

# CEO-Director Connections and Corporate Fraud

Not just whether you are connected but *how*\*

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## CEO-Director Connections and Corporate Fraud:

Not just whether you are connected but *how*

### ABSTRACT

We study the relation between fraud and CEO-director connectedness, focusing on the *type* of CEO-director connection. While nonprofessional connections due to shared non-business service or alma mater increase fraud probability, professional connections from employment overlaps lower the incidence of fraud. The benefits of professional connectedness are pronounced when individuals share service as executives rather than as directors or as director and executive. The results are robust to firm-specific controls, industry and time period controls, coopted directors, and measures of director quality and heterogeneity. While frauds have led regulators to (successfully) push for independent directors, our results suggest that independence is only necessary, not sufficient. Heterogeneity *within* the set of independent directors seems to be at least as important as independence per se.

# 1 Introduction

The end of the dot com bubble in 2000 was punctuated by several high profile cases of corporate fraud. These frauds raised suspicions that the governance systems in the U.S. had become dysfunctional and resulted in a swift and sweeping regulatory response in the form of the 2002 Sarbanes-Oxley Act (SOX). While the eleven titles of SOX targeted several stakeholders of firms, a key target was the board of directors. Frauds seem to manifest a basic failure of the board oversight function, perhaps due to excessively cozy relationships between CEOs and directors. Thus, regulators, institutional shareholders and proxy advisory services aimed to reform boards, primarily by stressing director independence.<sup>1</sup>

The current standards for director independence focus on the *economic* relationships between directors and top executives. NASDAQ Rule 4200 a(15) and Section 303A of NYSE listing rules define a director of a firm as independent only if (s)he has no material economic relationships with the firm or its executives directly or through immediate family. The regulations also target indirect economic relationships. For instance, a firm's director is not considered independent if the firm's CEO serves on the compensation committee of another firm where the director is an executive. By constraining the economic ties between independent directors and top executives, the reforms aim to facilitate independent judgment by directors.

Economic ties represent only one source of CEO-director connections. Directors can have no economic ties to CEOs according to legal standards but could share ties to the CEO through common educational, service, or employment experiences. These connections reflect social interactions that can also exert influence on board functioning. As Adams, Hermalin, and Weisbach (2009) note,

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<sup>1</sup>For example, NYSE and NASDAQ listed firms require at least 50% of the boards of directors to consist of independent directors. Besides overall board independence, the governance regulations can also set norms for board committees: NYSE rules require the CEO to recuse herself from director nominations. See Beasley, Carcello, Hermanson, and Neal (2009), Chhaochharia and Grinstein (2007)). See Dahya and McConnell (2007) on similar Cadbury commission norms in the U.K.

a large part of a director’s job involves interactions with or assessments of CEOs. Prior connections can influence the nature of these interactions. The economic effect could be positive or negative depending on whether the connection type constrains or facilitates opportunistic behavior.<sup>2</sup>

We study whether CEO-director connections explain fraud. If we include a measure that aggregates all types of connections, we find that CEO-director connections *lower* the probability of fraud. This finding is surprising. It suggests that CEO-director connections are beneficial as they mitigate fraud, counter to the regulatory thrust towards an arms-length relationship between CEOs and directors. We show this overall result reflects important and economically sensible heterogeneity based on the connection *type*. Professional “LinkedIn” connections derived from employment overlaps lower the likelihood of fraud. In contrast, nonprofessional “Facebook” ties of nonprofessional origin are positively related to fraud.<sup>3</sup> The results, especially the differences in the economic effects of different connection types, are new to the literature.

While we motivate the tests in more detail below, it is useful to briefly consider why nonprofessional and professional connections could have different effects. Ties of all kinds can predispose individuals towards cutting slack. For instance, connections can predispose individuals towards making favorable judgments in situations of ambiguity (McPherson, Smith-Lovin, and Cook, 2001), which can compromise monitoring and increase fraud. However, there could be countervailing effects for professional connections. For example, one channel is that a director who has worked with a CEO has witnessed the CEO’s functioning, actions, and choices in work settings. These insights can make the director a better judge of a CEO’s actions. They can also foster better professional advisory relationships with the CEO.<sup>4</sup> On the other hand, nonprofessional connections through

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<sup>2</sup>See, e.g., Granovetter (1985), Coleman (1990) or Uzzi (1996).

<sup>3</sup>We use the phrase “Facebook” and “LinkedIn” as metaphors. Facebook was formed in 2004 to establish ties between students at similar universities and is now a site connecting people based on informal family and friendship ties, mainly of a nonprofessional nature. LinkedIn establishes professional connections arising out of employment.

<sup>4</sup>For the effect of director characteristics on accounting conservatism see Klein (2002), and Ahmed and Duellman (2007). Adams and Ferreira (2003), Adams (2005), and Raheja (2005) discuss the advising function of boards, a

common service on the board of an orchestra or a common alma mater, are unlikely to endow business skills that help a director do a better job. The differential effects should be especially manifest in vigilance about fraud, which has large negative consequences for the human capital of independent directors.

Our first tests consider nonprofessional ties. We use data on CEO-director connectedness from the “Boardex” database compiled by Management Diagnostics Limited. Boardex contains biographic data on over 60,000 executives serving at over 76,000 private, public, and not-for-profit organizations. One source of nonprofessional connections, studied by Cohen, Frazzini, and Malloy (2008, 2010) is a common alma mater. As Cohen et al. argue, these connections endow individuals with shared experiences, a common culture, and a common alumni network. While these commonalities can foster trust and aid teamwork, their effects can be less benign when the task is to monitor the CEO. For instance, friendships can foster status-based homophily due to loyalty and trust (Lazarsfeld and Merton (1954), Marsden (1987), McPherson, Smith-Lovin, and Cook (2001)). The resulting under-monitoring could start a slide down a slope towards fraud.

To further clarify the role of nonprofessional ties, we conduct holdout tests that exploit the “other activities” in the Boardex dataset. These are nonprofessional connections formed through overlaps at not-for-profit organizations such as service as trustees on charities, non-profit organizations, universities, or joint memberships of clubs. Such ties are unlikely to endow a director any expertise in monitoring a CEO in a business setting – just as belonging to a common alma mater confers no advantage in executing the fiduciary responsibilities of a director. The informal non-business connections have gained notoriety in the popular press. For instance, in the well known case of Enron, the firm donated hundreds of millions of dollars to the M.D. Andersen Cancer Center,

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literature dating back to Mace (1971). Other work includes Fischer (1982), Rosen (1983), Westphal (1999), Coles, Daniel, and Naveen (2007), and Linck, Netter, and Yang (2009).

whose president John Mendelsohn sat on Enron’s board as an (ostensibly) independent director. Consistent with such anecdotal evidence, non-business connections significantly elevate fraud.

Our next tests consider professional connections. These connections can be related to fraud through several channels. First, professionally connected directors are individuals who have interacted with and observed the CEOs closely in work settings. The connections endow the director insights on a CEO’s work attributes, strengths and weaknesses. This knowledge can improve a director’s monitoring capability. Second, a prior working relationship sets up a channel for CEOs to get professional counsel and advice from the board. Third, prior work in the same team offers a director the opportunity to gain private information about a CEO’s traits. Directors may be more willing to join a board when their assessment of a CEO indicates that malfeasance is unlikely. These effects could result in professional connections lowering fraud probability. Alternatively, professional relationships could act as a source of personal friendships, which could increase rather than decrease opportunistic behavior and fraud. We let the data speak to the net effect. We find that the beneficial effects dominate: professional connections lower fraud probability.

The subject of fraud is of considerable interest to the accounting and finance literature, dating back to at least Dechow, Sloan, and Sweeney (1995) and Beasley (1996). While our primary contribution to this literature is to show that connections explain fraud, asymmetrically depending on connection type, we also introduce other new evidence. We introduce new explanatory variables relating to CEO and board attributes and also use the opportunity to refresh the evidence about other fraud determinants studied in prior work. For instance, the evidence on board independence is mixed (e.g., Beasley (1996), Agrawal and Chadha (2005), Karpoff, Lee, and Martin (2008a)). We find that independence is significantly negatively related to fraud probability. Among firm characteristics, larger firms, growth firms, less profitable firms, and firms raising external finance are more likely to commit fraud. Following Agrawal and Chadha (2005), we also find that financial

misconduct is less likely with the presence of financial expertise. Nevertheless, expertise becomes insignificant when we add year dummy variables, suggesting that financial expertise has diffused across boards over time. Turning to other board attributes, busy directors who serve on multiple boards attenuate fraud probability. This is consistent with the idea that busy directors have incentives to protect reputational capital.<sup>5</sup>

We consider endogeneity issues. The key endogeneity question in our context is unobserved covariates that can explain fraud, specifically whether there are other explanatory variables that we omit but should reasonably enter our specification.<sup>6</sup> We examine several candidates, and in doing so, introduce new evidence on fraud determinants to the literature. One possibility is that professional connections perhaps pick up omitted director quality attributes. For instance, prestigious companies such as GE, IBM, or McKinsey that serve as breeding grounds for corporate talent. We find that the presence of directors from these firms does lower the probability of fraud but professional connectedness remains significant. We also test the hypothesis that professional connections matter more when there are more meaningful professional interactions, which arise when individuals work together as employees rather than as director and employee. We find support for this view. The effect of professional connections is greater when directors overlap as employees rather than as director and employee or director and director. Finally, we control for unobserved heterogeneity in director quality through director fixed effects. We find similar, even stronger results.

Another possibility is that connectedness manifests omitted measures of executive ability. Following Chevalier and Ellison (1999), we include a dummy for the quality of a CEO's undergraduate institution. Individuals from prestigious schools may have higher ability or face greater costs of

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<sup>5</sup>Recent work on busy directors includes Ferris, Jagannathan, and Pritchard (2003), Yermack (2004), and Fich and Shivdasani (2007). See also Srinivasan (2005) on labor market consequences for directors after restatements, Kaplan and Reishus (1990) on dividend cuts, Brickley, Coles, and Linck (1999) on performance, and Coles and Hoi (2003) on opting out of takeover provisions.

<sup>6</sup>See Roberts and Whited (2011) for a review of the types of endogeneity issues in empirical research.

social stigma, so they are less likely to commit fraud. We find that fraud is less likely when a firm’s CEO has attended a prestigious undergraduate school but there is little effect on the connectedness variable. Bertrand and Schoar (2003) point out that CEOs with MBAs tend to take aggressive strategies, which could lead them to cross the line into fraudulent behavior. These assertions are not supported by the data and have little effect on connection variables.<sup>7</sup> Finally, CEO ability is likely to be manifested in larger rolodexes and better overall connectedness. Our results are robust to the CEO rolodex measures. In any event, our focus is on the different signed results for different *types* of connections, a result that remains robust.

We also consider the possibility that CEOs with intent to commit malfeasance endogenously coopt amenable directors, who may monitor the CEO less and appoint them to the board. We include as an explanatory variable the portion of the board appointed by the current CEO. The variable is also interesting because the appointments made after a CEO assumes office should pick up any primary or residual effects from pliable directors, in the spirit of Yermack (2004) or Coles, Daniel, and Naveen (2007). We find that this variable does not alter the effect of connectedness. As a further test, we also examine the effect of directors appointed after a CEO assumes office *and* connected to the CEO. This variable also has little effect on the results. We also incorporate the role of incentive compensation. Cheng and Warfield (2005), Burns and Kedia (2006), and Erickson, Hanlon, and Maydew (2006) examine the role of equity and option compensation on fraud with mixed results. While including equity-based compensation shrinks the sample by over 60% due to data requirements, it does not materially affect the role of CEO-director connections.

We also examine the variation introduced by the 2002 Sarbanes-Oxley Act (SOX). SOX provides an interesting setting for testing the effects of connectedness on fraud as it aimed to distance boards

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<sup>7</sup>Thus, while it may be tempting to draw conclusions from the Enron fraud case in which the CEO and several executives are Harvard MBAs, neither the “Harvard” nor the “MBA” moniker seems to be a significant feature of frauds. This finding may be of interest given the increasing stress on ethics education by several business schools in the wake of the financial crisis. See, e.g., “Economic Crisis Leads Business Schools to Meld Ethics Into MBA,” (Jennifer Epstein, USA Today, May 5, 2010).



from CEOs by increasing director independence. Increasing the distance between CEOs and boards should lower the effects of all types of connections, which we find in the data. In fact, nonprofessional connections become insignificant. Professional connectedness continues to matter. While its effect is lower after SOX like that of all other variables, the magnitude increases relative to firm size, the most significant determinant of fraud in the literature.

In sum, connectedness matters even after including an exhaustive set of variables used in the governance literature and does so in somewhat unexpected ways. While nonprofessional connections elevate fraud, in line with the traditional agency viewpoint of connections, professional connections are related to lower fraud probability. These results make three major points. First, connections matter. At the minimum, they appear to pick up unobserved aspects of governance that conventional board variables do not. Second, connections matter at least as much as independence. Thus, while the regulatory push towards director independence is useful, our results say that independence is perhaps not enough. Heterogeneity *within* independent directors deserves more attention. Finally, we emphasize a bright side of CEO-director connections. Not all forms of connections are necessarily bad. Professional connections lower fraud probability even before SOX when boards and connections faced relatively less scrutiny.

The rest of the paper is organized as follows. Section 2 reviews the related literature. Section 3 discusses the data. Sections 4 and 5 present the empirical results including several robustness tests and a detailed discussion of alternate interpretations of our key results. Section 6 concludes.

## 2 Related Literature

We contribute to a growing literature on the design and role of the boards of directors in the modern corporation. Hermalin and Weisbach (2007) and Adams, Hermalin, and Weisbach (2009) present recent surveys of the literature. The topic of special interest since the 2002 Sarbanes-Oxley Act

and related rules that place substantial restrictions on the composition and functioning of boards, mainly to avoid a repetition of the fraud waves of the post dot com era. We contribute to the debate by offering new evidence on the aspects of boards that contribute positively or negatively to the board oversight function. In particular, we analyze the board attributes that explain fraud. Frauds are an extremal example of the failure of board oversight and the main contributory factor for SOX, the most aggressive regulatory intervention in the governance of public firms.

Our findings add to a growing literature on fraud. Beasley (1996) presents early evidence that board independence matters, based on a sample of 75 fraud firms between 1982 and 1991. More recently, Agrawal and Chadha (2005) find little effect of independence but show that financial experts on boards lowers the propensity to restate. Erickson, Hanlon, and Maydew (2006), Cheng and Warfield (2005) and Burns and Kedia (2006) study the role of equity incentives on the likelihood of misreporting.<sup>8</sup> We add to this literature by highlighting the role played by CEO-director connections. Additionally, we introduce and find evidence of new board attributes that matter. For instance, we show that fraud is less likely when directors have more external appointments, so reputational incentives appear to enhance director attention (Ferris, Jagannathan, and Pritchard (2003), Yermack (2004), Fich and Shivdasani (2007)).

It is worth considering the economic and empirical merits of focusing on how to measure fraud. Our study employs the SEC and DOJ actions dataset of Karpoff, Lee, and Martin (2008a).<sup>9</sup> We echo their point about the need to carefully measure fraud. The GAO restatements database from 2002 to 2006 can be used as a fraud indicator, but it contains several technical errors and misclassifications. The noise in the unfiltered data can be significant. For instance, in the finance

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<sup>8</sup>Other studies examining different dimensions of frauds include Bergstresser and Philippon (2006), Dechow, Sloan, and Sweeney (1996), Johnson, Ryan, and Tian (2009), Kedia and Philippon (2009), Desai, Hogan, and Wilkins (2006), Lennox and Pittman (2010), Li (2010), Peng and Roell (2008), Povel, Singh, and Winton (2007), and Wang (2008), Karpoff, Lee, and Martin (2008a, 2008b).

<sup>9</sup>We thank them for graciously sharing their dataset with us.

literature, Fracassi and Tate (2009) use GAO restatements as proxies for fraud but Hennes, Leone, and Miller (2008) suggest that 76% of GAO restatements are erroneous. This problem is well known in the accounting literature. Hennes et al suggest refinements that result in what is essentially our empirical strategy of focusing on enforcements.<sup>10</sup>

Given our focus on the beneficial effects of professional connections, it is useful to consider why professional CEO-director connections can alleviate fraud. One channel is heterogeneity in monitoring capability between independent directors that is not always picked up by observable traits of directors or managers (see Coles and Li (2010)). Connections can contribute towards explaining inter-director heterogeneity. Peers who have worked with the CEO in a professional capacity in the past may be better monitors of CEOs as they may find it easier to judge a CEO's professional choices or the content of information flows from the CEO. Thus, the misstep and the snowballing effect culminating in fraud is averted. Alternatively, it is also plausible that the insights that directors have gained from prior work with a CEO influences their decision to accept a board position. Directors may be more willing to join a board when their prior assessment of a CEO indicates that malfeasance is unlikely. Either channel predicts and motivates the hypothesis that fraud is negatively related to professional CEO-director connectedness.

For a complementary view, it is useful to consider how fraud could arise. It is unlikely that the CEO asks his board for advice on whether he should commit fraud or not (and receives affirmative assent). Indeed, we know of no such cases where boards are actively and willfully complicit in this manner. An alternative view is that most frauds begin small. For instance, Schrand and Zechman (2011) report that 75% of violations start small and eventually develop into intentional criminal

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<sup>10</sup>Class action litigations have the limitations that lawsuits could be biased towards firms with deep pockets or frivolous lawsuits (Easterbrook and Fischel (1985) and Thakor, Nielson, and Gulley (2005)). For within-GAAP earnings management, see, e.g., Bruynseels and Cardinaels (2011).

malfeasance. Real-life anecdotal evidence is provided in the case of the company Satyam Inc. The CEO, says “...what began as a small discrepancy continued to grow over the years.”<sup>11</sup>

The first and possibly minor misstep is less likely when there is an active counsel and advising relation with back and forth between the CEO and directors, which is more likely when there are professionally connected directors whose business judgment the CEO respects. The sociology literature suggests that different types of networks are activated in different situations and may therefore have different effects on the board’s monitoring and advising roles. Saint-Charles and Mongeau (2009) show that “advice networks,” consisting of people or specialists that are consulted for work-related matters are activated at different times relative to “friendship networks.” In particular, “advice networks,” based on “competence trust” are called upon at times of organization uncertainty, and such networks are more readily accessible when the board comprises professional colleagues. Plickert, Ct, and Wellman (2007) suggest that a notion of reciprocity might also be at work. Having professional peers on board may more likely be associated with professional quid pro quo rather than non-pecuniary kinship utility that might be derived from having nonprofessional friends on boards that permit lax monitoring of CEOs.

We join a burgeoning literature on CEO social connections, much of it spawned by Cohen, Frazzini, and Malloy (2008) and Cohen, Frazzini, and Malloy (2010).<sup>12</sup> We add to their work in two ways. First, we present new evidence on the dark side of connections, not only the undergraduate alma mater connections of Cohen et al., but also nonprofessional connections generated through non-business service. Perhaps more importantly, we also show evidence on the bright side of connections. Our finding that professional connections lower fraud probability support work in the mergers and acquisitions area by Cai and Sevilir (2009) and Schmidt (2009), who point out

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<sup>11</sup>See “Satyam Chief admits huge fraud,” by Heather Timmons and Bettina Wassener, *The New York Times*, January 7, 2009.

<sup>12</sup>Related work includes Westphal and Zajac (1995), Nguyen (2008), Subrahmanyam (2008), and Hwang and Kim (2009), Engelberg, Gao, and Parsons (2009), Fracassi and Tate (2011), and Liu (2009).

that connections benefit firms by facilitating acquisitions. Finally, our result that different types of connections have different-signed effects is new to the literature. In subsequent work in accounting, Bruynseels and Cardinaels (2011) use our approach to study audit committee effectiveness. Like us, they report asymmetric effects for professional and non-professional connections.

A parallel literature on social connections analyzes the aggregate measures of overall network architecture of connections that is derived from pairwise connections between individuals. In the venture capital context, Hochberg, Ljungqvist, and Lu (2007) show the benefits of sourcing financing from venture capitalists with high aggregate connectedness. While we control for these measures, our work stresses a rather different economic point. Our focus is on different *types* of connections. Our point is that besides the numerical count of connections or their structural strength, the nature of the *economic interaction* generating the connection is also important. Connections born out of different interactions between agents can have different economic effects. The role played by interactions is often stressed by sociologists such as Granovetter (2005), but is less known or explored in the finance literature. We provide some of the first evidence in this regard.

### 3 Data and Descriptive Statistics

The primary data source on the Board of Directors and the CEO is the BoardEx database provided by Management Diagnostic Limited. The fraud data come from the SEC Enforcement action database of Karpoff, Lee, and Martin (2008a) updated to September 2009. The charges filed by the SEC against the firm identifies the “violation period,” i.e., the period over which the firm allegedly engaged in financial misconduct. We classify as fraud years the violation period in which the firm engaged in financial misconduct. Stock return and accounting data are from CRSP/COMPUSTAT while the Executive compensation data is from EXECUCOMP.

Table 1 provides descriptive statistics on the fraud years. Between fiscal years 2000 and 2006, there are 560 fraud years representing about 2.6% of the sample firm-years. The fraction of the firms subject to enforcement actions is 5.07% in 2000, rising to about 5.68% in 2002 and dropping to less than 1% in 2006. The declining rate of misrepresentation after 2002 could be due to tighter regulatory framework under Sarbanes-Oxley Act of 2002.<sup>13</sup> These data suggest that year fixed effects should be included when predicting fraud. Table 2 displays the variation in frauds across the Fama-French 48 industry categories. There is some evidence on industry effects in fraud. For instance, fraud appears more likely in computer hardware sector. These data suggest that industry fixed effects may be needed as controls while predicting fraud. We do so in the empirical analysis.

### 3.1 CEO-Director Connections

BoardEx collects biographical information of corporate directors and senior managers from a wide variety of public domain sources. We sort and code the data at the individual officer and director level and then aggregate data at the firm level for each fiscal year. The raw data needs to be filtered for screening out errors and inconsistencies and needs to be manually matched with the other databases that we use. We describe this process in detail before turning to the distribution of the connectedness variables and various attributes and characteristics used in the empirical analysis.

BoardEx covers all individuals who have ever been an officer or a director, i.e. a disclosed earner, in US and European public firms since 1999. The biographical data included in BoardEx covers educational qualifications, employment history including the type of service (director or executive or both), as well as service on not-for-profit organizations. The personal biographical information collated by BoardEx dates back to as early as 1926. Our base dataset consists of two main files, containing the employment records and education records respectively, downloaded

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<sup>13</sup>A small fraction of fraud in 2006 might also be due to the fact that firms that were choosing to misrepresent in 2006 may have not been discovered by September 2009, the last date for data collection.

from BoardEx on August 1, 2008. The key firm identification variable in BoardEx is *companyid*, the key individual identification variable is *directorid*, and the key variable to identify educational or certifying institutions attended by individual officers and directors is *universityid*. The August 1, 2008 download from BoardEx has 61,119 individuals who have served as directors or disclosed earners with employment or service histories over a total of 76,572 unique organizations.

BoardEx coverage includes public, private, and non-profit companies in the US and foreign countries. Since our unit of analysis is a firm, we begin by identifying publicly listed US firms, both active and inactive. BoardEx provided us with a field for whether the coverage of a firm is complete or not. We found that BoardEx coverage is not complete for several firms prior to 2000. There is yet another data consideration. The list of complete coverage firms encompasses about 1,500-1,900 firms from 2000-2002, roughly corresponding to firms in the EXECUCOMP database. This expands significantly to incorporate over 3,000 firms after 2003. Boardex confirms that coverage expands after 2003. We account for this expansion in our empirical analysis. We match firms in BoardEx to the merged CRSP-COMPUSTAT database through a combination of machine and hand-matching methods to get GVKEY and PERMNO identifiers.

For each firm for which we have a valid GVKEY and PERMNO, we first identify the CEO for the firm. The employment records in BoardEx give the starting and ending dates of each job in the employment history of the officer and director. We use the dates to identify the individual serving as the CEO at the end of the fiscal year. We next identify an annual snapshot of all officers and directors at the end of the fiscal year for a given firm. We scroll through the employment records for each individual officer and director and determine whether they were employed by the firm and whether the fiscal year end of the company falls between the start and end dates for a job with the firm. If the individual was employed by the firm at fiscal year-end, we further mark them as officers (who do not serve on boards but are disclosed earners), executive directors (executives on

boards), or supervisory directors (outside directors not otherwise employed by the firm) based on the position description in BoardEx.

### **3.2 Professional Connections**

We classify a CEO as having a professional employment connection with an outside director if they are employed at the same time in a firm excluding the service at the current firm. Empirically, we define professional connectedness between the board and the CEO in a firm, `PROF_FRAC`, as the fraction of the board of directors that is connected to the CEO through prior common employment antecedents. We find that about 41.3% of firm years in our sample were classified as having an employment connection between the CEO and an outside director. As shown in Table 3, the average value of `PROF_FRAC` for misreporting firms is 8.44% which is significantly lower than the 13.61% for non misreporting firms. We grade the connections further by the nature of the underlying professional job and by the type of firm at which the connections were formed. We return to this point after introducing the main logit results.

### **3.3 Nonprofessional Connections**

Nonprofessional connections between CEOs and directors can arise from common service at not-for-profit institutions or through commonalities in educational institutions. Neither the common alma mater nor the shared service in non-business activities are likely to make directors more capable in their fiduciary role as board members. We analyze the two sources of non-business connections individually and together in some specifications.

Inferring educational institution connectedness requires screening with considerable manual intervention. The names of the degree granting institutions are not necessarily coded in a consistent way. We manually match the names of educational institutions taking care to identify multiple



versions of the names (e.g. Harvard University and Harvard). There is a similar variation in the specification of the degrees earned by the officer and director in the biographies. We manually sort through the degrees received and categorize them into the following six categories: Bachelors, Masters, MD, MBA, JD, and PhD. Given our focus on nonprofessional connections, we examine connections derived from a common undergraduate alma mater. In any event, graduate connections add very little. As in Cohen, Frazzini, and Malloy (2008), we do not emphasize common years of attendance. As they argue, trust and information flows from education ties capture shared beliefs, common culture and a sense of belonging that can arise from a common institution.<sup>14</sup> The fraction of board members with educational ties to the CEO is referred to as EDU\_FRAC. The average EDU\_FRAC is 1.37% for misreporting firms versus 1.11% for other firms and the univariate difference is not significant as shown in Table 3.

One issue with educational connections is about possible gaps in coverage by Boardex either because disclosures were less complete in earlier years or because transcription became more accurate over time. These gaps could induce bias, particularly for executives who are not covered in later years because they drop out as executives or directors. Two factors mitigate this concern in our study. First, as discussed above, we rely on the institution from which the executive obtains an undergraduate degree and not the year of graduation. We find that the undergraduate institution field is well populated. Second, to the extent the data gaps reduce over time, educational connectedness should have stronger effects in subsamples drawn from later years. In contrast, we find diminishing effects in the post-SOX period after 2002, as discussed in Section 5.5, so it is unlikely that measurement error in the education connections drives our results.<sup>15</sup>

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<sup>14</sup>A definition of connectedness based on the same institution *and* graduating within a +/-2 year cohort may be argued to capture personal friendships rather than cultural origins picked up by common alma mater. As a proxy for personal friendships, it is both excessively inclusive (given the average cohort size of several thousand students per year) and simultaneously too exclusive because it does not capture personal friendships formed outside the college context. Whether it is a useful proxy or not is an empirical issue: it has little effect on its own and changes little else.

<sup>15</sup>We thank (without implicating in any way) David Yermack for motivating the investigation of these data issues.

BoardEx classifies non-business activities of individuals as “other” activities. Based on the data for individual directors and officers, we develop data with respect to common service by the CEO and directors at not-for-profit organizations such as trusts, universities, clubs and other non-business associations. As before we measure the fraction of board members connected with educational ties to the CEO and refer to it as OTH\_FRAC. As Table 3 shows, the average OTH\_FRAC is 9.52% for misreporting firms versus 6.32% for other firms and the univariate difference is significant at 1%. We combine the connections arising from these two nonprofessional sources into one variable denoted as NONPROF\_FRAC, which denotes the fraction of board members that have an educational or non-business tie to the CEO. The average NONPROF\_FRAC is 10.85% for fraud firms versus 7.39% for other firms and the univariate difference is significant at 1%.

### 3.4 Other Explanatory Variables

We control for firm size using log of total assets (COMPUSTAT item data6). Profitable firms may have less need to commit fraud. To control for profitability, we include the ratio of EBITDA (earnings before interest, taxes, and depreciation, COMPUSTAT item data13) to total assets. Leverage, a proxy for closeness to debt covenant violations or financial distress, may be more likely to be associated with fraud. We define leverage as the ratio of Total Liabilities (Compustat item data 181) to total assets. Povel, Singh, and Winton (2007) show that high-growth firms facing reduced growth opportunities are most likely to engage in financial misrepresentation. To control for growth opportunities, we include Q, following Davis, Fama, and French (2000). Firms with a greater need to access external capital markets are more likely to misreport in order to reduce the cost of external financing (Dechow, Sloan, and Sweeney (1996) and Beneish (1999)). Thus, we construct a dummy variable ISSUANCE that equals 1 if the firm issues stock (COMPUSTAT item data108 > 0) or increases debt (COMPUSTAT item data111 > 0) and zero otherwise.

The univariate statistics in Table 3 suggest that size is a significant predictor of misreporting. The unconditional comparisons must be read with caution given the size effect. Leverage and issuance also matter, perhaps due to correlation with size. Among the board characteristics are board size BSIZE, which is the number of directors on the board and INDEP\_FRAC, which is the ratio of outside or supervisory directors to board size. Following Fich and Shivdasani (2007), we count the number of other directorships held by each director of the firm. We then average across all directors to create a measure BUSY that captures the incidence of busy directors at the firm level. BoardEx carries information on whether a director is classified as a financial expert. Following Agrawal and Chadha (2005), we create a variable FINEXP, which takes the value one when the board has a director who is classified as a financial expert and zero otherwise.

On a univariate basis, misreporting firms have about one more board member, an equal degree of independence, slightly greater outside appointments, and lesser financial expertise. We also consider some elements of CEO educational background, following Chevalier and Ellison (1999). We create the variable CEOIVY, which is a dummy variable that takes the value one when the CEO attended a high quality undergraduate institution, which is the “Ivy” definition proposed by Zawel (2005). Following Chevalier and Ellison (1999), this could serve as a proxy for quality or it could reflect the need to preserve reputation by a CEO. 27.48% of CEOs are classified as having an Ivy league degree in misreporting firms versus 25.22% in non-misreporting firms. We also create a variable CEOMBA, which takes the value of 1 if the CEO has an MBA degree. 26.4% of fraud firms have MBA CEOs compared to 22.7% in non-fraud firms.

While the univariate comparisons are useful descriptors, little can be inferred from them alone because of correlations between variables. This is more than a mere theoretical possibility because of the dominant role played by firm size in explaining fraud. For instance, large firms with large boards may be more likely to employ directors holding more outside appointments so any differences

in BUSY might reflect differences in firm size. We examine these and the other univariate differences using a multivariate logit specification.

## 4 Logit Estimates

In this section we present the main logit estimates that explain fraud. The dependent variable is a dummy variable that equals 1 if the firm misreports during the year and zero otherwise. In a specification that aggregates all types of connections, we find that CEO-director connections lower the probability of fraud. Given our focus on different types of connections and space constraints, we omit this specification and go directly to ones that disaggregate connections by their origin. Section 4.1 begins with a baseline model that incorporates firm and board characteristics studied in prior work. Sections 4.2 and 4.3 expand the specification to include CEO-director connectedness. We also conduct many robustness tests. As not all fit due to space constraints, we omit some. All unreported results are available from us upon request.

### 4.1 Baseline Specification

Table 4 displays estimates of baseline logit models to explain financial fraud. Among firm characteristics, firm size is significant in all specifications and is positively related to fraud. Growth firms are more likely to commit fraud, as predicted by Povel, Singh, and Winton (2007) and Wang (2008). Profitable firms are less likely to misrepresent while leverage is insignificant. Firms that access external capital markets are more likely to engage in fraud, consistent with the view that one motivation for fraud is to temporarily inflate security prices and lower costs of external finance.

The other variables included in model (1) represent selected characteristics of a firm’s board of directors drawn from prior work. Although board size is significant in the univariate comparisons of Table 3, it is insignificant in all logit models. The explanatory power of board size is essentially

absorbed by firm size. Board independence matters in all specifications. More outside directors tend to reduce the probability of fraud. The differences between the logit estimates and the univariate comparisons in Table 3 are worth stressing. Board size matters in the univariate results but is insignificant in the logit, while independence is insignificant in univariate comparisons but matters in the logit model. The differences in results largely reflect the confounding effect of size. Little can be read into the univariate comparisons absent a control for size.

Among the other board variables, we find that fraud is less likely when outside directors have more external appointments. The results support the view in Yermack (2004) and Fich and Shivdasani (2007) that reputational concerns matter for individuals active in the market for directors. In line with Agrawal and Chadha (2005), we find that financial expertise on the board reduces the probability of financial misrepresentation. This result is however not robust to the inclusion of year fixed effects. Including these makes the coefficient for financial expertise insignificant, as shown in specification (2). The likely explanation for this difference is that financial expertise on boards has increased over time so its effect on fraud is largely absorbed by year fixed effects. Consistent with Table 1, the year fixed effects are themselves significant for each year after 2002 and have a negative sign, indicating a reduction in fraud in the post-SOX period. Finally, motivated by the industry patterns noted in Table 2, we include industry fixed effects in specification (3). Several of these are significant so we include them in all the logit specifications to follow.

## 4.2 Nonprofessional Connections

We next examine the relation between CEO-director connections and fraud. We start by examining the effects of nonprofessional connections. We consider the educational ties together with the other educational attributes that we examine. In Table 5, specification (1) includes nonprofessional ties between directors and CEOs derived through non-business activities such as common club

memberships or shared service at not-for-profit organizations through the variable OTH\_FRAC. This represents the fraction of board members connected to the CEO through such non-business activities. The coefficient for OTH\_FRAC is positive and significant at 5%. Non-business CEO-board connections elevate fraud probability.

We also introduce CEO personal attributes to the first specification in Table 5. The first proxy is a dummy variable for the quality of the degree-granting undergraduate institution attended by the CEO as listed by Zawel (2005). CEOs attending high quality undergraduate institutions are less likely to commit fraud, consistent with these CEOs having greater ability. Alternatively, they could have greater concerns for reputation and other penalties from fraud. A second variable is CEOMBA, which is a dummy for whether the CEO has an MBA degree. The coefficient for CEOMBA is negative although it is not significant. CEOs with MBAs are not especially prone and perhaps even less prone to fraudulent behavior compared to non-MBA CEOs.<sup>16</sup>

Specification (2) in Table 4 introduces nonprofessional connections arising out of common educational antecedents. Following Cohen, Frazzini, and Malloy (2008) and Cohen, Frazzini, and Malloy (2010), the measure of CEO-director education connectedness is EDU\_FRAC, i.e., the fraction of the board that comes from the same undergraduate institution as the CEO. The coefficient for EDU\_FRAC is positive so educational overlaps tend to increase fraud probability, but the coefficient falls short of being significant at conventional levels ( $t$ -statistic = 1.55,  $p=0.12$ ). In specification (3), we add the educational and non-business connections to form an index of nonprofessional connections between board members and the CEO. This variable effectively aggregates and combines all ties of an informal, non-business origin between CEOs and directors. The coefficient for NONPROF\_FRAC is positive and significant.

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<sup>16</sup>We also experimented with conventional attributes such as CEO tenure and age, which can reflect horizon effects. Neither variable is significant.

In unreported results, we further investigate CEO-director educational connectedness. First, we further condition the connections by the prestige of the institution, whose empirical definition is made precise in Section 3. We find no evidence that more prestigious (or less prestigious) connections matter more. Second, we consider educational connections in which graduation dates or CEO-director age differences (for connected directors) are within a 2 year span, in the spirit of Hwang and Kim (2009). These have little effect. In our view, the results are not particularly surprising. As Cohen, Frazzini, and Malloy (2008) and Cohen, Frazzini, and Malloy (2010) point out, the important component of educational ties likely relate to cultural origins from belonging to similar institutions and sharing similar alumni networks. We support this view. Finally, besides undergraduate ties, we also examine connections between CEOs and directors formed during graduate school either by virtue of a common school, or a common school and program, or a common school, program, and year. These connections have little independent explanatory power and do not affect the other coefficients. If educational connections matter, the ones that do come from a common undergraduate alma mater, as proposed by Cohen, Frazzini and Malloy (2008, 2009).

### 4.3 Professional Connections

We next examine the role of professional connections between CEOs and directors. The measure of CEO-director employment connections is PROF\_FRAC, which is the fraction of individuals on the board of directors who were professionally employed at the same firm as the CEO at some point of time in the past, prior to the CEO's current employment. Table 6 explores its relation to fraud. The coefficient for PROF\_FRAC is negative and significant at 1%, so professional connectedness between CEOs and boards lowers the likelihood of fraud. The beneficial effect could reflect better monitoring capacity of a director who has worked with a CEO before in conjunction with or in addition to better advisory relationships between individuals who have worked before, or because

directors use knowledge of the CEO in work interactions to decide what boards they will join. While it is possible that professional connections can act as a source of personal friendships and result in more lax monitoring, this is clearly not the dominant effect in the data.

We assess a more mechanical explanation for the effects of professional connectedness. Specifically, we test the hypothesis that the professional connectedness effect is really the effect of whether the CEO is internally or externally sourced. CEOs who build their career within a firm may have few outside professional connections. Thus, the lower propensity to commit fraud of professionally connected CEOs could manifest the greater likelihood of fraud committed by internally hired CEOs. We find that internally hired CEOs are in fact less likely to commit fraud. Furthermore, the coefficient for professional connections remains significant even after including a dummy variable for internal hires, CEOINTERNAL.

Specification (2) in Table 6 examines whether the effect of professional connectedness of the CEOs and directors is diluted when we add the nonprofessional connectedness between the CEOs and directors. Nonprofessional connectedness has little effect on the coefficients for professional connections. It is also worth stressing that the signs and significance of the different forms of connectedness remain consistent across specification and do not rely on a particular configuration of explanatory variables. The basic result appears to be a robust feature of the full sample.

## 5 More Tests

As discussed in Section 1, the main endogeneity issue that arises in our study is whether connectedness picks up an unspecified attribute that is omitted from our main specifications. To address this issue, we consider several additional specifications, as well as additional variables whose effects may be picked up by connectedness. We also consider the possibility that CEOs with intent to



commit malfeasance endogenously coopt pliant directors, and the variation introduced by the 2002 Sarbanes-Oxley Act. The last section offers an overall perspective of the findings.

## 5.1 Strength of Professional Connectedness

Our basic proxy for the strength of the connections exploits the nature of the past professional overlap between CEOs and directors. To further assess the economic meaning of the variable, we consider additional variation that plausibly reflects the type and intensity of the interaction between the CEO and the director in their past job.<sup>17</sup>

We classify the professional connections as being formed when the CEO and directors were executives or into connections formed when the pair served as directors at another firm (or one was a director while the other was an executive). Interactions between individuals employed as executives at the same firm are likely to be more substantive. These likely involve more frequent discussions on substance, and under environments varying in the levels and nature of the professional issues facing firms. This type of involvement is likely to lead to a greater understanding of an executive's knowledge and style of functioning. In contrast, directors at the same firm tend to meet less frequently and the interactions are likely to be at the same depth. Thus, the effects of professional connection are likely to be the most pronounced when it is derived through common service as executives of the same team. Model (1) of Table 7 supports this view. Connections formed at the executive level (PROF\_FRAC\_E) have a significant negative effect on misconduct while those formed through shared directorships are insignificant.

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<sup>17</sup>We considered overlaps without conditioning on dates of overlap. These represent less than 2% of the professional connections sample. 98% of CEO-director professional connections display overlap in firm and time.

## 5.2 Director Quality and Director Heterogeneity

We next consider the possibility that professional connections are a proxy for director quality. For instance, firms such as General Electric, Pepsico, Procter and Gamble, and IBM serve as breeding grounds for high quality business professional (see, e.g., “Breeding Grounds for New CEOs” in *BusinessWeek*, April 30, 2009). Professional connections are perhaps more likely when executives have prior work experience at these firms. Thus, connections may be picking up the effects of executives trained at these “director” factories. We identify firms as “director factories” if the number of executives with employment histories in these firms are among the top 10% of all firms. These firms include IBM, GE, consulting firms such as Ernst and Young, Andersen, and McKinsey as well as financial firms such as Goldman Sachs.

We include as an independent variable the fraction of directors that are from these director factories. To control for CEOs who also originate from one of the director factories, we also include a dummy for whether the CEO is from a director factory. Model (2) in Table 7 reports the results. We find that greater the fraction of directors from director factories the smaller is the likelihood of fraud. The CEO’s being from a director factory is not significant, possibly because we already control for CEO ability. More interestingly, the effect of professional connections remains significant. Thus, professional connections in all forms attenuate fraud probability regardless of – or more precisely, in addition to – the professional origins of the directors. We also examine whether the connections formed between the CEO and directors at “director factories” are special. These connections have a negative but insignificant coefficients, so the the benefit of professional connections is not exclusive to connections formed at director factories.<sup>18</sup>

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<sup>18</sup>Following Engelberg, Gao, and Parsons (2009), we examine if the CEO’s rolodex or the overall connectedness of the CEO subsumes the CEO-board professional and nonprofessional connections. Our main results are robust to measures of aggregate connectedness including centrality and eigenvector centrality.

We also consider director fixed effects to control for unobserved director heterogeneity. Identification relies on variation in fraud propensity across subsamples of firms in which directors hold multiple appointments some with and some without connections. Thus, the sample of usable firms shrinks and we likely lose power. Nevertheless, specification (5) in Table 7 shows that professional connections lower fraud. This result is not likely to be driven by unobserved director heterogeneity.

We next consider the possibility that pliable directors are set in place by a CEO who already has intent to commit fraud. These directors may be lax monitors as they are obligated to the CEO for their appointment. An interesting proxy for co-option is suggested by the board literature. Following Yermack (2004) and Coles, Daniel, and Naveen (2007), we proxy captured directors as the fraction of the board appointed after the current CEO assumes office. As seen in model (3) of Table 7, AFTER\_CEO\_FRAC is not significant. Nor does it alter the coefficients for professional connections. As a further refinement of this test, we also estimate the fraction of the board of directors who are appointed after the CEO takes office and have nonprofessional connections. Model (4) includes this additional variable. The variable is not significant and it does not affect the other coefficients in any material way.

### 5.3 Compensation

Existing literature finds that the structure of executive compensation significantly affects the propensity for financial misconduct. In particular, Bergstresser and Philippon (2006), Burns and Kedia (2006), Cheng and Warfield (2005), and Erickson, Hanlon, and Maydew (2006) examine the effect of equity incentives on discretionary accruals and restatements. We obtain equity incentive data from the EXECUCOMP database. Perhaps the biggest issue that arises with this subsample is the reduction in sample size by more than 50% to 7,595 observations. Additionally, the sample

is concentrated among larger firms that comprise the EXECUCOMP database. We conduct tests in this subsample to assess the robustness of our results.

Specification (1) in Table 8 presents the logit estimates for the full logit specification reported in Table 6 plus non-cash compensation variable. Following Karpoff, Lee, and Martin(2008b) , non-cash compensation is the ratio of the compensation paid through non-cash means (i.e., excluding salary and bonus) to the total direct compensation (TDC1 in ExecuComp). We find that non-cash compensation is positively associated with fraud. The key connectedness variables remain significant in the compensation subsample. Professional connectedness mitigates fraud while non-professional CEO-director connections are positively related to fraud. Both measures matter as much as conventional measures of independence.<sup>19</sup>

Most other variables are not materially altered by the restriction to the compensation subsample or by the inclusion of the compensation variable. For instance, we find that board independence is associated with lower fraud probability. CEOs attending prestigious undergraduate programs and those with an MBA degree are less likely to be associated with fraud as are internally hired CEOs. The number of outside directorships held loses significance in this sample perhaps due to the lack of variation when the sample is constrained to include only the larger firms with ExecuComp data. In any event, controlling for compensation does not materially affect our main inferences about CEO-director connections or the asymmetry between professional and nonprofessional connections.

## 5.4 SOX

Our sample period 2000 to 2006 spans the passage of the Sarbanes Oxley Act in 2002. The Act aimed to put distance between CEOs and boards by tilting boards towards (economically) independent directors and diminishing executive roles in key aspects of board functioning. These measures,

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<sup>19</sup>Other specifications of the compensation variable do not alter these conclusions.

coupled with intense public scrutiny, increased the pressure on boards to act independently. While captured directors might have felt comfortable asking few questions of a CEO prior to 2002, the passage of SOX may make such support less forthcoming. If so, the positive relation between non-professional connectedness and fraud could weaken after 2002. A more arm’s length regime could also create greater distance between the professionally connected directors and the CEO. If such connections have beneficial effects in lowering fraud, they should be less affected by SOX.

To test for the SOX effects, we examine the effect of connections, both nonprofessional and professional on the propensity of misconduct before and after the passage of SOX. We estimate logit models separately for the pre-SOX period, defined as years 2000-2002 and the post-SOX period, defined as years 2003-2006. Specification (2) and (3) of Table 8 present the logit estimates for the pre-SOX and the post-SOX period, respectively. As before, both forms of connectedness matter in the pre-SOX period but not in the post-SOX period. The coefficient for non-professional connections declines by 50% in the post-SOX period and it is not significant, compared to a 17% decline for the professional connections coefficient, which remains significant. Thus, while SOX does distance CEOs from boards, it does not eliminate the beneficial effects of professional connectedness.<sup>20</sup>

## 5.5 Marginal Effects

In this section, we examine the logit marginal effects. Table 9 reports the marginal effect estimates and significance for the logit estimates reported in Table 8. For discrete variables such as CEOMBA or CEOIVY the marginal effects show the effect on logit probability of changing the variable from zero to one and for continuous variables, we report the effect of a one standard deviation change. To put the marginal effects in perspective, the overall probability of fraud in the Table 9 sample is

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<sup>20</sup>Boardex increases data coverage over this period so there are several new firms in the post SOX period. A proper examination of the effect of SOX requires us to observe the firm both before and after the passage of SOX. As BoardEx coverage of large firms, i.e., those covered in ExecuComp is steady over this period, we report the SOX results for the ExecuComp sample. The results are materially unchanged if we use the full sample.

3.94%. While fraud attracts significant attention from regulators and policy makers and has resulted in some of the most expansive intervention into corporative governance of public corporations, it is a relatively rare event.

As in prior work, firm size has the largest marginal effect. Model (1) shows that it has a (one standard deviation) marginal effect of 1.93%. Of the remaining variables, professional connectedness is the most significant with a (one standard deviation) marginal effect of -0.81%. Perhaps the more interesting comparison is between professional connections and board independence, which has been a major focus of received regulations. Board independence has a marginal effect of -0.35%, so professional connections have roughly twice the marginal effect of independence in attenuating fraud. Nonprofessional connections also matter and model (1) suggests that these marginal effects also exceed that of board independence in the full sample. A similar ranking emerges for the pre-SOX estimates reported in model (2). In sum, social connections matter at least as much as and perhaps more than board independence in explaining fraud.

The marginal effects for all variables decline after SOX, consistent with the lower fraud probability in the post-SOX period reported in model (3). For instance, the marginal effect for size declines from 4.14% to 1.67%. As in Table 8, there is an asymmetric decline across the different types of connectedness. Nonprofessional connectedness declines from 1.11% to 0.20%. The economic effect of professional connectedness declines from 1.59% to 0.60%. It is also informative to compare the economic effect of connections to those of firm size. The economic effect of non-professional connectedness is about 25% of that of size in the pre-SOX period and about 21% in the post-SOX period. However, the effect of professional connections is about 60% of that of size after SOX, up from about 40% of the size effect in the pre-SOX period. The results for professional connections are also interesting in view of the significant scrutiny, regulations, and discipline imposed on directors after SOX. While these could substitute for and render other effects redundant, professional

connections continue to matter. Finally, CEO attributes also matter in Table 9. The significance of the marginal effects of CEOMBA and CEOIVY suggest the importance of considering CEO attributes in a broader discussion of fraud and perhaps board composition and effectiveness.

## 5.6 Discussion

We consider the collective implications of our results and the additional tests described above. The main result is what while nonprofessional connections are positively related to fraud, professional connections lower the probability of fraud in all specifications. The result on the bright side of connections is new, so the finding and its interpretation perhaps warrant more discussion.

A candidate explanation for our results is that professional connections are proxies for director ability. Perhaps professional connections between CEOs and directors reflect the supply-side effects of well regarded firms that spawn large numbers of directors. We find evidence for this view. Nevertheless, professional connectedness remains significant even after including this control. Directors appointed after a CEO assumes office may be less assiduous monitors because they are beholden to the CEO. This variable has little effect on connections. Thus, the most conservative interpretation of our results is that professional CEO-director connectedness pick up otherwise unobserved aspects of board quality not reflected in other board attributes. The finding that professional connections can act as a positive quality attribute is new to the literature. The finding suggests that arm's length independence between boards and CEOs is perhaps just a good starting point for board reforms. Variation within independent directors that speaks to a director's professional knowledge can also matter, and matters more than independence per se in our models.<sup>21</sup>

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<sup>21</sup>A related question is whether professional connectedness reflects CEO ability. Proxies for ability suggested in the literature such as the undergraduate institution or the overall rolodex do not alter the importance of professional connections, which appear to contain orthogonal information.

Next, we turn to the role of fraud detection. Our dependent variable is a compound probability, that of committing fraud  $p_f$  and of detecting this committed fraud  $p_d$ . Thus, our estimates must be divided by the probability of fraud detection to arrive at the probability of committing fraud. Full econometric estimation with cross-sectional variables in both probabilities is attempted by Li (2010). She finds that to a first order, there is a pure scale effect with little cross-sectional shift in coefficients. In fact, *no* cross-sectional variable is materially altered by modeling detection but each probability is scaled *up* as the composite probability must be divided by the probability of fraud detection to estimate committed fraud. The true probabilities and the marginal effects are likely even greater than what our estimates indicate. It also seems economically implausible that boards with professional connections may aid and abet fraud by helping CEOs hide fraud and that this effect continues even after the stringent restrictions imposed after SOX, or that nonprofessional connections aid detection.<sup>22</sup> Finally, there is no evidence that the SEC detection technology depends on connectedness and that we are picking up this dependence. This would require that the SEC looks closer at firms with professional connected CEO-boards while looking askance at firms in which the CEO and directors have nonprofessional connections. We are unaware of any evidence to this effect.

To summarize, CEO-director connections matter even after including an exhaustive set of variables used in the governance literature. In particular, professional connections appear to have a beneficial effect in all specifications, suggesting a bright side to this particular source of connections. It is unlikely that connections are a proxy for detection, CEO ability, director ability or CEO influence over the board. Thus, at a minimum, our results indicate that CEO-director connections pick up an orthogonal dimension of governance that conventional variables do not, and they do so with asymmetric signs for connections that have professional and nonprofessional origins.

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<sup>22</sup>In fact, the Enron case cited in the introduction suggests the opposite.



## 6 Conclusion

The high profile cases of fraud at the end of the dot com era have led to one of the most sweeping regulatory interventions into corporate America, the 2002 Sarbanes Oxley Act (SOX). At the center of the financial misconduct are the CEO and the firm’s board of directors who have fiduciary responsibility towards shareholders. Frauds seem to reflect a failure of this basic governance function of boards, perhaps because directors are compromised through their nexus to CEOs. Thus, breaking the CEO-board nexus has been a key focus of regulators, policy makers, and institutional investors.

We contribute new evidence to the debate by investigating the relation between fraud and a broad vector of board attributes. While we control for traditional board measures, our focus is on newer metrics based on CEO-director connectedness. Using an extensive dataset on executive biographies, we find that the CEO-director connectedness matters and is at least as important as – and typically more important than – board independence. Perhaps more interestingly, different types of connections have different-signed effects. Connections of non-business origins such as those from common alma mater and non-business activities elevate fraud probability. This is the traditional agency viewpoint of connections. However, fraud probability is reliably lower when CEOs and directors have professional connections originating in shared employment experiences, especially when the connected individuals serve as employees rather than as directors or director and employee. The result on the bright side of connections is new to the finance literature.

We also examine several other attributes that could explain fraud. Having an MBA degree does not increase and sometimes significantly decreases fraud probability. We find that fraud is less likely when CEOs are internally hired, educated at reputed schools, when board members have more external appointments, or when they are drawn from prestigious “director factory” firms. The last result suggests that there is value in the training realized at firms that have historically been a breeding ground for executive talent in corporate America.

Our results reinforce the value of studying the “multiplex” of connections in social network analysis. Connections with different institutional origins operate through different channels and have different economic effects. The possibility of different effects is worth stressing. Sociologists and social network researchers argue that any *one* type of network could have positive or negative effects (see, e.g., Coleman (1990), p. 302 and Putnam (2000), chapter 22). Our point is that different *types* of connections could result in different economic outcomes. It is therefore not always appropriate to sum the different types of connections to form a single aggregate connectedness index. We do not say that this practice is always incorrect. When all types of connections contribute similarly (and positively), e.g. in searching for merger targets, summing up connections may be reasonable and even desirable to gain statistical power. However, this practice may not be empirically appropriate when different connections have different-signed effects on economic outcomes.

Finally, our study also informs a broader debate on board design. The evidence suggests that the commonly studied attributes of board effectiveness such as board size, independence, or financial expertise can be enriched by incorporating broader metrics related to CEO-board connections. Our results certainly support the growing consensus that CEO-board connections deserve closer scrutiny as part of the governance process. However, the mere existence of connectedness is not bad. Connections do not necessarily indicate unhealthy boards or governance systems in dysfunction. The genesis of the connections matters.

The more general point emphasized by our results is that not all independent directors are equal. Thus, independence is reasonable but only a useful first step. Researching the heterogeneity *within* independent directors is a profitable avenue for further investigation. We regard our research as one step in this direction.

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**Table 1:** Distribution of Fraud and Non Fraud Firms

Table 1 displays the distribution of firms in the fraud and the non-fraud sample over the period 2000-2006. Firms in the fraud sample are those that were subject to SEC enforcement actions for misreporting their financials. Firms in the non-fraud sample consist of all other firms that have complete data on board of directors in BoardEx and coverage in CRSP/Compustat.

Year	Fraud not firms	Non-Fraud firms	Total firms	% Fraud Firms
2000	1,424	76	1,500	5.07%
2001	1,739	102	1,841	5.54%
2002	1,809	109	1,918	5.68%
2003	3,443	104	3,547	2.93%
2004	4,226	87	4,313	2.02%
2005	4,514	55	4,569	1.20%
2006	4,138	27	4,165	0.65%
Total	21,293	560	21,853	2.6 %

**Table 2:** Industry Distribution of Financial Fraud

Table 2 displays the distribution of firms in the fraud and non-fraud sample for the 48 Fama-French industries in the period from 2000-2006.

Industry	Industry Name	Non-Fraud Firms	Fraud Frims	% Fraud Firms
1	Agriculture	37	11	22.9%
2	Food products	260	17	6.1%
3	Soda	36	0	0.0%
4	Beer	61	0	0.0%
5	Smoke	32	0	0.0%
6	Toys & Recreation	114	5	4.2%
7	Fun Entertainment	261	2	0.8%
8	Printing & Publishing	97	6	3.0%
9	Household Consumer Goods	255	3	1.2%
10	Clothes Apparel	266	1	0.4%
11	Healthcare	353	1	3.0%
12	Medical equipment	670	2	0.3%
13	Pharmaceutical Products	1,301	20	1.5%
14	Chemicals	382	6	1.5%
15	Rubber & Plastic Products	113	4	3.4%
16	Textiles	39	0	0.0%
17	Construction Material	294	2	0.7%
18	Construction	246	14	5.4%
19	Steel works etc	236	0	0.0%
20	Fabricated Products	41	0	0.0%
21	Machinery	571	40	6.5%
22	Electrical Equipment	285	4	1.4%
23	Automobiles and Trucks	262	15	5.4%
24	Aircraft	106	5	4.5%
25	Shipbuilding & Railroad Equip.	47	6	11.3%
26	Defense	38	0	0.0%
27	Precious Metals	32	0	0.0%
28	Non Metallic & Metal mining	57	0	0.0%
29	Coal	60	0	0.0%
30	Petroleum and Natural gas	722	14	1.9%
31	Utilities	637	21	3.2%
32	Communication	574	17	2.9%
33	Personal Services	226	5	2.2%
34	Business Services	2,387	73	3.0%
35	Computer Hardware	760	50	6.2%
36	Computer Software	1,298	52	3.9%
37	Electronic Equipment	460	11	2.3%
38	Measuring & Control Equip.	229	4	1.7%
39	Business Supplies	64	0	0.0%
40	Shipping Containers	482	13	2.6%
41	Transportation	621	25	3.9%
42	Wholesale	1,011	27	2.6%
43	Retail	323	5	1.5%
44	Rest., Hotels & Motels	2,584	21	0.8%
45	Banking	760	27	3.4%
46	Insurance	108	5	4.4%
47	Real Estate	1,292	16	1.2%
48	Trading	103	0	0.0%
Total		21,293	560	2.6%

**Table 3:** Descriptive Statistics

Table 3 displays summary statistics for explanatory variables for firms in the fraud and non-fraud samples from fiscal 2000 to fiscal 2006. PROF\_FRAC denotes the number of supervisory directors who worked together professionally at a firm prior to the CEO's current assignment. NON\_PROF\_FRAC denotes the number of directors who either share a common undergraduate alma mater or who share service in a nonprofessional capacity with the CEO. EDU\_FRAC denotes the number of supervisory directors who attended the same undergraduate school as the CEO. OTH\_FRAC is the number of directors that share nonprofessional service with the CEO. All connection variables are scaled by the number of directors in the firm's board. SIZE denotes the book value of assets, TOBINQ is market value to book value. EBITDA is earnings before interest, taxes, and depreciation scaled by total assets. ISSUANCE equals 1 if the firm issues equity or debt in the fiscal year and zero otherwise. BSIZE, board size, is the number of directors and INDEP\_FRAC is the percentage of outside directors on the board. BUSY is the average number of other directorships held by directors, FINEXP equals 1 if the board has a designated financial expert and zero otherwise. CEOMBA equals 1 if the CEO has an MBA and zero otherwise. CEOIVY equals 1 if the CEO's undergraduate degree is from a prestigious school as defined in Zawal (2005) and zero otherwise. The table presents the mean and median for each sample, the t-statistic for the difference in the mean, and the Wilcoxon-z statistic for the difference in the median. The superscripts <sup>c</sup>, <sup>b</sup>, and <sup>a</sup> indicate significance at the 10%, 5% and 1% levels, respectively, using robust standard errors.

Variable	Non-Fraud		Fraud		<i>t</i> -statistic	Wilcoxon <i>z</i>
<i>Professional Connections</i>						
PROF_FRAC	13.61%	0.00%	8.44%	0.00%	5.342 <sup>a</sup>	2.817 <sup>a</sup>
<i>Education and Other Connections</i>						
NONPROF_FRAC	7.39%	0.0%	10.85%	0.0%	-6.42 <sup>a</sup>	-5.95 <sup>a</sup>
EDU_FRAC	1.11%	0.00%	1.37%	0.0%	-1.360	-1.507
OTH_FRAC	6.32%	0.00%	9.52%	0.0%	-6.54 <sup>a</sup>	-5.68 <sup>a</sup>
<i>Firm Characteristics</i>						
SIZE	,6607	658	39,991	2,213	-15.34 <sup>a</sup>	-14.35 <sup>a</sup>
TOBINQ	2.113	1.492	2.169	1.424	-0.659	1.180
EBITDA	6.23%	9.32%	8.7%	9.44%	-2.402 <sup>a</sup>	-1.706*
LEVERAGE	22.21%	17.05%	25.3%	22.54%	-2.956 <sup>a</sup>	-4.299 <sup>a</sup>
ISSUANCE	0.97		0.99		-3.396 <sup>a</sup>	
<i>CEO and Board characteristics</i>						
BSIZE	8.58	8.00	9.39	9.00	-6.849 <sup>a</sup>	-6.349 <sup>a</sup>
INDEP_FRAC	79.56%	83.33%	79.73%	83.33%	-0.339	-0.176
BUSY	1.43	1.00	1.60	1.0	-4.926 <sup>a</sup>	-5.030 <sup>a</sup>
FINEXP	2.93%		1.78%		-5.629 <sup>a</sup>	
CEOMBA	22.7%		26.4%		0.490	0.498
CEOIVY	25.22%		27.48%		1.473	1.470

**Table 4:** Base Model For Financial Misconduct

Table 4 displays estimates of logit models. The dependent variable is 1 if the firm engages in fraud in the fiscal year and is zero otherwise. The data are from 2000 to 2006. LSIZE is the logarithm of the book value of assets, TOBINQ is the ratio of firm market value to book value, EBITDA is earnings before interest, taxes, and depreciation scaled by total assets, ISSUANCE equals 1 if the firm issues equity or debt in the fiscal year and zero otherwise, BSIZE is the number of total directors on the board, INDEP\_FRAC is the percentage of outside directors on the board, BUSY is the average number of other directorships held by directors, FINEXP is a dummy which is equal to 1 if the board has a designated financial expert. CEOMBA equals 1 if the CEO has an MBA and zero otherwise. CEOIVY equals 1 if the CEO's undergraduate degree is from a prestigious school as defined in Zawel (2005) and zero otherwise. Coefficients for time and industry fixed effects are not shown. The superscripts <sup>c</sup>, <sup>b</sup>, and <sup>a</sup> indicate significance at the 10%, 5% and 1% levels, respectively, using robust standard errors.

	Model 1	Model 2	Model 3
LSIZE	0.414 <sup>a</sup> (14.436)	0.405 <sup>a</sup> (13.641)	0.471 <sup>a</sup> (14.509)
TOBINQ	0.055 <sup>**</sup> (2.384)	0.05 <sup>b</sup> (2.184)	0.037 (1.382)
EBITDA	-0.700 <sup>a</sup> (3.434)	-0.807 <sup>a</sup> (3.767)	-0.714 <sup>a</sup> (2.825)
LEVERAGE	-0.263 (1.439)	-0.266 (1.469)	0.018 (0.105)
ISSUANCE	1.138 <sup>b</sup> (2.241)	1.094 <sup>b</sup> (2.164)	1.051 <sup>**</sup> (2.067)
BSIZE	-0.013 (0.598)	-0.03 (1.402)	-0.015 (0.676)
INDEP_FRAC	-1.028 <sup>a</sup> (2.948)	-0.451 (1.224)	-0.938 <sup>b</sup> (2.417)
BUSY	-0.088 <sup>c</sup> (1.725)	-0.125 <sup>b</sup> (2.432)	-0.143 <sup>a</sup> (2.71)
FINEXP	-0.253 (2.815) <sup>a</sup>	0.033 (0.318)	0.058 (0.539)
INTERCEPT	-6.263 <sup>a</sup> (11.456)	-6.076 <sup>a</sup> (10.831)	-3.553 <sup>a</sup> (5.424)
Year Fixed Effects	No	Yes	Yes
Industry Fixed Effects	No	No	Yes
# Observations	18,503	18,503	17,712
Pseudo- $R^2$	0.068	0.099	0.149

**Table 5:** Financial Misconduct and CEO-Director Nonprofessional Connectedness

Table 5 displays estimates of logit models. The dependent variable is 1 if the firm engages in fraud in the fiscal year and is zero otherwise. The data are from 2000 to 2006. LSIZE is the logarithm of the book value of assets, TOBINQ is the ratio of firm market value to book value, EBITDA is earnings before interest, taxes, and depreciation scaled by total assets, ISSUANCE equals 1 if the firm issues equity or debt in the fiscal year and zero otherwise, BSIZE is the number of total directors on the board, INDEP\_FRAC is the percentage of outside directors on the board, BUSY is the average number of other directorships held by directors, FINEXP is a dummy which is equal to 1 if the board has a designated financial expert. CEOMBA equals 1 if the CEO has an MBA and zero otherwise. CEOIVY equals 1 if the CEO's undergraduate degree is from a prestigious school as defined in Zawel (2005) and zero otherwise. EDU\_FRAC denotes the number of supervisory directors who attended the same undergraduate school as the CEO. The variable OTH\_FRAC is the number of supervisory directors that share nonprofessional service with the CEO, and NONPROF\_FRAC denotes the number of supervisory directors who either share a common undergraduate alma mater or who share service in a nonprofessional capacity with the CEO. All connectedness variables are scaled by board size. Coefficients for time and industry fixed effects are not shown. The superscripts <sup>c</sup>, <sup>b</sup>, and <sup>a</sup> indicate significance at the 10%, 5% and 1% levels, respectively, using robust standard errors.

	Model 1	Model 2	Model 3
LSIZE	0.474 <sup>a</sup> (14.2)	0.476 <sup>a</sup> (14.215)	0.473 <sup>a</sup> (14.188)
TOBINQ	0.041 (1.553)	0.04 (1.527)	0.041 (1.53)
EBITDA	-0.705 <sup>a</sup> (2.705)	-0.693 <sup>a</sup> (2.631)	-0.697 <sup>a</sup> (2.662)
LEVERAGE	0.012 (0.069)	0.016 (0.088)	0.016 (0.089)
ISSUANCE	1.02 <sup>b</sup> (2.011)	1.016 <sup>b</sup> (2.013)	1.02 <sup>b</sup> (2.017)
BSIZE	-0.017 (0.779)	-0.017 (0.755)	-0.018 (0.787)
INDEP_FRAC	-1.013 (2.518) <sup>b</sup>	-1.02 (2.529) <sup>b</sup>	-1.022 (2.539) <sup>b</sup>
BUSY	-0.142 <sup>a</sup> (2.643)	-0.141 <sup>a</sup> (2.622)	-0.144 <sup>a</sup> (2.677)
FINEXP	0.061 (0.563)	0.063 (0.583)	0.062 (0.572)
OTH_FRAC	0.756 <sup>b</sup> (2.108)	0.706 <sup>b</sup> (1.961)	
EDU_FRAC		1.636 (1.554)	
NONPROF_FRAC			0.839 (2.515) <sup>b</sup>
CEOMBA	-0.165 (1.567)	-0.162 (1.539)	-0.163 (1.554)
CEOIVY	-0.272 <sup>b</sup> (-2.593)	-0.288 <sup>a</sup> (-2.732)	-0.281 <sup>a</sup> (2.68)
INTERCEPT	-3.328 <sup>a</sup> (5.111)	-3.373 <sup>a</sup> (5.177)	-3.331 <sup>a</sup> (5.124)
Year Fixed Effects	Yes	Yes	Yes
Industry Fixed Effects	Yes	Yes	Yes
# Observations	17,363	17,363	17,363
Pseudo- $R^2$	0.152	0.153	0.153

**Table 6:** Financial Misconduct and CEO-Director Professional Connectedness

Table 6 displays estimates of logit models. The dependent variable is 1 if the firm engages in fraud in the fiscal year and is zero otherwise. The data are from 2000 to 2006. LSIZE is the logarithm of the book value of assets, TOBINQ is the ratio of firm market value to book value, EBITDA is earnings before interest, taxes, and depreciation scaled by total assets, ISSUANCE equals 1 if the firm issues equity or debt in the fiscal year and zero otherwise, BSIZE is the number of total directors on the board, INDEP\_FRAC is the percentage of outside directors on the board, BUSY is the average number of other directorships held by directors, FINEXP is a dummy which is equal to 1 if the board has a designated financial expert. CEOINTERNAL equals 1 if the CEO is internally hired and zero otherwise. CEOMBA equals 1 if the CEO has an MBA and zero otherwise. CEOIVY equals 1 if the CEO's undergraduate degree is from a prestigious school as defined in Zawel (2005) and zero otherwise. NONPROF\_FRAC denotes the number of supervisory directors who either share a common undergraduate alma mater or who share service in a nonprofessional capacity with the CEO. PROF\_FRAC denotes the number of supervisory directors who worked together professionally at a firm prior to the CEO's current assignment. All connectedness variables are scaled by board size. Coefficients for time and industry fixed effects are not shown. The superscripts <sup>c</sup>, <sup>b</sup>, and <sup>a</sup> indicate significance at the 10%, 5% and 1% levels, respectively, using robust standard errors.

	Model 1	Model 2
LSIZE	0.473 <sup>a</sup> (14.524)	0.487 <sup>a</sup> (14.399)
TOBINQ	0.034 (1.248)	0.039 (1.483)
EBITDA	-0.757 <sup>a</sup> (3.002)	-0.722 <sup>a</sup> (2.683)
LEVERAGE	0.018 (0.1)	0.03 (0.164)
ISSUANCE	1.034 <sup>b</sup> (2.035)	0.995 <sup>b</sup> (1.973)
BSIZE	-0.019 (0.84)	-0.016 (0.72)
INDEP_FRAC	-0.804 <sup>b</sup> (2.061)	-0.879 <sup>b</sup> (2.185)
BUSY	-0.098 <sup>c</sup> (1.885)	-0.104 <sup>b</sup> (1.969)
FINEXP	0.066 (0.612)	0.072 (0.669)
CEOINTERNAL		-0.362 <sup>a</sup> (3.633)
CEOMBA		-0.172 (1.618)
CEOIVY		-0.287 <sup>a</sup> (2.72)
NONPROF_FRAC		0.993 <sup>a</sup> (2.932)
PROF_FRAC	-1.149 <sup>a</sup> (4.126)	-1.443 <sup>a</sup> (5.06)
INTERCEPT	-3.606 <sup>a</sup> (5.471)	-3.418 <sup>a</sup> (5.162)
Year Fixed Effects	Yes	Yes
Industry Fixed Effects	Yes	Yes
# Observations	17,708	17,363
Pseudo- $R^2$	0.152	0.159



**Table 7: Robustness of Professional Connectedness**

Table 7 displays estimates of logit models. The dependent variable is 1 if the firm engages in fraud in the fiscal year and is zero otherwise. The data are from 2000 to 2006. Control variables that are included but whose coefficients are suppressed include LSIZE, TOBINQ, EBITDA, LEVERAGE, ISSUANCE, BSIZE, FRAC\_INDEP, BUSY, and FINEXP. CEOINTERNAL equals 1 if the CEO is internally hired and zero otherwise. CEOMBA equals 1 if the CEO has an MBA and zero otherwise. CEOIVY equals 1 if the CEO's undergraduate degree is from a prestigious school as defined in Zawel (2005) and zero otherwise. NONPROF\_FRAC denotes the number of supervisory directors who either share a common undergraduate alma mater or who share service in a nonprofessional capacity with the CEO. PROF\_FRAC denotes the number of supervisory directors who worked together professionally at a firm prior to the CEO's current assignment. PROF\_FRAC\_E denotes the same quantity but where the prior employment is such that both the CEO and the director were employed as executives, PROF\_FRAC\_D denotes these connections derived from common directorships at the same board, CEOFACTORY and FRAC\_FACTORIES denote a CEO or the fraction of a board formerly employed by one of the top 10% of suppliers of directors, respectively. AFTER\_CEO\_FRAC denotes the proportion of directors appointed after the CEO assumes office, and AFTER\_CEO\_FRAC\_NONPROF denotes the subset of such directors with a prior nonprofessional overlap with the CEO. All connectedness variables are scaled by board size. Model 5 is a director-level specification with director fixed effects. Coefficients for time and industry fixed effects are not shown. The superscripts <sup>c</sup>, <sup>b</sup>, and <sup>a</sup> indicate significance at the 10%, 5% and 1% levels, respectively, using robust standard errors.

	Model 1	Model 2	Model 3	Model 4	Model 5
CEOINTERNAL	-0.335 <sup>a</sup> (3.33)	-0.358 <sup>a</sup> (3.58)	-0.354 <sup>a</sup> (3.53)	-0.356 <sup>a</sup> (3.55)	-0.1650 <sup>b</sup> (-2.37)
CEOMBA	-0.154 (1.46)	-0.149 (1.39)	-0.148 (1.37)	-0.146 (1.35)	-0.1025 (-1.34)
CEOIVY	-0.305 <sup>a</sup> (2.89)	-0.28 <sup>a</sup> (2.66)	-0.282 <sup>a</sup> (2.66)	-0.282 <sup>a</sup> (2.66)	-0.184 <sup>b</sup> (-2.37)
NONPROF_FRAC	0.914 <sup>a</sup> (2.70)	1.082 <sup>a</sup> (3.21)	1.074 <sup>a</sup> (3.17)	1.198 <sup>a</sup> (4.35)	1.0597 <sup>a</sup> (-1.289 <sup>a</sup> )
PROF_FRAC		-1.439 <sup>a</sup> (-5.06)	-1.433 <sup>a</sup> (-5.04)	-1.439 <sup>a</sup> (-5.06)	(-5.29)
FRAC_FACTORIES		-0.841 <sup>a</sup> (-3.53)	-0.844 <sup>a</sup> (-3.55)	-0.844 <sup>a</sup> (-3.55)	-1.4307 <sup>a</sup> (-6.26)
PROF_FRAC_E	-3.075 <sup>a</sup> (3.589)				
PROF_FRAC_D	0.198 (0.20)				
CEOFACTORY		0.007 (0.23)	0.008 (0.26)	0.008 (0.27)	
AFTER_CEO_FRAC			0.056 (0.34)	0.071 (0.43)	
AFTER_CEO_FRAC_NONPROF				-0.761 (0.72)	
Year Fixed Effects	Yes	Yes	Yes	Yes	Yes
Industry Fixed Effects	Yes	Yes	Yes	Yes	Yes
# Observations	17,363	17,363	17,363	17,363	13,842
Pseudo-R <sup>2</sup>	0.157	0.161	0.161	0.161	0.290

**Table 8:** Compensation Subsample and SOX

Table 8 displays results of Logit estimations where the dependent variable is a dummy that takes the value one when the firm engages in fraud. The data are from 2000 to 2006. LSIZE is the log of total assets, TOBINQ is the ratio of firm market value to its book value, EBITDA is scaled by Total Assets, ISSUANCE is a dummy variable if the firm issues equity or debt in the fiscal year, BSIZE is the number of total directors on the board, INDEP\_FRAC is the percentage of outside directors on the board, BUSY is the average number of other directorships held by directors, FINEXP is a dummy which is equal to 1 if the board has a designated financial expert, NONCASH is the percentage of non-cash compensation in the pay packages of the firm's executive team as reported in the ExecuComp database, CEOMBA is a dummy variable that equals one when the CEO has an MBA degree, CEOIVY area is a dummy variable that equals one if the CEO has an Ivy League undergraduate, CEOINTERNAL equals 1 if the CEO is internally hired and zero otherwise, NONPROF\_FRAC is the fraction of the board that have nonprofessional, i.e., education or other social connections with the CEO, and PROF\_FRAC is the fraction of the board that has employment connections with the CEO. Time and Industry fixed effects not shown for brevity. The superscripts <sup>c</sup>, <sup>b</sup>, and <sup>a</sup> indicate significance at the 10%, 5% and 1% levels, respectively, using robust standard errors.

	Full Sample	Pre-SOX	Post-SOX
LSIZE	0.464 <sup>a</sup> (9.16)	0.631 <sup>a</sup> (8.073)	0.311 <sup>a</sup> (4.609)
TOBINQ	-0.055 (1.279)	-0.087 (1.23)	0.066 (0.925)
EBITDA	-1.377 <sup>a</sup> (3.175)	-2.912 <sup>a</sup> (2.909)	-1.195 <sup>a</sup> (2.658)
LEVERAGE	0.592 <sup>c</sup> (1.849)	0.759 <sup>a</sup> (2.145)	0.622 (1.375)
ISSUANCE	0.541 (0.984)	0.227 (0.362)	0.842 (0.849)
BSIZE	-0.029 (0.988)	-0.052 (1.356)	0.00 (0.01)
INDEP_FRAC	-1.462 <sup>a</sup> (2.656)	-1.434 <sup>a</sup> (2.061)	-1.238 (1.244)
BUSY	-0.098 (1.555)	-0.13 (1.532)	-0.047 (0.456)
FINEXP	0.066 (0.493)	-0.033 (0.178)	0.27 (1.166)
NONCASH	0.72 <sup>b</sup> (2.518)	0.178 (0.505)	1.399 <sup>a</sup> (3.048)
CEOMBA	-0.327 <sup>b</sup> (2.456)	-0.134 (0.736)	-0.563 <sup>a</sup> (2.738)
CEOIVY	-0.493 <sup>a</sup> (3.666)	-0.709 <sup>a</sup> (3.734)	-0.31 (1.582)
CEOINTERNAL	-0.417 <sup>a</sup> (3.372)	-0.502 <sup>a</sup> (2.943)	-0.356 <sup>a</sup> (1.931)
NONPROF_FRAC	1.435 <sup>a</sup> (3.726)	1.952 <sup>a</sup> (3.757)	0.954 (1.546)
PROF_FRAC	-1.826 <sup>a</sup> (5.167)	-2.122 <sup>a</sup> (4.171)	-1.765 <sup>a</sup> (3.5)
INTERCEPT	-1.731 <sup>b</sup> (2.012)	-2.376 (2.148)	-3.559 (2.551)
Year Fixed Effects	Yes	Yes	Yes
Industry Fixed Effects	Yes	Yes	Yes
# Observations	7,595	2,545	4,682
Pseudo-R <sup>2</sup>	0.165	0.188	0.146

**Table 9:** Marginal Effects

Table 9 displays marginal effects of logit estimates. The dependent variable is 1 if the firm engages in fraud in the fiscal year and is zero otherwise. The full sample is from 2000-2006 and the pre-SOX and post-SOX periods cover subperiods until 2000 and after 2003, respectively. LSIZE is the logarithm of the book value of assets, TOBINQ is the ratio of firm market value to book value, EBITDA is earnings before interest, taxes, and depreciation scaled by total assets, ISSUANCE equals 1 if the firm issues equity or debt in the fiscal year and zero otherwise, BSIZE is the number of total directors on the board, INDEP\_FRAC is the percentage of outside directors on the board, BUSY is the average number of other directorships held by directors, FINEXP is a dummy which is equal to 1 if the board has a designated financial expert. CEOINTERNAL equals 1 if the CEO is internally hired and zero otherwise. CEOMBA equals 1 if the CEO has an MBA and zero otherwise. CEOIVY equals 1 if the CEO's undergraduate degree is from a prestigious school as defined in Zawel (2005) and zero otherwise. NONPROF\_FRAC denotes the number of supervisory directors who either share a common undergraduate alma mater or who share service in a nonprofessional capacity with the CEO. PROF\_FRAC denotes the number of supervisory directors who worked together professionally at a firm prior to the CEO's current assignment. All connectedness variables are scaled by board size. NONCASH is equity compensation to total compensation for the top 5 executive officers. Coefficients for time and industry fixed effects are not shown. Superscripts <sup>c</sup>, <sup>b</sup>, and <sup>a</sup> indicate significance at the 10%, 5% and 1% levels, respectively using robust standard errors.

	Full Sample	Pre-SOX	Post-SOX
LSIZE	1.93% <sup>a</sup> (9.52)	4.16% <sup>a</sup> (8.80)	1.04% <sup>a</sup> (5.08)
TOBINQ	-0.15% (-1.06)	-0.54% (-1.26)	0.13% (-0.74)
EBITDA	-0.48% <sup>a</sup> (-4.70)	-1.14% <sup>a</sup> (-2.89)	-0.34% <sup>a</sup> (-3.33)
LEVERAGE	0.18% (1.28)	0.57% <sup>c</sup> (1.78)	0.00% (-0.02)
ISSUANCE	0.95% (1.16)	0.73% (0.36)	0.97% (1.11)
BSIZE	-0.17% (-0.91)	-0.59% (-1.32)	0.00% (0.00)
INDEP_FRAC	-0.35% <sup>b</sup> (-2.44)	-0.64% <sup>b</sup> (-1.98)	-0.18% (-0.98)
BUSY	-0.21% (-1.52)	-0.50% (-1.52)	-0.06% (-0.39)
FINEXP	0.17% (0.53)	-0.11% (-0.15)	0.48% (1.33)
NONCASH	0.56% <sup>b</sup> (2.34)	0.14% (0.40)	0.93% <sup>a</sup> (2.95)
CEOMBA	-0.72% <sup>a</sup> (-2.54)	-0.50% (-0.74)	-0.92% <sup>a</sup> (-2.92)
CEOIVY	-1.05% <sup>a</sup> (-4.01)	-2.43% <sup>a</sup> (-4.15)	-0.49% (-1.56)
INTERNAL	-0.96% <sup>a</sup> (-3.32)	-1.88% <sup>a</sup> (-2.92)	0.62% <sup>c</sup> (-1.86)
NONPROF_FRAC	0.47% <sup>a</sup> (3.68)	1.11% <sup>a</sup> (3.61)	0.22% (1.46)
PROF_FRAC	-0.81% <sup>a</sup> (-4.93)	-1.59% <sup>a</sup> (-3.94)	-0.60% <sup>a</sup> (-3.34)
Year Fixed Effects	Yes	Yes	Yes
Industry Fixed Effects	Yes	Yes	Yes
# Observations	7,595	2,545	4,682