, we analogously identify a firm as having a powerful CEO (PCEO) in year t if three or more of its CEO's four centrality measures fall within the top quintiles of their individual-level distributions that year. Thus, we define

$$[14]\ PCEO_{h,t} \equiv \begin{cases} 1 & \text{if } h'\text{s CEO in year } t \text{ is individual } i, \text{who has} \\ & \delta(d_{i,t} \geq 80) + \delta(b_{i,t} \geq 80) + \delta(c_{i,t} \geq 80) + \delta(e_{i,t} \geq 80) \geq 3 \\ 0 & \text{otherwise} \end{cases}$$

We also retain mean of the CEO's three highest power centrality measures, her $p_{i,t}$, and denote this firm-level variable $CEOC_{h,t}$. The S&P 1500 CEOs' mean composite social power is the 74th percentile of the individual-level distribution of composite social power; their median is the 80th. Table 2 lists and defines variables used in the tables below.

For each year from 1998 to 2009, Table 3 tallies fractions of firms with majority independent boards and powerful independent boards, fractions of firms that separate the CEO and chair jobs, and fractions of firms that appoint a powerful director as the non-CEO chair. The fraction of boards whose directors are mostly independent rises monotonically, as does fraction whose independent directors are mostly powerful. An increasing fraction of firms also separate the CEO and chair jobs and name a powerful director to be chair. The importance of powerful independent directors on key board committees also rises steadily through time.

3.7 Financial and Governance Data

We obtain financial accounting data from Compustat and stock return data from CRSP for our sample of S&P 1500 firms from 1999 to 2010. CEO compensation data are from ExecuComp and additional data on directors on S&P 1500 firms' boards are from Risk Metrics. These include her age and assignments to audit, nominating, and compensation committees. We require firms to have at least three years of financial data. Merging these with the dataset described above generates our final firm-year panel contains 15,889 firm-years spanning 1,956 firms.

We measure shareholder valuation by *Tobin's Q*, the book value of total assets plus the market value of common shares minus book value of equity and deferred taxes, all divided by the book value of total assets. We denote this $Q_{h,t}$.

Our main regressions include control variables known to affect Tobin's Q. These include variables shown elsewhere to correlate with Tobin's Q (Morck et al. 1988; Hall 1993; Yermack 1996): *size*, the logarithm of total assets; *leverage* (total debt over total assets), *profitability* (net operating cash flow plus depreciation and amortization over total assets); *growth* (net capital expenditure over net property, plant and equipment), and intangibles (*advertising* and *R&D* expenditure, both scaled by total assets and set to zero if unreported). We also control for key corporate governance variables shown elsewhere to affect Tobin's Q. These include the logs of *CEO age* (Morck et al. 1988) and *board size* (Yermack 1996), as well as the *e-index* of Bebchuk, Cohen, and Farrell (2009). The last is a composite index reflecting the absence or presence of economically important management entrenchment devices: supermajority rules for amending corporate charters, similar requirements for mergers, limits on amending bylaws, staggered boards, poison pills, and golden parachutes. All explanatory variables are lagged one year.

Tobin's Q in our sample of S&P 1500 firms has a mean of 1.58 and a standard deviation of 1.55. The average board has nine directors. Independent directors are a majority in 91% of all firm-year observations, but a majority of these are powerful in only 52% of all observations. The mean independent director centrality is at the 81^{th} percentile of its distribution based on all listed firms' directors and top managers. The summary statistics of the other variables accord other studies using these data. Details are provided in Appendix Table A2.

4. Empirical Results and Discussion

We hypothesize that a predominance of powerful independent directors might correlate with elevated shareholder value. In exploring this hypothesis, we also consider the presence of a powerful CEO, powerful non-CEO chair, or powerful non-independent directors.

4.1 Board Power Structure and Shareholder Valuation

Table 4 summarizes OLS regressions of Tobin's Q on industry and year fixed-effects and a standard set of control variables, allowing for firm-level clustering. The control variables attract typical coefficients and significance levels. Larger firms, larger boards, more levered firms, and firms with more entrenched managers (indicated by a higher *e-index*) all have significantly lower shareholder valuations. Firms with more capital investment, higher R&D spending, and higher profitability tend to have higher Tobin's Q.

Regressions 4.1 through 4.3 shows that shareholders attach a statistically significant valuation premium to firms with powerful independent boards, but not to firms with a powerful CEO or a powerful director other than the CEO chairing the board. Regressions 4.4 through 4.6 show that more powerful independent directors correlate with higher valuations, but that more powerful CEOs and non-CEO chairs do not. Regressions 4.7 and 4.8 include three firm-level power centrality measures, the discrete and continuous variants respectively, and show that only the power centrality of the independent directors correlates with higher shareholder valuations.

The coefficients on independent director power in Table 4 are highly economically significant. Regression 4.2 implies that shareholders attach a premium of 4.2% (0.0658 over the mean Q of 1.58) to the market value of a firm with a powerful independent board.

These results contrast starkly with otherwise similar regressions using standard measures of board independence and the separation of the CEO and chair roles. Panel A of Table 5 shows negative or insignificant coefficients for the fraction of directors designated independent in proxy statements, the dummy for a majority of directors so designated, and the dummy for a two-thirds majority of independent directors. These regressions suggest that powerful independent directors predominating correlates with elevated valuations, but that legally independent directors predominating does not. The dummy for the CEO not chairing the board is also insignificant.

Panel B of Table 5 compares powerful independent directors to powerful insider directors. Regressions 5B.1 and 5B.2 show that a majority of insider directors being powerful, a dummy constructed analogously to the $PIB_{h,t}$, dummy for a majority of independent directors being powerful, correlates with elevated valuation. Regressions 5B.3 through 5B.5 show that a powerful insider other than the CEO chairing the board also correlates with higher valuation, but a powerful independent director doing so does not. Regressions 5B.6 and 5B.7 run horseraces between all these indicators. These reveal both indicators to be highly significant. At face value, these results point to power mattering more than independence for directors, and power mattering for a non-CEO chairing the board, but only if the chair is an insider.

4.2 Identification Discussion

The panel regressions in Tables 4 and 5 are consistent with powerful independent directors, powerful non-independent directors, and powerful non-independent non-CEO chairs elevating shareholder valuations (direct causality). However, high valuations might also help firms attract and retain powerful directors (reverse causality), or other factors might both elevate shareholder valuations and draw powerful directors (latent factor causality). Controls proxying for plausible latent factors mitigate the last problem. This section undertakes a series of tests to distinguish direct from reverse causality.

The first is an event study of stock price reactions to directors' sudden deaths, which Nguyen and Nielsen (2010) argue are exogenous. LexisNexis and Google searches flag directors in our sample who die in office, and the date and the of death. We exclude deaths coincident with confounding events, such as earnings or M&A announcements, or the 9-11 attacks; as well as deaths after long illnesses. We define decedent directors as independent or not, and as powerful or not, as above. Cumulative abnormal returns (CARs) are daily total returns minus market model estimates, the parameters estimated using data for pre-event days -300 through -46. This exercise is repeated using value- and equal-weighted CRSP total market returns.

Figure 1 summarizes the event study results, defining abnormal returns as stock returns minus the CRSP equal-weighted index return. Firms' stock prices drop significantly and substantially on news of a powerful independent director's sudden death. In contrast, cumulative abnormal returns (CARs) are insignificant on news of other independent directors' sudden deaths and positive on powerful insider directors' sudden deaths.

Panel A of Table 6 begins a statistical investigation of the patterns in Figure 1 by replicating the findings of Nguyen and Nielsen (2010): on average, stocks fall on news of independent directors' sudden deaths. However, regardless of the event window, and of how the CARs are weighted, Panel A shows that stock prices drop only on news of the sudden death of a powerful independent director, and actually rise on news of the sudden death of a non-powerful independent director. Nguyen and Nielsen's finding is thus the average of two distinct effects. The panel reports market model CARs using CRSP value-weighted market returns. Equal weighted CARs make [-1, +2] difference between powerful and non-powerful independent director deaths insignificant ($p = 0.11$), but uniformly boost the point estimates and significance of the positive CARs around powerful insider director sudden deaths and the significance of the difference in CARs between powerful and non-powerful insider directors. In particular, the p-level for that difference drops from +0.12 to 0.08 for the [-1, +1] window.

Each column of Panel B summarizes a regression of CAR on main-effects of the decedent director being powerful (PD) and independent (ID), and on their cross product, which equals the powerful independent director (PID) indicator. The main-effect of the independent director dummy is uniformly insignificant, indicating that independent director sudden deaths do not move the stock price unless the decedent is powerful.

The main-effect of the powerful director dummy is uniformly positive and significant in three of the eight regressions. Because the regressions all also include the PID cross-product, these positive and intermittently significant main-effect coefficients indicate that stocks do not fall, and may even rise, on news of the sudden death of a powerful insider director. The interaction, the PID dummy, attracts a significant negative coefficient in every case, except the value-weighted analysis using the seven-day window [-3, +3], which attracts a similar point estimate with a p-level of 14%. The negative coefficients on PID are uniformly larger than the positive coefficients on PD, so the net reaction to powerful independent director deaths is negative. In the three regressions where PD attracts a significant positive coefficient, the net effect on news of the death of a powerful independent director is negative but insignificant. Thus, five of the eight regressions in Panel B suggest a negligible stock price reaction to the sudden death of a powerful insider director and a significant negative stock price reaction to the sudden death of a powerful independent director. The other three regressions point to a significantly positive reaction to the sudden death of a powerful insider director and negligible reaction to the sudden death of a powerful independent director. We have only twelve sudden deaths of powerful insider directors; but the mean cumulative abnormal return around these events is positive and significant, with CAR[-1,3] = 1.61% ($p = 0.02$), suggesting that powerful insider directors depress shareholder valuations.

These findings are consistent with interpreting Tables 4 and 5 as powerful independent directors elevating shareholder value and elevated shareholder value attracting more powerful insiders on the board. The effects in Panels A and B are economically significant. For example, the sudden death of a powerful independent director triggering a 2% drop share price drop implies a loss in shareholder value of over $200 million, given the average market capitalization of $11.64 billion in the relevant sample of firms.

Two caveats merit discussion: First, the event study results are valid only if sudden director deaths are exogenous. Nguyen and Nielsen (2010) make a strong case for exogeneity. Endogeneity would have directors dying because the share price moved. For example, directors might commit suicide because of impending bad news about the firm. The sudden deaths include four suicides – one by a powerful independent director and three by non-powerful independent directors. Rerunning all the event study tests dropping these observations generates result virtually identical to those in the tables and Figure 1. The sudden deaths include no murders, but some might go unreported.[9] The roughly two percent negative abnormal returns, though substantial to shareholders, seem insufficient to induce heart attacks or other adverse shocks sufficient to kill directors. Moreover, such an interpretation of our findings would have to explain why powerful independent directors die when the share price drops, other independent directors die randomly, and powerful insider directors die when the share price rises.

Second, the CARs gauge the value shareholders attach to powerful independent directors relative to likely replacements. Thus, normal returns might occur on powerful independent director deaths if shareholders expect equally powerful independent replacements. Succession studies reveal regressions to the mean in CEO ability (Brown 1982; Harrison, Richard & Max Bazerman. 1995), and shareholders might expect something analogous in director power. That is, unusually powerful directors would be replaced by directors of more average power. To explore this, we use Boardex director announcement data to identify the directors who replaced a random sample of 49 (40 independent and 9 non-independent) directors who suddenly died. A clear regression to the mean is evident. Powerful independent director's replacements are more powerful than average, but significantly less powerful than the deceased directors they replace.[10] Replacements are also significantly younger (mean age 55 at appointment) than the deceased directors (mean age 69 at death). Thus, shareholders might well expect very powerful independent directors' replacements to be more powerful than average, but less powerful than the decedents. If so, the CARs in Table 6 usefully predict the sign of the valuation shareholders attach to powerful independent directors, but may understate its magnitude.

A second approach employs Granger causality tests. The variable *X Granger-causes* the variable *Y* if lagged values of *X* significantly explain *Y* in regressions controlling for lagged values of *Y*. Here, *X* and Y are alternately a measure of director power and the firm's Tobin's Q, and the regressions use firm-level clustering and industry and year dummies.

Consistent with powerful independent directors Granger causing high shareholder valuations, the left panel of Table 7 shows all combinations of lags of the two independent

[9] We are grateful to an anonymous referee for suggesting this line of argument.
[10] We are grateful to Nagpurnanand Prabhala and Michael Weisbach for suggesting these tests.

director power measures, $PIB_{h,t}$ and $IDC_{h,t}$, significant in regressions explaining shareholder valuation. The right panel finds no evidence of shareholder valuations Granger causing the continuous independent director power measure, $IDC_{h,t}$; and only a three-year lag of the powerful independent board dummy, $PIB_{h,t}$, significant in regressions explaining Tobin's Q. In contrast, the right panel reveals high shareholder valuations Granger causing powerful non-independent directors and non-CEO chairs; while the left panel shows none of them Granger causing shareholder valuation.

Granger causality tests are circumstantial evidence of causality only. However, their consistency with the event study strengthens the case for powerful independent directors raising shareholder valuations.

As noted above, event study CARs can understate the true value shareholders attach to powerful independent directors if director power regresses to the mean around successions. The CARs might also mismeasure economic significance if further news about directors' true power emerges subsequently. Lengthening the event window can capture this, but adds noise from other shifting determinants of valuation. Granger causality tests can help detect causation, but are also ill-suited to quantifying economic significance. As a naïve first-pass, we run first differences of Q on lagged first differences in the number of powerful independent directors and controls from Table 4. The results (not shown) associate one additional PID with a statistically and economically significant five to six percent increase in shareholder valuation. In contrast, neither another powerful non-independent director (ΔPNID) nor gaining a powerful non-independent non-CEO chair correlates with a change in valuation, and a powerful independent director becoming chair actually correlates with a 2.5% drop in valuation.

The combined results of Tables 6 and 7 weigh in favor of more powerful independent directors elevating shareholder valuations, but of powerful non-independent directors and chairs not doing this. Identification is never conclusive in econometrics, but these exercises strongly favor interpreting Tables 4 and 5 as powerful independent directors boosting valuations and high valuations attracting powerful insider directors and non-CEO chairs.

4.3 How Powerful Independent Directors Matter

This section explores channels through which powerful independent directors might raise valuations. This exercise considers situations in which the potential for corporate governance problems is plausibly large and explores the importance of powerful independent boards in each.

M&A

Mergers and acquisitions rank among CEOs' most important decisions. Many acquisitions reduce bidder shareholder value, and boards not providing sound advice, or not reining in CEOs who ignore it, are often blamed (Moeller et al. 2004, 2005).

If powerful independent directors render boards more effective, their presence ought to check value-destroying M&A bids. However, Byrd and Hickman (1992) link board independence to low bidder abnormal returns; suggesting that legally independent directors do not help in this context. Nonetheless, powerful independent directors might behave differently.

A sample of acquisitions of listed firms by S&P 1500 firms from 2000 to 2009 for which Securities Data Company (SDC) data are available lets us estimate bidder cumulative abnormal returns (CARs) and overall shareholder valuation effects (size-weighted averages of bidder and target CARs). Cumulative abnormal returns are measured from three days prior to the announcement date until three days after it, and denoted CAR [-3, 3]. This exercise excludes acquirers with pre-acquisition majority ownership or post-acquisition ownership below 100% to eliminate effects associated with stalled takeovers. The final sample comprises 632 takeover bids by 379 distinct acquirers.

Table 8 presents OLS regressions of bidder CARs or bidder and target weighted average CARs on merger announcement on either the powerful independent board dummy, PIB, or mean independent director power centrality, IDC. Controls include the log of CEO age (Jenter and Lewellen 2011), the log bidder size (Moeller et al. 2004, 2005), the E-index entrenchment measure of Bebchuk et al. (2009), dummies for the target and bidder being in the same industry (Morck, Shleifer, and Vishny 1990) and for the payment being primarily in the bidder's stock (Myers and Majluf 1984), as well as year and bidder industry fixed-effects. Also, the size of the deal is measured as deal value over bidder size in regressions explaining the bidder CAR, but as deal value over combined size in regressions explaining the combined CAR. Finally, because El-Khatib, Fogel, and Jandik (2015) find firms with better-connected CEOs more prone to launch value-destroying M&A bids, we control for the dummy indicating a powerful CEO, $PCEO_{h,t}$, in regressions where the dummy $PIB_{h,t}$ measures independent director power, and for the continuous CEO power centrality measure, $CEOC_{h,t}$, in regressions where the continuous variable $IDC_{h,t}$ measures independent director power. In general, the controls attract coefficients consistent with prior studies. In particular, the CEO power measures are significant and negative, with point estimates consistent with El-Khatib et al. (2015).

The coefficients of interest show acquirers with powerful independent boards making statistically and economically significantly better M&A decisions. A powerful independent board correlates with a bidder CAR higher by 1.6% and a combined CAR higher by 1.5%. Given number and sizes of the deals in our sample, this constitutes an economically significant addition of $498 million to acquirer shareholder wealth and of $495 million to overall shareholder wealth.

Free Cash Flow

Jensen (1986) argues that self-interested managers are apt to retain earnings and invest excessively from shareholders perspective, and thus to pay lower dividends than shareholders would prefer. This free cash flow agency problem is more evident in firms with lower shareholder valuations, higher cash flows, and lower dividend payouts (Lang and Litzenberger 1989; Lang, Stulz, and Walkling 1991; La Porta et al. 2000). Our proxy for likely free cash flow problems is therefore an indicator variable set to one if the firm has all of the following: a below median Tobin's Q, an above median cash flow to property, plant and equipment ratio, and a below median dividend payout ratio; and to zero otherwise.

Jensen (1986) argues that free cash flow agency problems are larger in firms where boards are less effective in advising and monitoring the CEO. To explore this, Table 9 presents probit regressions of the likely free cash flow problem dummy on either the powerful independent board dummy, $PIB_{h,t}$, or the continuous independent director power centrality variable, $IDC_{h,t}$. As in previous studies, lower leverage and greater managerial entrenchment also correlate significantly with likely free cash flow problems.

Consistent with Jensen's argument, both independent director power measures attract significant negative coefficients. The point estimates are economically significant. For example, a powerful independent board corresponds to a 22% lower likelihood of a firm being designated as likely to suffer from free cash flow problems.

CEO successions and pay

Weisbach (1988) reports weak past financial performance increasing the odds of forced CEO exit in firms with more independent boards.[11] To investigate forced CEO successions, we follow Vancil (1987), who argues that a board satisfied with the departing CEO generally selects a senior officer – one of the old CEO's team - as successor so as to disturb existing policies as little as possible. Vancil views a new CEO from outside as reliably indicates dissatisfaction with the status quo. To exclude normal CEO retirements, we follow Morck *et al.* (1990) in using a subsample of CEO successions with departing CEOs aged 60 or younger. We flag as *abnormal successions* firm-year observations in which a successor from outside the firm replaces a CEO aged 60 or younger.

Table 10 presents probit regressions of a dummy variable, set to one for abnormal successions and zero otherwise, on the firm's total stock return the prior year, $RET_{h,t-1}$, an independent director power measure, and, following Weisbach (1988), their interaction. The alternative power measures are: the powerful independent board dummy, $PIB_{h,t-1}$, a powerful independent nominating committee dummy variable, $PIBN_{h,t-1}$, set to one if a majority of the independent directors on the nominating committee are powerful independent directors (PIDs), the continuous mean independent director centrality measure, $IDC_{h,t-1}$, and an analogously defined mean of the power measures of independent directors on the nominating committee, $IDCN_{h,t-1}$. Weisbach (1988) argues that the coefficient on the interaction reflects the board's propensity to fire an underperforming CEO. In Table 10, these coefficients are uniformly negative, and two of the four, those of the interactions of lagged stock returns with $PIB_{h,t-1}$ and $PIBN_{h,t-1}$ are statistically significant.

To assess economic significance, we follow Norton, Wang, and Ai (2004) and construct distributions of firm-year observation-level estimated changes in the conditional probability of forced CEO turnover per unit change in past stock return - first with, and then without, a powerful independent board or nominating committee. The differences in the distributions' means range from -20.8% to -0.863% using 10.1; and from -24.8% to +0.264% using 10.2. The means of the implied interactions are -18.3% and -21.2% for 10.1 and 10.2, respectively; and both are statistically significant. Their economic significance can be summarized as follows: The mean change in the predicted conditional probability of a forced CEO turnover, given a one unit worse past return (i.e. a return of -50% versus +50% return), is about eighteen percentage points

[11] See also Warner, Watts and Wruck (1988). These findings are extensively replicated and extended (e.g. Parrino 1997; Goyal and Park 2002; Hermalin and Weisbach 2003; Hazarika et al. 2012; Kaplan and Minton 2012).

higher with a powerful independent board than without one, all else equal. The equivalent difference in 10.2 is a twenty-one percentage point higher probability of a forced CEO turnover with a powerful independent nominating committee versus without one, all else equal. Including additional controls for CEO power and non-CEO chair power and independence leaves the results in the table virtually unchanged, and the added controls are uniformly insignificant.

Other regressions (not shown) explain logs of cash, equity, and total CEO pay, all from ExecuComp, with the interaction of the prior year's stock return with one of: the $PIB_{h,t}$ dummy; the continuous independent director power measure, $IDC_{h,t}$; a powerful independent compensation committee dummy, $PIBC_{h,t}$, set to one if firm h's compensation committee has a majority of PIDs in year t and to zero otherwise; or the mean power centrality of all the independent directors on that committee that year, $IDCC_{h,t}$. In each case, the purpose is to see if past stock returns correlate more strongly with CEO pay in firms which more powerful independent directors in general or on the compensation committee.

All of these regressions control for the main effects of the independent director power measure used, the prior year stock return (Murphy 1985), CEO power (Renneboog & Zhao 2011; Engelberg et al. 2013; El-Khatib et al. 2015), CEO age (McKnight 2000), the E-index for CEO entrenchment (Bebchuk, et al. 2009; Borokhovich et al. 1997; Core et al. 1999), firm size (Murphy 1985), board size (Yermack 1996), leverage (Ortiz-Molina 2007), profitability (Deckop 1988), and capital and R&D spending (Cheng 2004). The control variables' coefficients and p-levels all affirm previous results. Notably, the independent director power main effects show more powerful independent boards and compensation committees paying CEOs more in total, in equity-linked pay, and in cash pay. These findings elaborate on the positive link between CEO pay and director independence found by Ryan and Wiggins (2004) by showing independent director power to matter as well. We also reproduce the positive link between CEO power and all measures of CEO pay found by Renneboog and Zhao (2011) Engelberg et al. (2013), and El-Khatib et al. (2015).

The coefficients of interest, those on the interactions of independent director power with the prior year's stock return, are only intermittently positive and significant in explaining equity-linked and are insignificant in regressions explaining total pay and cash compensation. Insignificant main effects on the prior year's stock returns suggest that even that tenuous link is absent in firms whose boards and compensation committees contain relatively few powerful independent directors or relatively powerless independent directors.

In summary, CEO pay may be more performance-related if the full board or compensation committee is more powerful independent director-dominated, but these findings are not robust to different measures of independent director power. However, more powerful independent directors dominating the full board or nominating committee does boost the odds of an underperforming CEO being fired and replaced by an outsider, rather than a member of the CEO's team, an outcome Vancil (1987) characterizes as a rebuff to the CEO.

Earnings Management

Empirical evidence links more earnings manipulation to less effective internal controls (Doyle et al. 2007), less disciplinary executive turnover (DeAngelo 1988; Dechow and Sloan 1991), and less independent boards and audit committees (Klein 2002). We estimate abnormal earnings accruals following Jones (1991), but adjusting for growth in credit sales (Dechow et al. 1995), and benchmarking against control firms – those with the closest ROA in the same industry that year (Kothari et al. 2005).

Each regression in Table 11 explains abnormal earnings accruals with an independent director power measure: either the dummy $PIB_{h,t}$ or the continuous measure $IDC_{h,t}$ for the full board; or their analogs gauging the power of independent directors on the audit committee, the dummy variable $PIBA_{h,t}$ and the continuous measure $IDCA_{h,t}$. The table reveals significantly lower abnormal accruals in firms with powerful independent boards or audit committees in five of the eight specifications, and coefficients bordering on significance ($p \approx 0.11$) in two more. The point estimate in 11.1 is economically significant: it corresponds to roughly half the overall mean of the abnormal accruals measure. The coefficients on the controls show more earnings management if the CEO is older or less powerful, or if the firm undertakes less capital investment. Reported earnings are also higher in firms that manage earnings more aggressively. These findings are consistent with powerful independent directors elevating shareholder valuations by limiting earnings management.

5. Robustness Checks

The results above survive a battery of robustness checks, in that re-estimating the tables using alternative estimation approaches, variable constructions, and other reasonable variants yields qualitatively similar results. By this, we mean the powerful independent director measures' coefficients have patterns of signs and significance identical to those in the tables and magnitudes consistent with those in the tables. The results fail a few specific robustness checks, thereby highlighting aspects of the social network that appear critical. The following applies to all of the tables, except where specific table numbers are mentioned.

The results are not driven by outliers. All continuous variables are windsorized, and outlier tests reveal no observations with undue influence.

The results are not driven by the general way we build the social network. The power centrality measures in the tables assume connections formed in one year persist thereafter. As robustness checks, we construct alternative networks assuming connections form only after three years of overlap, assuming connections break after five years of non-overlap, and both. Qualitatively similar results to those in the tables ensue in each case.

However, the results are not robust to using only current interlocks on S&P1500 boards to define connections. Using only current connections formed at all firms (S&P 1500 firms and non-S&P1500 firms) generates qualitatively similar results, except that IDC loses significance in explaining the combined bidder plus target abnormal return in Table 8 and the PIB interaction with prior return loses significance in explaining forced CEO turnover in Table 10. Using current and past service together at large (S&P1500) firms preserves some results, but the IDC power measure loses significance in Table 4 and neither measure remains significant in Tables 7, 8 and 11. Using only current service together at S&P1500 firms – that is, dropping both connections formed through past work together anywhere and connections formed at non-S&P1500 boards – leaves a much sparser network in which virtually none of the results survive. Redefining "powerful" independent directors to include only the top 10%, 5% or 1% of the power centrality measures distributions in this network does not restore the results. Non-robustness here may be economically meaningful: current interlocks on S&P1500 boards work well as measures of director busyness (Ferris et al. 2003; Fich and Shivdasani 2006). Power centrality in the denser and larger network used in the tables may better reflect director power. The two are very different concepts, so a lack of robustness is reasonable.

The results are not driven by the precise ways we define individuals' social power. The tables define a powerful independent director (PID) as having at least three of the four centrality measures in the top quintiles of their empirical distributions, constructed using the centrality measures of all officers and directors of listed firms covered by BoardEx. Using the top 15% or 25%, rather than top quintiles, of the distributions also generates qualitatively similar results. Qualitatively similar results also ensue if we use top quintiles of distributions based on all officers and directors of both listed and unlisted firms, rather than of listed firms only.

Qualitatively similar results to those in all the tables ensue if we require all four power centrality measures to be in their top quintiles to classify an individual as powerful: the number of powerful independent directors falls, the Table 6 significance levels improve, however the PIB dummy in Table 4 and Panel B of Table 5 loses significance. Otherwise, the results are qualitatively similar to those in the tables. All of the tables are robust to redefining the continuous independent director power centrality measure as the mean across independent directors of the means of all four of their individual social power measures, rather than of the means of their three highest social power measures.

The results are not driven by the precise way we combine individual independent directors' power measures to construct overall independent director power measures at the firm-level. The tables are robust to changing the fraction of independent directors who must be powerful for the indicator variable $PIB_{h,t}$ to be one. Other reasonable values, such as 3/5, 2/3, 3/4, or 4/5, yield qualitatively similar results. Using a *PID ratio*, defined as the fraction of independent directors who are powerful, also yields results qualitatively similar to the tables. Principal components analysis is another approach to estimating a single summary power measure for each individual from her four power centrality measures. At the director-year level, the resulting first principal component captures 86% of the variation of the four rescaled centrality measures (b_i, c_i, d_i and e_i,). The first principal component using the raw centrality measures (B_i, C_i, D_i and E_i,) accounts for 62% of their total variance. In both cases, the first principal component approximates an equally weighted mean of the four individual centrality measures. Substituting the mean first principal component values of the firm's independent directors, constructed using either the four raw centrality measures or the four percentile centrally measures, for $IDC_{h,t}$ in regressions explaining Q generates results qualitatively similar to the tables. The first principal component estimate of CEO power, if also included in these regressions, is insignificant.

The results are not driven by the time window. However, using different windows exposes the Sarbanes-Oxley (SOX) reforms, implemented in 2003, as a possible institutional break-point.[12] Post-SOX data yield results qualitatively similar to those in the tables. In contrast, the pre-SOX subsample generates insignificant coefficients in Table 4 and Panel B of Table 5, though Panel A of Table 5 is preserved. As a further robustness check, we run year-by-year cross-section regressions for each of 2000 through 2010 using the Table 4 specifications. The coefficients on PID and IDC are always positive, but attain significance only intermittently – PID in 2007, 2009 and 2010 and IDC in 2001, 2003, 2005, 2007 and 2010. The lack of significance in the cross sections and pre-SOX subsample may reflect fewer observations.

The specific way we estimate Tobin's Q does not drive our results. The tables take Tobin's Q as the book value of total assets plus the market value of common shares minus the book values of equity and deferred taxes, all divided by the book value of total assets. As a robustness check, we recalculate Tobin's Q using as numerator the sum of market value of common shares, book value of short-term and long-term debts, liquidation value of preferred shares, and deferred taxes and investment tax credit, while using the same denominator: total book assets. Qualitatively similar results ensue.

The regressions cluster standard errors by firm to control for firm-level persistence and include industry fixed-effects to control for unobserved time invariant latent industry-level factors. Clustering by industry, which also allows for cross-correlations among firms within each industry, generates qualitatively similar results to those in the tables.

The results are not dependent on the inclusion of the control variables; though dropping them also provides additional information. Dropping the control variables and retaining only year and industry fixed-effects generates qualitatively similar results to those in the tables, except that a powerful CEO becomes significantly associated with higher Tobin's Qs. Restoring the controls one-by-one reveals R&D spending critical in rendering the CEO's power insignificant. R&D intensive firms have both unusually high Tobin's Q and unusually powerful CEOs. However, including both variables leaves R&D still significant and CEO power insignificant. Powerful CEOs have a higher median age, but dropping the CEO age variable does not qualitatively change the results.

Controlling for other board characteristics does not change the results. Including a dummy for an *intensive monitor board*, which Faleye et al. (2012) define as having a majority of independent directors on at least two of its three main monitoring committees, does not

[12] We are grateful to Nagpurnanand Prabhala for suggesting these tests.

qualitatively change the results. No qualitative changes ensue from including a dummy for a *busy board*, which Fich and Shivdasani (2006) define as a board in which a majority of independent directors serve on three or more other boards. Including a measure of independent director *experience*, defined as in Kang (2014) as the independent directors' mean years of experience on boards of publicly traded companies also leaves our results qualitatively unchanged. Controlling for high independent director share ownership (Bhagat and Bolton 2013) also generates results qualitatively similar to the tables. Controlling for the experience or share ownership of all directors, rather than just independent directors, likewise leaves our results qualitatively unchanged.

Table 8, which shows the positive link between powerful independent directors and bidder and total M&A announcement CARs, is subjected to additional robustness checks. The Table 8 regressions include CEO power measures because El-Khatib et al. (2013) find that CEOs with high social network centrality supervise value destroying M&A activity. Table 8 is the sole set of results in which CEO power is significant. Moreover, not including CEO power in Table 8 leaves the $PIB_{h,t}$ dummy insignificant and the continuous independent director power measure, $IDC_{h,t}$, insignificant in explaining bidder returns and significantly (p = 0.08) negative in explaining combined bidder and target returns. These results suggest that the interplay between powerful CEOs and powerful independent directors may be uniquely important in takeover bids. Including all the control variables in Table 4 in the Table 8 regressions yields qualitatively similar results; and the additional control variables are all insignificant. Including variables from Table 5 – the indicator variables or continuous power centrality measures for powerful non-independent directors and/or independent and/or non-independent non-CEO chairs – in these regressions also yields qualitatively similar results, and the additional power measures are again all insignificant, save that the powerful non-independent board dummy, $PNIB_{h,t}$, attracts a negative and significant sign if $PCEO_{h,t}$ is dropped.

Including CEO power measures in Tables 9 and 10 generates qualitatively similar results to those shown. Tables 8, 9 and 10 are robust to including the extra explanatory variables used in Table 4. Qualitatively similar results also ensue after including a dummy for a powerful director other than the CEO chairing the board and/or dummies for that individual being independent or not.

Table 10 drops CEO successions where the departing CEO is over 60 to exclude normal

CEO retirements and ensure that an outsider as successor more reliably indicates a forced turnover event. Using 65, rather than 60, renders the coefficients associated with powerful independent directors insignificant, as does using all CEO turnover events regardless of the exiting CEO's age.

6. Conclusions and Potential Implications

Collectively, these results are consistent with powerful independent directors elevating shareholder valuations, in part at least, by deterring value-destroying CEO decisions such as economically unsound merger bids and excessive free cash flow retention, by forcing out underperforming CEOs and meaningfully linking CEO pay to firm performance, and by discouraging earnings manipulation. The results are also consistent with independent directors who are not powerful failing to do these things.

These findings extend the use of social power measures in finance beyond the pioneering work of Hwang and Kim (2009), who show that CEOs with strong social ties to their independent directors have more scope for self-interested behavior. We use social power measures in an entirely different way that highlights director heterogeneity. These findings thus supplement other work on other forms of director heterogeneity (e.g. Ferris et al. 2003; Faleye et al. 2012; Knyazeva et al. 2013).

The high incidence of powerless independent directors in the data is consistent with many CEOs selecting independent directors for timidity (Mace 1971; Hwang and Kim 2009). Post mortems of corporate governance shipwrecks suggest this has not changed greatly in many boards, often describing corporate cultures that equated dissent with disloyalty. For example, an Enron executive describes an "atmosphere of intimidation" in which many worried about the firm, but none dared confront the CEO (Cohan 2002). We posit that more powerful independent directors are less apt to be timid "yes men" in such situations because their social networks provide information that lets them more reliably identify CEO waywardness as well as influence that lets them more effectively challenge a wayward CEO.

Our findings support models of director decision-making based on behavioral finance (Bebchuk and Fried 2006, p. 4) or bounded rationality.[13] For example, our findings are

[13] See Bernardo and Welch (2001). Obedience to a leader or group is arguably a form of bounded rationality, akin to an information cascade (Banerjee, 1992; Bikhchandaqni et al. 1992).

potentially consistent with Kahneman's (2011) thesis that people default to "rule of thumb" decision making (thinking fast) and resort to the more metabolically costly rational analysis of alternative options (thinking slow) only if thinking fast fails to converge. Here, the rule of thumb (acquiescing to the CEO) fails to converge if other credible authorities (a sufficient number of sufficiently powerful independent directors) voice disagreement. This interpretation of our findings is also supported by work in social psychology. Milgram (1967, 1974) finds that humans reflexively obey authority, and cites Darwin's (1871) thesis that such a reflex elevated the survival odds of prehistoric hominids and therefore may be biologically innate. However, he also finds that voiced dissent, especially if the voice carries authority, can interrupt unthinking obedience. Voiced dissent also interrupts conformity to group opinions (Asch 1951) and other forms of "groupthink" (Janis 1971). We posit that more powerful independent directors constitute a more informed and credible potential voice of dissent, and can more reliably interrupt reflexive obedience to a wayward CEO in the full board and in board committee.

Our regressions include year fixed-effects, and consequently net out any overall time trend. However, the rising incidence of powerful independent directors in Table 3 is consistent empirical findings (Gompers, Ishii, and Metrick 2003; Kaplan and Minton 2012; Bebchuk et al. 2013) suggesting a secular shift in the balance of power favoring public shareholders over corporate insiders in large US listed firms in these years.

To the extent that shareholder value maximization is a public policy objective, corporate governance regulations might be evaluated for their ability to instill optimal dissent in boards. Obviously, boards cannot be debating societies. CEOs selected for expertise necessarily know things others do not, and excessively active boards can unduly curtail trailblazer CEOs (Adams, Almeida, and Ferreira 2005). Our findings suggest that reforms to director nomination and selection processes might be evaluated, in part at least, for their propensity to screen out "yes men" while protecting legitimate CEO discretion.

Finally, our results suggest a framework for analyzing business ethics in corporate boards. Hirschman (1970) explains that people, confronted with unethical or inept behavior in an organization, have three response options: exit, voice, and loyalty. By selecting independent directors for impotence, a discreditable CEO leaves them only two choices: exit (resignation) or loyalty (becoming a "yes man"). As Milgram (1974) discusses at length, the "loyalty" option typically does not nullify the individual's ethical sense. Milgram's subjects administered electric shocks to a stranger (a confederate) when ordered to do so, and explained their actions as "doing my duty", "doing what was expected of me", "loyalty to the experimenter", and "not making a scene" in exit interviews.[14] Milgram describes this behavior as an *agentic shift* - a deontological (duty-based) norm displacing a teleological (outcomes-based) norm, rather than as a suspension of ethical norms.[15] In boards, "yes men" directors might come to view themselves as more ethical if they better fulfill their duty to support their CEO. Discussions of business ethics on boards might usefully consider the economic implications of deontological ethics and the feasibility and implications of fostering teleological ethical thinking.

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[14] These results are extensively replicated (see Blass 2004; Packer 2008; Morck 2009, 2010).

[15] See Sheridan and King (1972); Martin et al. (1976); Miller (1986); Merritt and Helmreich (1996); Blass (1998, 2000, 2004); Tarnow (2000) and others. Burger (2009) reproduces the agentic shift, but not its interruption; and acknowledges this may reflect their more limited experimental framework.

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Figure 1: Cumulative abnormal returns on news of director sudden deaths

Directors are classified as powerful (three of their four power centrality measures lie in their distributions' top quintiles) or not, and as legally independent (as reported by RiskMetrics) or not. This partitions decedent directors into four groups. Cumulative abnormal returns are total returns minus market model estimated returns using the CRSP value-weighted return to proxy for the market. Market model parameters are estimated using data from days -200 to -46, with day 0 the date of the sudden death of one of its directors.

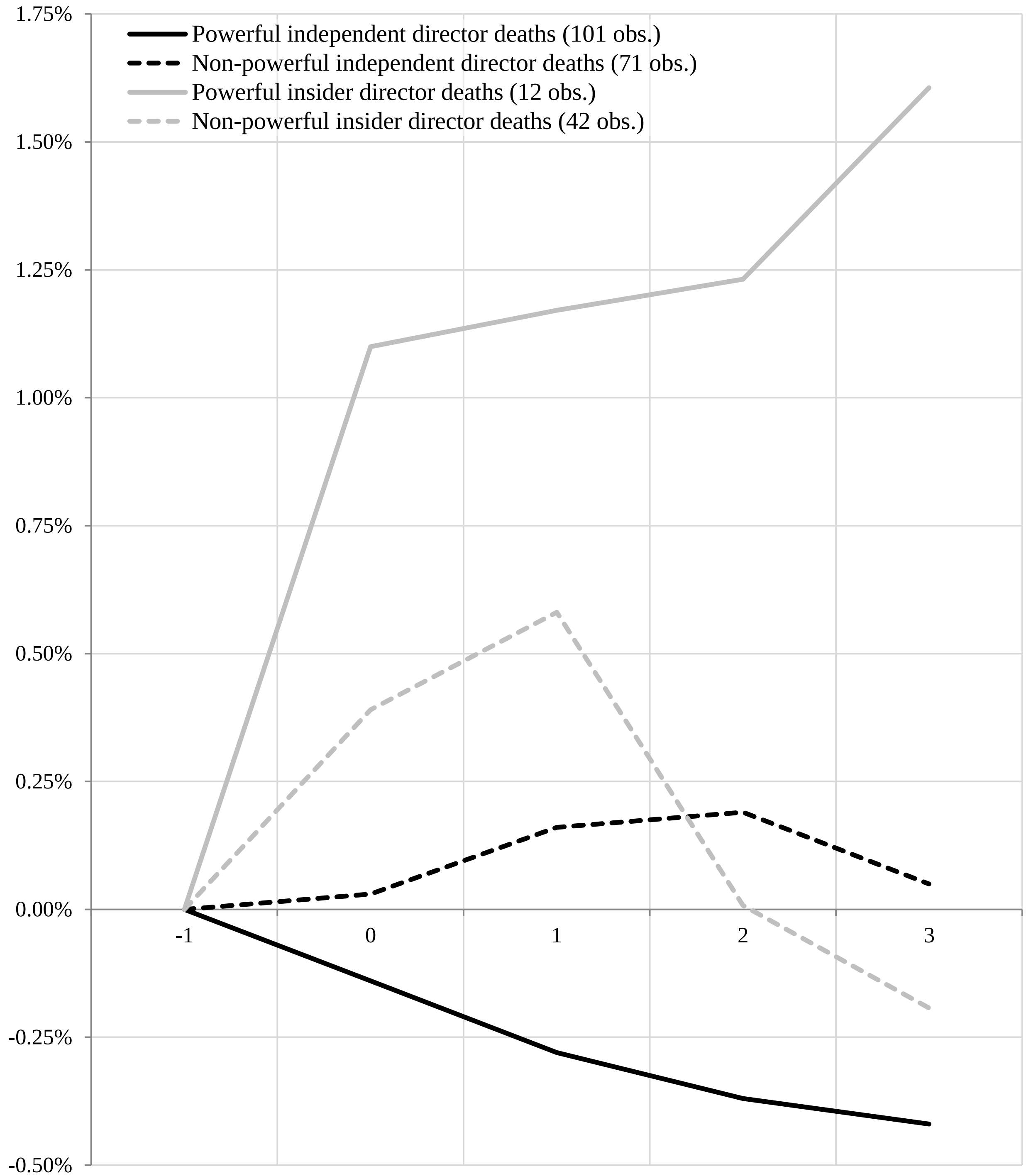

Table 1: S&P 1500 Officer and Director Power Centrality Measure Characteristics

Power centrality measures are based on a social network whose nodes all individual directors and executives included in Boardex. Connections between two individuals in the network form when they serve at the same listed firm in the same year and persist thereafter. The network is followed from 1998, when it has 191,049 individual nodes and 5,438,006 connections between nodes, to 2009, when it has 313,958 nodes and 11,639,006 connections. Each individual's four power centrality measures are: degree centrality (no. of direct connections), closeness centrality (mean degrees of separation from all others in the network), betweenness centrality (no. of shortest paths of connections linking other pairs of people that pass through her), and eigenvector centrality (a recursive measure in which each individual's social power as a weighted average of the social power of her direct connections). Statistics describe the 19,223 unique S&P 1500 firm directors only, a panel of 132,020 director-years from 1998 to 2009. Panel A summarizes their raw power centrality measures; Panel B summarizes their power centralities' positions within the full network. Panel C presents Pearson correlation coefficients, clustered at individual level, of the individual centrality measures with each other. The upper triangle (above the diagonal line) uses raw measures and the lower triangle (numbers in italics) uses percentile measures. All correlation coefficients are significant at 1% or better. More detail is provided in Appendix Table A1.

Panel A: Characteristics of Raw Power Centrality Measures

		Mean	Std. Dev.	Min	25th	Median	75th	Max
Betweenness	B_i	0.00973%	0.0229%	0.00%	0.000147%	0.00216%	0.00905%	0.677%
Closeness	C_i	25.3%	3.20%	0.000688%	23.2%	25.4%	27.6%	34.4%
Degree	D_i	197	245	1	43	104	245	2,211
Eigenvector	E_i	0.0581%	0.371%	0.00%	0.000129%	0.00213%	0.0117%	4.15%

Panel B: Characteristics of Power Centrality Measure Percentage Ranks

		Mean	Std. Dev.	Min	25th	Median	75th	Max
Betweenness	b_i	79.8	25.7	1	73	90	98	100
Closeness	c_i	78.2	21.3	1	66	85	95	100
Degree	d_i	77.0	22.4	1	63	86	95	100
Eigenvector	e_i	76.5	20.9	1	65	81	94	100

Panel C: Pearson Correlation of CEO and Director Centrality Measures

		Betweenness	Closeness	Degree	Eigenvector
Betweenness	b_i	1.00	0.388	0.780	0.273
Closeness	c_i	*0.748*	1.00	0.616	0.232
Degree	d_i	*0.809*	*0.887*	1.00	0.501
Eigenvector	e_i	*0.677*	*0.942*	*0.813*	1.00

Table 2: Variables and Definitions

Variable	Definition
Measures of Director Independence and Power	
Independent Board (IB)	Annual firm-level dummy set to 1 if over 50% of directors are so listed in proxy, 0 otherwise.
Powerful Director (PD)	Director-level variable set to 1 if at least three of director's four centrality measures are in their distributions' top quintiles
Powerful Independent Director (PID)	Annual firm-dependent director-level dummy set to 1 if director is both powerful (PD = 1) and listed as independent in proxy, 0 otherwise
Powerful Non-Independent Director (PNID)	Firm-dependent director-level dummy set to 1 if director is both powerful (PD = 1) and listed as a non-independent (insider) in proxy, 0 otherwise
Powerful Independent Board (PIB)	Annual firm-level dummy set to 1 if board is both an independent (IB = 1) and majority of independent directors are powerful independent directors, 0 otherwise
Powerful Non-Independent Board (PNIB)	Annual firm-level dummy set to 1 if majority of insider directors are powerful, 0 otherwise
Independent Director Centrality (IDC)	Annual firm-level mean of means of each independent director's highest 3 centrality measures
Non-Independent Director Centrality (NIDC)	Annual firm-level mean of means of each non-independent director's highest 3 centrality measures
Measures of Chair Independence and Power	
Non-CEO Chair (NCC)	Annual firm-level dummy set to 1 if CEO does not chair board, 0 otherwise
Non-CEO Chair Centrality (NCCC)	Annual firm-level variable equal to mean of chair's top 3 percentile centrality measures if CEO is not chair, 0 otherwise
Powerful Non-CEO Chair (PNC)	Annual firm-level dummy set to 1 if chair is powerful director (PD = 1) and not CEO, 0 otherwise
Powerful Independent Non-CEO Chair (PINC)	Annual firm-level dummy set to 1 if chair is powerful independent director (PID = 1), 0 otherwise
Powerful Non-independent Non-CEO Chair (PNINC)	Annual firm-level dummy set to 1 if chair is powerful non-independent director (PNID = 1) and not CEO, 0 otherwise
Independent Non-CEO Chair Centrality (INCC)	Annual firm-level variable equal to mean of chair's highest 3 percentile centrality measures if chair is an independent director, 0 otherwise
Non-independent Non-CEO Chair Centrality (NINCC)	Annual firm-level variable equal to mean of chair's highest 3 centrality measures if chair is non-independent director other than CEO, 0 otherwise
Measures of CEO Power	
Powerful CEO (PCEO)	Annual firm-level dummy set to one if CEO is *powerful*, in that at least three of her four centrality measures are in their distributions' top quintiles
CEO Centrality (CEOC)	Annual firm-level variable equal to the mean of the CEO's highest 3 percentile centrality measures
Regression Variables (all are annual firm-level variables)	
Tobin's Q (Q)	Book value of assets minus book value of equity plus market value of equity minus deferred tax obligations, all over book value of assets

CEO Age (CEOA)	CEO age
Board Size (BSIZE)	Total number of directors on board
E-Index (ENDX)	Entrenchment Index (Bebchuk, Cohen, and Ferrell 2009)
Assets (ASSETS)	Total assets, in billions of dollars
Leverage (LEV)	Total debt over total assets
Probability (PROF)	Net income over total assets
Tangibility(TANG)	Property, Plant, and Equipment over total assets
Capital Investment(CAPEX)	Net Capital expenditure over last year's property, plant and equipment
Cash Flows(CF)	The sum of net income, depreciation, and amortization over last year's property, plant and equipment
Research & Development (R&D)	Research & Development expense over total assets
Advertising (ADV)	Advertising expense over total assets
Event Study Variables	
Cumulative Abnormal Return (CAR)	Stock's daily return minus NYSE/AMSE/NASDAQ value-weighted market return, compounded
Sudden Death (DEATH)	Firm dummy set to one on date of a powerful independent director sudden death and zero otherwise
Measures of Changing Independent Director Power (all are annual firm-level variables)	
PID Addition (PIDA)	Dummy set to 1 if at least one new PID joins the board and 0 otherwise
PID Deletion (PIDD)	Dummy set to 1 if at least one new PID leaves the board and 0 otherwise.
Measures of Independent Directors' Power in Specific Decisions	
Powerful Independent Nominating Committee (PIBN)	Dummy set to 1 if majority nominating committee are powerful independent directors, 0 otherwise
Powerful Independent Auditing Committee (PIBA)	Dummy set to 1 if majority auditing committee are powerful independent directors, 0 otherwise
Powerful Independent Compensation Committee (PIBC)	Dummy set to 1 if majority compensation committee are powerful independent directors, 0 otherwise
Centrality of Nominating Comm. Members (IDCN)	Mean of the top 3 centrality measures for independent directors on nominating committee
Centrality of Auditing Comm. Members (IDCA)	Mean of the top 3 centrality measures for independent directors on auditing committee
Centrality of Compensation Comm. Members (IDCC)	Mean of the top 3 centrality measures for independent directors on compensation committee
Other variables	
Bidder Return (BRET)	Cumulative Abnormal Return between [-3, +3] to a bidder upon merger announcement
Combined Return (CRET)	Cumulative Abnormal Return between [-3, +3] to the combined entity, calculated as the asset weighted CARs of the bidder and the target, upon merger announcement
Free Cash Flow (FCF)	Annual firm-level dummy set to 1 if cash flow exceeds 2-digit SIC industry median, dividend payout is below 2-digit SIC industry median, and Tobin's Q exceeds 2-digit SIC industry median.
Stock Return (RET)	Annual firm-level variable equal to its stock's total return minus the CRSP value-weighted market total return
Earnings Manipulation (EM)	Annual firm-level variable equal to absolute value of discretionary accruals from modified Jones model

Table 3: Characteristics of Independent Directors, Committees, Chairs and CEOs

No. firms is number of S&P 1500 firms in sample each year. Board characteristics include: PCEO is set to one if the CEO is designated as powerful, that is having at least three of her four power centrality measures lying in the top quintiles of their overall distributions. PCEO is one if the CEO is designated as powerful. BSIZE is the number of directors on the board; NID is the number of directors designated independent in the firm's SEC filings, and IB is one for firms with a majority of independent directors and zero otherwise. NPID/ID is the fraction of independent directors designated as powerful and PIB is one for independent boards in which a majority of independent directors are powerful. Board chair characteristics are: NCC, set to one if the CEO is not the chair and to zero otherwise, and PNC, set to one if NCC is one and if the non-CEO chair is designated as powerful. Board committee characteristics are the means of dummies set to one if majorities of the Audit, Compensation and Nominating committee members are powerful independent directors.

		Directors on full boards					**Independent director power on**			**CEO**	**Board Chair**	
		No. of directors	Director independence		Independent director power		Audit committee	Compensation Committee	Nominating Committee	CEO power	Non-CEO as chair	Powerful Non-CEO as chair
Year	*No. Firms*	*BSIZE*	*NID/BSIZE*	*IB*	*NPID/ID*	*PIB*	*PIBA*	*PIBC*	*PIBN*	*PCEO*	*NCC*	*PNC*
1998	1,110	9.74	58.7	76.9	34.5	42.3	43.6	49.1	31.4	44.7	30.5	17.7
1999	1,233	9.58	61.8	80.2	36.2	43.8	46.0	50.4	31.8	46.4	29.9	17.2
2000	1,343	9.44	63.3	81.9	37.8	45.1	48.9	51.6	33.8	46.4	30.8	18.0
2001	1,327	9.42	65.5	86.1	39.8	49.4	50.5	52.8	38.7	46.9	30.7	17.2
2002	1,372	9.38	67.6	89.5	41.3	51.0	52.5	54	47.8	47.1	31.9	18.1
2003	1,384	9.36	69.7	93.1	42.0	52.4	52.9	54.6	52.2	47.3	34.5	19.8
2004	1,354	9.36	71.2	93.9	43.4	52.8	54.5	55.8	53.1	46.5	36.6	22.0
2005	1,341	9.48	71.6	94.9	44.6	55.9	55.2	57.3	52.8	47.7	38.3	22.5
2006	1,367	9.32	76.3	99.1	46.9	56.6	56.9	59.5	56.7	46.2	40.5	24.7
2007	1,417	9.43	77.2	99.1	48.0	57.8	56.8	59.6	56.8	44.8	40.9	25.8
2008	1,376	9.43	77.2	98.8	49.2	58.5	59.0	60.8	58.1	46.2	43.0	27.5
2009	1,265	9.44	78.3	99.3	49.9	59.5	59.8	61.7	59	46.1	39.8	25.7
All	15,889	9.44	70.1	91.4	43	52.3	53.2	55.7	48.1	46.4	35.8	21.4

Table 4: Firm Value, Powerful Independent Directors, and a Powerful Non-CEO as Chair

Shareholder valuation, measured by Tobin's Q (Q) from 1999 to 2010 explained with OLS regressions on one-year lagged measures of CEO, chair, and independent director presence and power as well control variables including industry and year fixed-effects. Variables are as described in Table 2. Sample is a 13,933 observation annual panel of S&P 1500 firms. Numbers in parentheses are robust p-levels clustering by firm. Boldface denotes significance at 10% or better.

	4.1	**4.2**	**4.3**	**4.4**	**4.5**	**4.6**	**4.7**	**4.8**
Powerful CEO dummy (PCEO)	0.0364 (0.26)						0.0224 (0.50)	
Powerful independent board dummy (PIB)		**0.0658** **(0.04)**					**0.0557** **(0.10)**	
Powerful non-CEO chair (PNC)			0.0499 (0.16)				0.0429 (0.23)	
CEO power centrality (CEOC)				0.000189 (0.84)				-0.00105 (0.35)
Independent director power centrality (IDC)					**0.00254** **(0.04)**			**0.00322** **(0.04)**
Non-CEO chair power centrality (NCCC)						0.000179 (0.63)		0.000106 (0.78)
log (ceo age)	**-0.183** **(0.09)**	-0.160 (0.14)	-0.156 (0.14)	**-0.180** **(0.09)**	-0.148 (0.17)	-0.169 (0.12)	-0.143 (0.19)	-0.138 (0.21)
log(board size)	**-0.303** **(0.00)**	**-0.312** **(0.00)**	**-0.309** **(0.00)**	**-0.302** **(0.00)**	**-0.311** **(0.00)**	**-0.305** **(0.00)**	**-0.318** **(0.00)**	**-0.310** **(0.00)**
e-index	**-0.0597** **(0.00)**	**-0.0605** **(0.00)**	**-0.0589** **(0.00)**	**-0.0593** **(0.00)**	**-0.0601** **(0.00)**	**-0.0588** **(0.00)**	**-0.0605** **(0.00)**	**-0.0592** **(0.00)**
log (total assets)	**-0.0433** **(0.00)**	**-0.0470** **(0.00)**	**-0.0382** **(0.01)**	**-0.0393** **(0.01)**	**-0.0502** **(0.00)**	**-0.0377** **(0.01)**	**-0.0487** **(0.00)**	**-0.0469** **(0.00)**
book leverage	-0.137 (0.26)	-0.136 (0.26)	-0.138 (0.26)	-0.137 (0.26)	-0.140 (0.25)	-0.137 (0.26)	-0.138 (0.26)	-0.140 (0.25)
profitability	**5.384** **(0.00)**	**5.376** **(0.00)**	**5.393** **(0.00)**	**5.391** **(0.00)**	**5.377** **(0.00)**	**5.393** **(0.00)**	**5.374** **(0.00)**	**5.378** **(0.00)**
investment	**0.796** **(0.01)**	**0.806** **(0.01)**	**0.782** **(0.01)**	**0.784** **(0.01)**	**0.821** **(0.01)**	**0.782** **(0.01)**	**0.813** **(0.01)**	**0.813** **(0.01)**
R&D/total assets	**8.674** **(0.00)**	**8.596** **(0.00)**	**8.694** **(0.00)**	**8.733** **(0.00)**	**8.569** **(0.00)**	**8.738** **(0.00)**	**8.524** **(0.00)**	**8.609** **(0.00)**
advertising / total assets	**1.767** **(0.05)**	**1.736** **(0.05)**	**1.821** **(0.04)**	**1.798** **(0.04)**	**1.723** **(0.05)**	**1.820** **(0.04)**	**1.739** **(0.05)**	**1.740** **(0.05)**
Industry fixed-effects	yes	yes	yes	yes	yes	yes	yes	yes
Year fixed-effects	yes	yes	yes	yes	yes	yes	yes	yes
R^2	0.388	0.388	0.388	0.388	0.388	0.388	0.388	0.388

Table 5: Firm Value and Board Characteristics

OLS regressions explaining Tobin's Q (Q) with measures of directors' legal independence and independent directors' power, as well as all control variables from Table 4 and industry and year fixed-effects (not shown). Variables are as described in Table 2. Sample is a 13,933 firm-year panel of S&P 1500 firms from 1999 to 2010. Numbers in parentheses are robust p-levels clustering by firm. Boldface denotes significance at 10% or better.

Panel A. Legally Independent directors versus powerful independent directors

	5A.1	5A.2	5A.3	5A.4	5A.5	5A.6	5A.7
Powerful independent board dummy (PIB)						**0.104 (0.00)**	**0.102 (0.00)**
Fraction of directors independent	**-0.211 (0.02)**				**-0.335 (0.02)**	**-0.302 (0.00)**	**-0.384 (0.01)**
Majority of directors independent dummy (IB)		-0.0521 (0.30)			0.0461 (0.42)		0.0152 (0.79)
Two-thirds of directors independent dummy			-0.0517 (0.12)		0.0346 (0.42)		0.0309 (0.47)
CEO does not chair the board dummy				-0.0101 (0.74)	-0.0187 (0.54)		-0.0187 (0.54)
Control variables	yes	yes	yes	yes	yes	yes	yes
Industry fixed-effects	yes	yes	yes	yes	yes	yes	yes
Year fixed-effects	yes	yes	yes	yes	yes	yes	yes
Adjusted R-squared	0.389	0.388	0.388	0.388	0.389	0.390	0.390

Panel B. Powerful Independent Directors versus Powerful Insider Directors

	5B.1	5B.2	5B.3	5B.4	5B.5	5B.6	5B.7
Powerful CEO dummy (PCEO)							0.0163 (0.63)
Powerful independent board dummy (PIB)	**0.0530 (0.10)**					**0.0592 (0.06)**	**0.0554 (0.09)**
Powerful non-independent board dummy (PNIB)	**0.0873 (0.00)**	**0.0951 (0.00)**				**0.0588 (0.06)**	**0.0566 (0.08)**
Powerful independent non-CEO chair (PINC)			-0.0551 (0.28)	-0.0751 (0.13)		-0.0637 (0.21)	-0.0636 (0.21)
Powerful non-independent non-CEO chair (PNINC)			**0.153 (0.00)**		**0.160 (0.00)**	**0.124 (0.01)**	**0.126 (0.01)**
Control variables	yes	yes	yes	yes	yes	yes	yes
Industry fixed-effects	yes	yes	yes	yes	yes	yes	yes
Year fixed-effects	yes	yes	yes	yes	yes	yes	yes
Adjusted R-squared	0.389	0.389	0.389	0.388	0.389	0.390	0.390

Table 6: Cumulative Abnormal Returns on Powerful Independent Director Sudden Deaths

Cumulative abnormal returns (CARs), in percent, for windows [-1, 1], [-1, 2], [-1, 3], and [-3, 3], with t = 0 the first news of the director's sudden death and $[t_1, t_2]$ a window from t_1 to t_2. CARs are actual returns less market model estimates, parameters estimated using t = -200 to -46, using the CRSP value-weighted total market return (Panel A) and both the equal- and value-weighted CRSP total market return (Panel B).

Panel A: Mean cumulative abnormal returns on director sudden deaths.

Boldface indicates means significantly different from zero at 10% or better. F-test assume equal variance between pairs of groups unless noted by ǂ. Numbers in parenthesis are p-values for t-test statistics rejecting equal group means, with boldface indicating significance level 10% or better.

	(1) Director sudden deaths			**(2) Independent director sudden deaths**			**(3) Inside director sudden deaths**		
	Decedent is independent			**Decedent is powerful**			**Decedent is powerful**		
Event window	**Y**	**N**	**p-value**	**Y**	**N**	**p-value**	**Y**	**N**	**p-value**
[-1, +1]	-0.0197	**0.618**	(0.12)	-0.311	0.394	**(0.09)**	**1.65**	0.322	(0.12)
[-1, +2]	0.0602	0.219	(0.40)	-0.251	**0.503**	**(0.10)**	**1.60**	-0.177	**(0.08)**
[-1, +3]	0.0247	0.158	(0.42)	-0.252	0.419	(0.18)	**1.86ǂ**	-0.329	**(0.01)**
[-3, +3]	-0.209	0.165	(0.32)	-0.332	-0.0336	(0.36)	**1.95ǂ**	-0.346	**(0.02)**
Events	172	54	226	101	71	172	12	42	54

Panel B: OLS Regressions of CARs on decedent director independence and power indicators

CARs around 226 director sudden deaths explained with dummies for decedent director being powerful, legally independent or both, as well as controls for director age at death and firm characteristics, as in Table 4. Probability levels, in parentheses, are bold for significance at 10% or better.

	6B.1	**6B.2**	**6B.3**	**6B.4**	**6B.5**	**6B.6**	**6B.7**	**6B.8**
Market return weights	equal	equal	equal	equal	value	value	value	value
Event window	[-1, +1]	[-1, +2]	[-1, +3]	[-3, +3]	[-1, +1]	[-1, +2]	[-1, +3]	[-3, +3]
Powerful director (PD)	0.0168 (0.14)	**0.0231** **(0.06)**	**0.0288** **(0.05)**	**0.0289** **(0.10)**	0.0133 (0.23)	0.0178 (0.16)	0.0219 (0.14)	0.0197 (0.17)
Independent director (ID)	0.00187 (0.78)	0.00743 (0.31)	0.00866 (0.32)	0.00435 (0.68)	0.000720 (0.91)	0.00680 (0.36)	0.00748 (0.39)	0.00714 (0.40)
Powerful independent director (PID)	**-0.0239** **(0.06)**	**-0.0299** **(0.03)**	**-0.0342** **(0.03)**	**-0.0322** **(0.10)**	**-0.0204** **(0.10)**	**-0.0254** **(0.07)**	**-0.0286** **(0.08)**	-0.0233 (0.14)
Intercept	0.00199 (0.71)	-0.00372 (0.52)	-0.00574 (0.40)	-0.00488 (0.55)	0.00322 (0.54)	-0.00177 (0.76)	-0.00329 (0.64)	-0.00477 (0.48)
R^2	0.023	0.022	0.020	0.014	0.021	0.016	0.014	0.010

Table 7: Granger Causality Tests

The left panel runs regressions of Tobin's Q on lags of Q and lags of X; the right panel runs X on lags of Q and lags of X. In each row, X is one of: PIB (one if a majority of independent directors are powerful), PNIB (one if a majority of non-independent director are powerful), PINC (one if the chair is a powerful independent director), or PNINC (one if the chair is a powerful non-independent director) or one of the continuous variables IDC (mean independent director power centrality), NIDC (mean non-independent director centrality), INCC (chair's power centrality if an independent director is chair), or NINCC (chair's power centrality if a non-independent director other than the CEO is chair). Regressions explaining Q are OLS; those explaining X are probits if X is an indicator variable (PIB, PNIB, PINC, or PNINC) and OLS if X is continuous (IDC, NIDC, INCC, or NINCC). Numbers in parentheses are p-levels for t-tests (one lag specifications) or joint F-tests (two and three lag specifications) for rejecting the insignificance or joint insignificance of all included lags of X (left panel) or Q (right panel).

	Board power Granger causes shareholder value			**Shareholder value Granger causes board power**		
	$Q_{i,t} = \sum_{s=1}^{3} a_s Q_{i,t-s} + \sum_{s=1}^{3} b_s X_{i,t-s} + u_{i,t}$			$X_{i,t} = \sum_{s=1}^{3} a_s X_{i,t-s} + \sum_{s=1}^{3} b_s Q_{i,t-s} + u_{i,t}$		
Power measure ($X_{i,t}$) is:	***1 lag***	***2 lags***	***3 lags***	***1 lag***	***2 lags***	***3 lags***
PIB	**3.24 (0.07)**	**4.84 (0.01)**	**3.43 (0.02)**	2.64 (0.11)	4.59 (0.10)	**17.82 (0.00)**
PNIB	0.38 (0.54)	0.91 (0.40)	1.00 (0.39)	**10.69 (0.00)**	**8.30 (0. 02)**	**17.12 (0.00)**
PINC	2.08 (0.15)	2.00 (0.14)	0.23 (0.88)	**6.48 (0.01)**	**10.35 (0.01)**	5.17 (0.16)
PNINC	1.87 (0.17)	1.13 (0.32)	0.37 (0.78)	**7.89 (0.01)**	**10.39 (0.01)**	**9.79 (0.02)**
IDC	**4.33 (0.04)**	**3.97 (0.02)**	**4.99 (0.00)**	2.05 (0.15)	1.36 (0.26)	1.16 (0.32)
NIDC	0.07 (0.79)	0.62 (0.54)	2.1 (0.10)	**15.49 (0.00)**	**3.81 (0.02)**	**6.60 (0.00)**
INCC	0.17 (0.68)	1.90 (0.15)	1.26 (0.29)	**9.77 (0.00)**	**7.81 (0.00)**	**3.69 (0.01)**
NINCC	3.76 (0.05)	0.96 (0.38)	0.69 (0.56)	**10.81 (0.00)**	**10.43 (0.00)**	**3.91 (0.01)**

Table 8: Value Destroying M&A

Cumulative abnormal returns from day -3 to day +3 around dates of M&A announcement by S&P 1500 firms between 1999 and 2010, explained by OLS regressions on measures of CEO and independent director power as well as control variables, including industry and year fixed-effects. Variables are as described in Table 2. Numbers in parentheses are robust probability levels with clustering by bidder. Boldface denotes significance at 10% or better.

	8.1	**8.2**	**8.3**	**8.4**
LHS is CAR [-3, +3] of	***Bidder***	***Bidder***	***Combined***	***Combined***
PIB	**0.0155** **(0.04)**		**0.0148** **(0.04)**	
IDC		**0.000777** **(0.03)**		**0.000396** **(0.26)**
PCEO	**-0.0346** **(0.00)**		**-0.0304** **(0.00)**	
CEOC		**-0.00127** **(0.00)**		**-0.000871** **(0.00)**
Log (CEO age)	0.0721 (0.01)	0.0656 (0.02)	0.0387 (0.14)	0.0290 (0.27)
Log(board size)	-0.00316 (0.77)	-0.000736 (0.94)	-0.0166 (0.11)	-0.0143 (0.17)
Entrenchment index	0.00209 (0.35)	0.00223 (0.33)	0.00297 (0.17)	0.00276 (0.21)
Same industry dummy	-0.00513 (0.43)	-0.00359 (0.58)	-0.00329 (0.60)	-0.00233 (0.71)
Stock payment dummy	**-0.0174** **(0.02)**	**-0.0164** **(0.02)**	**-0.0169** **(0.02)**	**-0.0166** **(0.02)**
Deal value over bidder size	**-0.0331** **(0.00)**	**-0.0333** **(0.00)**		
Deal value over combined size			**0.0283** **(0.05)**	**0.0281** **(0.05)**
Observations	632	632	632	632
R^2	0.0592	0.0568	0.0406	0.0313

Table 9. Powerful Independent Directors and Free Cash Flow Agency Problems

Probit regressions of a free cash flow "danger signal" dummy on CEO, chair, and independent director power, with controls and industry and year fixed-effects. Variables are described in Table 2. The free cash flow "danger signal" dummy is set to one if the firm's cash flow exceeds its Fama-French 17-industry (FF-17) median, its dividend payout is below its FF-17 median, and its Tobin's Q is below its FF-17 median; and to zero otherwise. Sample is 13,933 firm-years of S&P 1500 firms from 1999 to 2010. Numbers in parentheses are robust p-levels clustered by firm. Bold denotes significance at 10% or better.

	9.1	**9.2**	**9.3**	**9.4**	**9.5**	**9.6**
PIB	**-0.217** **(0.00)**	**-0.212** **(0.01)**	**-0.220** **(0.00)**			
PCEO		-0.0169 (0.82)	-0.0156 (0.83)			
PNC			0.0674 (0.41)			
IDC				**-0.00700** **(0.00)**	**-0.00797** **(0.00)**	**-0.00817** **(0.00)**
CEOC					0.00134 (0.54)	0.00140 (0.53)
NCCC						0.000568 (0.50)
log (CEO age)	0.107 (0.65)	0.109 (0.64)	0.140 (0.55)	0.0768 (0.74)	0.0708 (0.76)	0.107 (0.65)
log (board size)	0.0961 (0.51)	0.0959 (0.51)	0.0899 (0.54)	0.0890 (0.54)	0.0847 (0.56)	0.0749 (0.61)
e-index	-0.0153 (0.57)	-0.0152 (0.58)	-0.0154 (0.57)	-0.0171 (0.53)	-0.0174 (0.53)	-0.0168 (0.54)
log (total assets)	0.0161 (0.56)	0.0174 (0.53)	0.0185 (0.50)	0.0189 (0.48)	0.0164 (0.54)	0.0188 (0.48)
book leverage	-0.432 (0.02)	-0.429 (0.02)	-0.433 (0.02)	-0.393 (0.04)	-0.399 (0.04)	-0.400 (0.04)
profitability	-0.600 (0.08)	-0.592 (0.09)	-0.588 (0.09)	-0.541 (0.12)	-0.553 (0.12)	-0.543 (0.12)
investment	1.000 (0.02)	0.997 (0.02)	1.000 (0.02)	1.006 (0.02)	1.015 (0.01)	1.017 (0.01)
R&D / total assets	-8.128 (0.00)	-8.079 (0.00)	-8.146 (0.00)	-7.950 (0.00)	-8.061 (0.00)	-8.081 (0.00)
advertising / total assets	-4.206 (0.03)	-4.200 (0.04)	-4.183 (0.03)	-4.177 (0.04)	-4.147 (0.04)	-4.102 (0.04)
R^2	0.0489	0.0490	0.0493	0.0494	0.0497	0.0499

Table 10. Powerful Independent Directors and Forced CEO Turnover

Binomial probit regressions explain log odds of a forced CEO turnover with independent director power measures – the powerful independent board dummy PIB or the continuous independent director power measure IDC for the full board, or their analogs for the nominating committee, PIBN or IDCN – along with their interactions with the prior year's total stock return, RET and control variables including industry and year fixed-effects. The forced CEO turnover dummy is set to one if a new CEO is brought in from outside the firm during the year and to zero otherwise. Variables are described in Table 2. Sample includes 212 forced turnover events and 394 non-forced turnover events from 1999 to 2010. Numbers in parentheses are robust p-levels clustering by firm. Boldface denotes significance at 10% or better.

	10.1	**10.2**	**10.3**	**10.4**
***power* measure**	***PIB***	***PIBN***	***IDC***	***IDCN***
power	0.0839 (0.47)	0.0296 (0.80)	**0.0109** **(0.02)**	0.00237 (0.19)
power* × *RET [a]	**-0.520** **(0.06)**	**-0.611** **(0.04)**	-0.0112 (0.35)	**0.00003** **(0.99)**
RET	-0.00511 (0.98)	-0.0543 (0.73)	0.669 (0.51)	-0.267 (0.22)
log (*CEO age*)	-0.472 (0.39)	-0.463 (0.40)	-0.460 (0.40)	-0.494 (0.36)
log (*board size*)	-0.287 (0.24)	-0.277 (0.27)	**-0.436** **(0.08)**	-0.356 (0.15)
e-index	-0.0197 (0.64)	-0.0237 (0.57)	-0.0138 (0.74)	-0.0218 (0.60)
$\mathbf{R^2}$	0.0494	0.0499	0.0511	0.0452

[a.] Assessing the economic significance of interactions in probits requires exploring distributional characteristics (across observations) of changes in implied conditional probabilities of a forced CEO turnover given a unit change in prior stock returns as the board indicator changes from the non-powerful to the powerful category (Stata command INTEFF). The differences in the marginal effect of past stock returns between firms with and without powerful independent boards ranges from -20.8% to -0.863% for regression 10.1 and that between firms with and without powerful independent nominating committees in 10.2 ranges from -24.8% to 0.264%. The mean interactions are -18.3% for 10.1 and -21.2% for 10.2, with both statistically significant. Intuitively, 10.1 says that the average change in predicted conditional probability of a forced CEO turnover, given a 1% worse past return, is 18.3 percentage points higher with a powerful independent board than without one, and that this difference is statistically significant.

Table 11. Powerful Independent Directors and Earnings Manipulation

OLS regressions explain the absolute value of the modified Jones model discretionary accruals with measures of independent director power – the powerful independent board dummy *PIB* or the continuous independent director power measure *IDC* for the full board, or their analogs for the audit committee, *PIBA* or *IDCA*. All regressions include control variables and industry and year fixed-effects. Regressions 15.4 through 15.8 also control for the corresponding CEO power measures, either the powerful CEO dummy PCEO or the continuous CEO power measure CEOC. Variables are as described in Table 2. Sample is a 13,933 firm-year panel of S&P 1500 firms from 1999 to 2010. Numbers in parentheses are robust p-levels clustering by firm. Boldface denotes significance at 10% or better.

Independent director *POWER* measure is	10.1	10.2	10.3	10.4	10.5	10.6	10.7	10.8
	PIB	***PIBA***	***IDC***	***IDCA***	***PIB***	***PIBA***	***IDC***	***IDCA***
POWER	**-0.00402**	-0.00326	**-0.000263**	**-0.000210**	-0.00334	-0.00259	**-0.000168**	**-0.000137**
	(0.05)	(0.11)	**(0.00)**	**(0.00)**	(0.13)	(0.22)	**(0.05)**	**(0.06)**
PCEO					-0.00246	-0.00272		
					(0.28)	(0.22)		
CEOC							**-0.000138**	**-0.000152**
							(0.04)	**(0.02)**
log (*CEO age*)	**0.0273**	**0.0277**	**0.0251**	**0.0259**	**0.0276**	**0.0280**	**0.0255**	**0.0259**
	(0.00)	**(0.00)**	**(0.00)**	**(0.00)**	**(0.00)**	**(0.00)**	**(0.00)**	**(0.00)**
log (*board size*)	0.00379	0.00345	0.00402	0.00393	0.00378	0.00349	0.00424	0.00425
	(0.41)	(0.45)	(0.38)	(0.39)	(0.41)	(0.45)	(0.36)	(0.35)
e-index **($x\ 10^3$)**	-0.197	-0.246	-00144	-0.169	-0.170	-0.208	-0.0479	-0.04.80
	(0.78)	(0.73)	(0.84)	(0.81)	(0.81)	(0.77)	(0.95)	(0.95)
log (*total assets*)	0.000728	0.000638	0.00139	0.00117	0.000988	0.000934	**0.00176**	0.00170
	(0.47)	(0.53)	(0.19)	(0.25)	(0.35)	(0.38)	**(0.10)**	(0.11)
book leverage	0.00395	0.00408	0.00370	0.00357	0.00385	0.00395	0.00377	0.00364
	(0.62)	(0.61)	(0.64)	(0.65)	(0.63)	(0.62)	(0.63)	(0.65)
profitability	**0.0670**	**0.0671**	**0.0658**	**0.0658**	**0.0669**	**0.0670**	**0.0651**	**0.0650**
	(0.00)	**(0.00)**	**(0.00)**	**(0.00)**	**(0.00)**	**(0.00)**	**(0.00)**	**(0.00)**
investment	**-0.114**	**-0.114**	**-0.117**	**-0.116**	**-0.115**	**-0.115**	**-0.119**	**-0.118**
	(0.00)	**(0.00)**	**(0.00)**	**(0.00)**	**(0.00)**	**(0.00)**	**(0.00)**	**(0.00)**
R^2	0.0373	0.0372	0.0383	0.0381	0.0374	0.0373	0.0388	0.0388

Appendix Table A1. Listed Firm Top Executive and Director Network Characteristics

Each Node is a director or business executive with at least one connection to other directors or executives. The Listed Network includes all directors and senior managers who ever served on the board of or worked at a listed firm covered by BoardEx from 1998 through 2009.

Year	Nodes (Individuals) in Social Network	Connections between pairs of Nodes (Individuals) in Social Network
1998	191,049	5,438,006
1999	200,156	5,925,380
2000	210,220	6,483,455
2001	219,321	6,991,534
2002	228,375	7,466,223
2003	237,980	7,967,959
2004	249,126	8,511,737
2005	261,823	9,105,517
2006	276,237	9,757,497
2007	292,131	10,472,468
2008	305,399	11,156,481
2009	313,958	11,639,006

Appendix Table A2. Firm-level Variable Summary Statistics

Summary statistics of variables defined in Table 2. Sample includes 15,889 firm-year observations.

		Mean	Standard deviation	Q1	Median	Q3
Independent Board	*IB*	0.914	0.281	1	1	1
Powerful Independent Board	*PIB*	0.523	0.499	0	1	1
Powerful Non-Independent Board	*PNIB*	0.313	0.464	0	0	1
Independent Director Centrality	*IDC*	81.1	14.9	74.3	84.9	92.1
Non-independent Director Centrality	*NIDC*	55.1	35.8	0	66.8	85.3
Non-CEO Chair	*NCC*	0.358	0.479	0	0	1
Powerful Non-CEO Chair	*PNC*	0.214	0.410	0	0	0
Powerful Independent Non-CEO Chair	*PINC*	0.111	0.314	0	0	0
Powerful Non-independent Non-CEO Chair	*PNINC*	0.103	0.304	0	0	0
Non-CEO Chair Centrality	*NCCC*	28.5	39.7	0	0	74
Independent Non-CEO Chair Centrality	*INCC*	13.0	31.1	0	0	0
Non-independent Non-CEO Chair Centrality	*NINCC*	15.5	31.8	0	0	0
Powerful CEO	*PCEO*	0.464	0.499	0	0	1
CEO Centrality	*CEOC*	77.3	19.2	65.3	82.3	93
Powerful independent Auditing Committee	*PIBA*	0.490	0.500	0	0	1
Powerful independent Compensation Committee	*PIBC*	0.520	0.500	0	1	1
Powerful independent Nominating Committee	*PIBN*	0.442	0.497	0	0	1
Auditing Committee Members Centrality	*IDCA*	80.7	16.3	73.3	85.0	92.8
Compensation Committee Members Centrality	*IDCC*	80.9	18.1	74.0	86.2	93.6
Nominating Committee Members Centrality	*IDCN*	70.7	32.0	64.0	83.8	92.8
Tobin's Q	*Q*	1.58	1.55	0.848	1.19	1.83
CEO Age	*CEOA*	55.7	7.33	51	56	60
Board Size	*BSIZE*	9.44	2.62	8	9	11
E-Index	*ENDX*	2.72	1.4	2	3	4
Total Assets (in $bil.)	*ASSETS*	16.8	89.2	0.755	2.12	7.37
Leverage	*LEV*	0.225	0.181	0.066	0.212	0.339
Profitability	*PROFIT*	0.126	0.101	0.07	0.121	0.176
Capital Expenditure	*CAPEX*	0.049	0.062	0.013	0.0324	0.0638
Cash Flow	*CF*	0.0908	0.125	0.0407	0.0878	0.142
R&D	*R&D*	0.024	0.0444	0	0	0.0279
Advertising	*ADV*	0.0102	0.0245	0	0	0.00584
Earnings Manipulation	*EM*	0.00819	0.0870	-0.0228	0.0113	0.0464

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