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CEO Connectedness and Corporate Frauds

Vikramaditya Khanna, E. Han Kim, and Yao Lu*

ABSTRACT

We find connections CEOs develop with top executives and directors through their appointment decisions heighten the risk of corporate fraud. Appointment-based CEO connectedness in executive suites and boardrooms increases the likelihood of committing fraud and decreases the likelihood of detection. Additionally, it decreases expected costs of fraud by helping to conceal frauds, making CEO dismissal less likely upon fraud discovery, and lowering the coordination costs of carrying out illegal activities. Connections based on network ties through past employment, education, or social organization memberships have insignificant effects on frauds. Appointment-based CEO connectedness warrants attention from regulators, investors, and corporate governance specialists.

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Accusations of corporate and securities fraud dominated headlines over the last decade. Corporate wrongdoing damages investor confidence, hurts shareholder value, causes misallocation of capital, and increases financial market instability, leading a number of scholars to examine factors affecting the likelihood of fraud and its detection.[1] Largely absent from these inquiries, however, is the role played by the CEO's connections with other leaders within the firm.[2] CEOs have substantial "soft" influence along with explicit legal authority within the firm to direct corporate behavior,[3] of which wrongdoing is but one potential outcome. This soft influence is likely to be strengthened by the CEO's internal connections.

CEO connections with other top executives and directors could increase or decrease the incidence of corporate fraud. As with other corporate activities, corporate wrongdoing often requires coordination between, or acquiescence by, top executives and/or board members. The coordination and acquiescence can be in the form of direct involvement in criminal activities or a reluctance to "blow the whistle." CEOs' close connections may help obtain the necessary support and thereby facilitate wrongdoing. However, it may also help deter frauds. The CEO's familiarity with other top executives may enable him to detect early signs of fraud. Or when a CEO is unaware or uncertain about the illegality of certain activity, a common problem in some areas of white collar crime, closer interpersonal relationships could

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[1] See Karpoff and Lott (1993); Beatty, Bunsis, and Hand (1998); Bhagat, Bizjak, and Coles (1998); Karpoff, Lee, and Vendrzyk (1999); Bar-Gill and Bebchuk (2002); Karpoff, Lee, and Martin (2008a); Karpoff, Lee, and Martin (2008b); Gande and Lewis (2009); Murphy, Shrieves, and Tibbs (2009); and Karpoff, Lee, and Martin (2014). Yu (2013) surveys this literature, highlighting the enormous welfare loss stemming from corporate fraud.

[2] A notable exception is Chidambaran, Kedia, and Prabhala (2012), who study how CEO-board network ties are related to fraud likelihood.

[3] The importance of CEO influence on firm behavior and performance is well documented. Graham, Harvey, and Puri (2013) show CEOs' behavioral traits such as optimism, risk-aversion, and time preference are related to corporate financial policies and managerial compensation; Bertrand and Shoar (2003) find CEO characteristics matter for a wide range of firm policies; Bennedsen, Perez-Gonzalez, and Wolfenzon (2006) document that CEO deaths are strongly negatively correlated with firm profitability and growth; Cronqvist, Makhija, and Yonker (2012) show differences in corporate financial leverage can be traced to CEOs' personal leverage; and Jenter and Lewellen (2014) find CEO age approaching retirement has an important impact on the likelihood of their firms being taken over and the takeover premiums their shareholders receive. Also see Allen, Kraakman, and Subramanian (2012) for discussion of CEOs' legal authority to contractually bind the firm for ordinary transactions.

make it easier for other executives and board members to provide friendly information to the CEO to help avoid wrongdoing. Further, the CEO's close connections could make it easier to stamp out fraud from which the CEO does not anticipate personal gains. That is, CEO connectedness can cut both ways. Which effect prevails is an empirical question.

We consider two sources of CEO connectedness to top executives and directors: through appointment decisions and prior network ties. Our results indicate that appointment-based connectedness warrants particular attention. It is significantly associated with not only greater fraud likelihood, but also with lower expected costs of engaging in fraud: it decreases the likelihood of fraud detection, lengthens the time from fraud commission to its detection, reduces the likelihood of forced CEO turnover upon discovery of fraud, and lowers the coordination costs needed to carry out illegal activities.

Appointment-based CEO connectedness is measured by the fraction of top corporate leaders – top executives and directors – appointed during the current CEO's tenure. Such connections increase what social psychologists refer to as social influence, which relies on norms of reciprocity, liking, and social consensus to shape group decision-making processes (Cialdini (1984)). Social influence facilitates the acquiescence or coordination required to engage in fraud and keep it from view. When more top executives are appointed during a CEO's tenure, the CEO's social influence increases because CEOs are heavily involved in recruiting, nominating, and appointing top executives. Those executives are more likely to share similar beliefs and visions with, and may be beholden to, the CEO who hired or promoted them to their current positions than executives appointed during a previous CEO's tenure (Landier, Sauvagnat, Sraer, and Thesmar (2013); Kim and Lu (2014)). CEOs also tend to be involved in appointing board members either directly or indirectly through consultation with the nominating committee. Consequently, directors recruited during a CEO's tenure may similarly be beholden to the CEO (Morse, Nanda, and Seru (2011); Coles, Daniel, and Naveen (2014)). In other words, appointment-based CEO connectedness with corporate leaders may weaken the checks and balances required for prevention of corporate wrongdoing and detection.

Inadequate checks and balances in the executive suite and the boardroom breed fraud, make detection difficult, and reduce the expected costs of wrongdoing.

In contrast to appointment-based connectedness, CEO connectedness based on sharing prior education, employment, or social network ties with top executives or directors have insignificant effects on fraud or the expected costs of wrongdoing. The insignificant effect may be attributed to a weaker sense of loyalty. When one is appointed to a top executive position or recommended to the board by a CEO, she may feel a sense of loyalty to the CEO. Such loyalty is likely to be weaker or absent when the connection is through network ties. One may even argue sharing similar education or work experiences can breed a sense of competition within the firm that may not fit as comfortably with loyalty.

Our sample covers 17,797 firm-year observations associated with 2,736 unique firms during the period 1996 through 2006. We identify 309 fraud cases with 873 firm-year fraud observations, in which the CEO is a named respondent and data is available to construct appointment-based CEO connectedness variables. Our primary source of fraud data is the Federal Securities Regulation (FSR) database (Karpoff, Koester, Lee, and Martin (2014)) generously provided by Karpoff and Martin. FSR provides the most comprehensive and accurate data on financial misstatements. We add other types of fraud by supplementing FSR with fraud allegations contained in the Securities and Exchange Commission's (SEC's) Litigation Releases and in the Stanford Securities Class Action Clearinghouse (SSCAC).

Inherent in any fraud sample is the partial observability problem: We observe detected frauds, not the population of frauds. Since observed fraud depends on two distinct but latent processes—commitment of fraud and detection of fraud—we follow Wang, Winton, and Yu (2010) and Wang (2013) and employ the bivariate probit model. CEO connectedness with top executives is measured by the fraction of the top four non-CEO executives appointed (FTA) during the current CEO's tenure; CEO connectedness with directors, by the fraction of directors appointed (FDA) during a CEO's tenure. These fractions at a particular point in time depend on how long the CEO has been in the office. Thus, our analyses control for CEO tenure throughout the paper.

Both measures of CEO connectedness are positively related to the likelihood of wrongdoing and negatively related to the likelihood of detection, given wrongdoing. These findings are robust to two-stage instrumental variable (IV) regression estimates. IVs are deaths of non-CEO top executives or of non-CEO directors, which increase FTA or FDA but are unlikely to be related to fraud—none of the deaths can be attributed to suicide. We also use the yearly industry average turnover ratio of top four non-CEO executives and non-CEO directors, excluding the firm in calculating the average, as an IV for FTA and FDA.

Our estimates indicate that a firm with all four top non-CEO executives appointed during the CEO's tenure (FTA = 1) has a 20% higher fraud incidence and a 12% lower likelihood of detection given fraud than a firm with none of the top four executives appointed during the CEO's tenure (FTA = 0). A firm with all directors appointed during the CEO's tenure (FDA = 1) has a 19% higher fraud incidence and a 14% lower likelihood of detection than a firm with no directors appointed during the CEO's tenure (FDA = 0).

An important factor in the choice of whether or not to commit fraud is the expected punishment (Becker (1968)), which depends on the likelihood of detection. Closer CEO connectedness may help conceal fraud by influencing others to fabricate or obfuscate internal records, making it harder to detect or prove wrongdoing in court (Arlen and Carney (1992); Khanna (2003)), or by simply pressuring individuals not to reveal instances of wrongdoing out of loyalty to the CEO who appointed them. Bivariate probit model estimates reveal FTA and FDA are negatively related to detection, given fraud. FTA is also positively related to fraud detection duration, the period from the commencement of fraudulent activity to the detection date, and negatively related to the Cox-hazard ratio of fraud detection. Our estimates imply a fraud by a firm with FTA = 1 will take 288 days longer to be detected than a fraud by a firm with FTA = 0. Appointment-based CEO connectedness seems to help conceal frauds and delay their detection.

Another channel through which CEO connectedness affects the expected costs of fraud is lowering the probability of CEO dismissal upon discovery of wrongdoing. Detected frauds with CEO involvement do not automatically lead to CEO dismissal. CEOs more connected to their top lieutenants and board members may garner greater support to retain their jobs. We find closer CEO connectedness is associated with lower forced CEO turnover-fraud sensitivity. Our estimates indicate that the probability of forced CEO turnover following a fraud by a firm with FTA = 1 is 8.27% lower than that by a firm with FTA = 0. The turnover probability is 13.69% lower for a firm with FDA = 1 than for a firm with FDA = 0.

In addition, coordinating illegal activities may be less costly when CEOs are more closely connected with other corporate leaders. With lower coordination costs, more people are likely to be involved in a fraud, and charged when detected. This is what we find: The number of people charged with fraud is positively and significantly related to both FTA and FDA.

All these findings are robust to alternate measures of FTA and FDA: tenure weighted and compensation weighted FTA and FDA, as well as abnormal fractions of top executives and directors appointed during a CEO's tenure, the residuals of regressions relating FTA and FDA to CEO tenure and other factors directly correlated to them.

The prior literature on corporate fraud examines the impact of board structure, general business conditions, corporate lobbying, market- and regulatory-based institutions, and executive compensation.[4] We contribute to this literature by identifying an important factor magnifying the risk of corporate frauds—appointment-based CEO connectedness. Our study also helps distinguish how different sources of CEO connectedness—appointment decisions vis-à-vis prior network ties—affect fraud.

[4] See Beasley (1996), Agrawal and Chadha (2005), and Chidambaran et al. (2012) for board structure; Povel, Singh, and Winton (2007), Wang et al. (2010), and Wang and Winton (2012) for general business conditions; Yu and Yu (2011) for corporate lobbying; Dyck, Morse, and Zingales (2010) for market- and regulatory-based institutions; and Burns and Kedia (2006), Peng and Röell (2008), Hertzberg (2005), and Efendi, Srivastava, and Swanson (2007) for executive compensation.

Before detailing our analyses, a caveat is in order. Our findings do not necessarily imply appointment-based CEO connectedness is bad overall. It has potential benefits. For example, closely-knit top executives may expedite decision-making, resulting in better anticipation of, and reactions to, internal and external challenges. They may also implement decisions more efficiently via effective communication and coordination. Furthermore, greater FTA and FDA mean there are more newly-appointed top executives and directors. The new blood may help revitalize the top executive team and the board, enhancing the CEO's productivity itself (Edmans, Goldstein, and Zhu (2013)). Unfortunately, these efficiency-related benefits of appointment-based CEO connectedness are not illuminated here because our inquiry is about a dark side of CEO connectedness—its association with fraud.

The next section contains the empirical design, data description, and summary statistics. We estimate how appointment-based CEO connectedness is related to fraud incidence and to the likelihood of its detection in Section II, and explore channels through which the connectedness influences the expected cost of wrongdoing in Section III. Section IV re-estimates the same set of regressions with prior network tie-based CEO connectedness. Section V estimates two-stage instrumental variables regressions for appointment-based connectedness and a battery of additional robustness tests. Section VI concludes.

I. Empirical Design, Data, and Summary Statistics

A. Empirical Methodology

To address the partial observability issue when estimating the relation between CEO connectedness and fraud, we follow Wang et al. (2010) and Wang (2013) and employ the bivariate probit model. For each firm i, we denote $Fraud_{it}^{*}$ and $Detect_{it}^{*}$ as the latent variables determining firm i's likelihood of committing a fraud in year t and the possibility of detecting it as follows:

$$Fraud_{it}^{*} = X_{F,it}\delta + \mu_{it} \qquad (1a)$$

$$Detect_{it}^{*} = X_{D,it}\eta + v_{it} \qquad (1b)$$

$X_{F,it}$ is a vector of variables explaining firm i's likelihood of committing a fraud in year t, and $X_{D,it}$ contains variables explaining the firm's likelihood of being detected. The variables μ_{it} and v_{it} are zero-mean disturbances with a bivariate normal distribution. The correlation between μ_{it} and v_{it} is ρ. We define $Fraud_{it} = 1$, if $Fraud_{it}^* > 0$, and $Fraud_{it} = 0$, otherwise; and $Detect_{it} = 1$ if $Detect_{it}^* > 0$, and $Detect_{it} = 0$, otherwise. We do not directly observe the realizations of $Fraud_{it}$ and $Detect_{it}$; instead, we observe $Observe_{it} = Fraud_{it}Detect_{it}$, where $Observe_{it} = 1$ if firm i has committed fraud and has been detected, and $Observe_{it} = 0$ if firm i has not committed a fraud or has committed fraud but has not been detected.

Let Φ denote the bivariate standard normal cumulative distribution function. The empirical model for $Observe_{it}$ is:

$$P(Observe_{it} = 1) = P(Fraud_{it}Detect_{it} = 1) = \Phi(X_{F,it}\delta, X_{D,it}\eta, \rho) \quad (2a)$$

$$P(Observe_{it} = 0) = P(Fraud_{it}Detect_{it} = 0) = 1 - \Phi(X_{F,it}\delta, X_{D,it}\eta, \rho) \quad (2b)$$

Thus, the log-likelihood function for the model is:

$$L(\delta, \eta, \rho) = \Sigma \log(P(Observe_{it} = 1)) + \Sigma \log(P(Observe_{it} = 0)) \quad (3)$$

This model can be estimated using the maximum-likelihood method. Robust standard errors are clustered at the industry level using 48 Fama-French (1997) industry groupings to account for possible correlations among firms in the same industry.

B. Variables

B.1. Fraud

Our fraud sample period covers 1996 through 2006. We begin in 1996 because RiskMetrics started to provide board data in that year, which is also the first year after the passage of the Private Securities Litigation Reform Act of 1995 designed to reduce frivolous private securities fraud class actions. Although we search for fraud cases through 2009 (we started compiling fraud data in 2010), we include only frauds occurring no later than 2006 to allow sufficient time for detection. In our sample, the average duration from the commencement of fraudulent activity to the detection date is 1,081 days.

Our primary source of fraud data is the Federal Securities Regulation (FSR) database described in Karpoff et al. (2014), who carefully study Securities and Exchange Commission (SEC) and Department of Justice (DOJ) publications and compile an exhaustive list of Federal enforcement actions under Section 13(b). Because sometimes there are multiple enforcement actions for a single instance of an alleged Section 13(b) violation, they group these actions together so that only one case is identified. For each case, FSR provides detailed relevant information. Over our sample period of 1996 through 2006, there are 171 fraud cases in FSR that are not dismissed and involve firms covered by RiskMetrics or ExecuComp that have sufficient data to construct appointment-based CEO connectedness measures.

We supplement FSR with alleged fraud cases from the SEC's online Litigation Releases (http://www.sec.gov/litigation.shtml) that go beyond the section 13(b) violations. The SEC data contains information on civil lawsuits and administrative proceedings brought for alleged financial misreporting, insider trading, violations of the Foreign Corruption Practice Act, violations of the Sarbanes-Oxley Act, and other alleged violations of the Federal Securities Laws and accompanying regulations. We obtain 41 additional unique fraud cases from the SEC. These cases are not present in FSR, but relate to frauds between 1996 and 2006 which are settled and involve firms with the necessary data to construct appointment-based CEO connectedness measures.

Shareholders may also bring private civil suits, independently of the SEC, for infractions beyond those covered in FSR. Thus, we supplement FSR and SEC cases with data from the Stanford Securities Class Action Clearinghouse (SSCAC) (http://securities.stanford.edu/index.html), which provides information on private securities fraud class actions. It provides a collection of likely discovered fraud cases, including virtually all alleged frauds with more than a *de minimis* effect on stock price that could generate private litigation.[5] Such private suits might include frivolous suits, because private litigants may be using the costs of the legal system as means to extract a monetary settlement (Alexander (1991);

[5] Filing a securities class action lawsuit is now a largely automatic process whereby law firms file a suit whenever there is a negative stock price movement above a certain *de minimis* level (Choi, Nelson, and Pritchard, 2009).

Grundfest (1995); Choi (2007); Choi et al. (2009); Dyck et al. (2010)). To cull false detections, we follow Dyck et al. (2010) and exclude cases subsequently dismissed by a court or settled for less than $3 million.[6] Unlike Dyck et al., however, we do not exclude backdating cases or cases where defendants claim they are settling to avoid negative publicity if the settlement amount exceeds $3 million. This provides 165 additional unique fraud cases.

For cases from FSR and the SEC's website, we also exclude cases dismissed by the courts but do not screen cases settled for amounts less than $3 million. SEC enforcement actions are less likely to be frivolous or mistaken than private suits because the people making enforcement decisions do not directly receive the monetary remedies. Thus, a small settlement amount in a SEC case does not imply a frivolous suit; the SEC sometimes pursues a case involving small harm because it raises important legal or enforcement questions or the SEC demands a substantial change in financial reporting and/or improvement in corporate governance in lieu of a large settlement.

We also exclude six cases solely involving IPO underwriter allocation, mutual fund timing and late trading, or analysts. CEO connectedness is unlikely to play a role in these cases. Thus, our total fraud sample consists of 309 fraud cases in which the CEO is a named respondent and 62 cases in which the CEO is unnamed.

B.2. Appointment-based CEO Connectedness

Appointment-based CEO connectedness is measured by the fraction of top four non-CEO executives appointed, FTA_{it}; and the fraction of directors appointed, FDA_{it}, during the tenure of firm i's CEO as of year t.[7] We follow ExecuComp and rank executives by the sum of salaries and bonuses. In calculating FDA, we

[6] The threshold of $3 million originates from previous studies (Grundfest, 1995; Choi, 2007; and Choi et al., 2009), which suggest a settlement amount as an indicator to separate frivolous suits from meritorious ones. They find suits settling below a $2.5 - $1.5 million threshold are on average more likely to be frivolous.

[7] We drop firm-year observations when ExecuComp reports less than five top executives (including the CEO) to reduce noise in FTA_{it}. Kim and Lu (2011) illustrate the importance of keeping constant the number of executives when constructing executive variables. Cross-checking against proxy statements shows that missing executives in

exclude the CEO from both the numerator and denominator if he is on the board. We determine if the executive or the director is appointed during the current CEO's tenure by comparing the appointment year with the year the current CEO took office.[8] We assume the year a non-CEO executive first appears on the list of top four non-CEO executives is the year in which she secured the position. The appointment date of each board member is obtained from RiskMetrics. Although RiskMetrics data is available from 1996, information on directors' appointment dates is available only from 1998. Therefore, the sample period for FDA analyses starts in 1998 instead of 1996.

We also regress FTA and FDA on CEO tenure and other factors mechanically correlated to them and use the residuals as abnormal FTA and FDA. The reestimation results using the abnormal measures, reported in Table IA.II of the Internet Appendix, are robust.[9]

B.3. Control variables

Estimating the bivariate probit model requires two sets of control variables, one each for the fraud commission and detection equations. In the baseline model, all variables in the detection equation are included in the commission equation, because the expected cost of committing fraud depends on the probability of detection. However, it is possible that individuals considering engaging in wrongdoing may not fully appreciate all the factors influencing fraud detection. As an alternative specification, we allow some control variables in the detection equation to be omitted from the commission equation. The reestimation results, reported in Table IA.I of the Internet Appendix, are robust.

B.3.1. Detection Variables

- *Monitoring*

ExecuComp are due to omission: The firm-year observations with less than five top executives in ExecuComp show five or more top executives in proxy statements.

[8] When the appointment year of the current CEO and an executive or a director is the same, as in Morse et al. (2011), we do not include the executive or director in calculating FTA or FDA because we cannot determine who is appointed first.

[9] The Internet Appendix may be found in the online version of this article.

Internal and external monitoring may play an important role in detecting fraud. Control variables related to internal monitoring by the board include: (1) the percentage of non-independent directors on the board, *%_NonIndepDirectors*. The monitoring role played by independent directors has been widely documented; for example, Weisbach (1988) finds CEO turnover following poor performance is positively related to the fraction of outside directors. (2) Log of the number of directors on the board, *Ln(BoardSize)*. Prior research indicates larger boards tend to be less effective monitors (Lipton and Lorsch (1992); Jensen (1993); Yermack (1996); and Eisenberg, Sundren, and Wells (1998)). (3) Log of the number of board meetings in a given year, *Ln(BoardMeetings)*, which may indicate the strength of board oversight and monitoring (Vafeas (1999)). (4) The percentage of non-independent directors on the audit committee, *%_NonIndepDirectors_Audit,* and (5) the log of the number of directors on the audit committee, *Ln(AuditComSize)*. Audit committees, charged with the oversight of financial reporting, internal controls, and external audits, play an important role in fraud detection (Deli and Gillan (2000)).

The strength of external monitoring is proxied by institutional ownership concentration, *IOC,* and analyst coverage, *Ln(Analyst)*. Previous studies document the important roles institutional investors play in shaping corporate governance (e.g., Hartzell and Starks (2003); Cremers and Nair (2005); Del Guercio, Seery, and Woidtke (2008); Edmans (2009); and Kim and Lu (2011)). We follow Hartzell and Starks (2003) and estimate *IOC* by the percentage shareholdings of the top five institutional investors. Analyst coverage is widely considered an important form of external monitoring as it reduces information asymmetry (e.g., Hong, Lim, and Stein (2000); Brav and Lehavy (2003); Chang, Dasgupta, and Hilary (2006); Das, Guo, and Zhang (2006); and Kelly and Ljungqvist (2012)). The variable *Ln(Analyst)* is the logged value of one plus the number of analysts following a firm in a given year.

- *Litigation Risk*

The securities litigation literature (e.g., Jones and Weingram (1996); Johnson, Nelson, and Pritchard (2007)) suggests that firm performance and stock return volatility are related to a firm's litigation risk. Firm performance is proxied by *Tobin's Q* and *Ebitda/TA*. The variable *Tobin's Q* is measured as the ratio

of the market value of common equity plus the book value of total liabilities to the book value of total assets. The variable *Ebitda/TA* is measured as earnings before interest, taxes, depreciation, and amortization divided by the book value of total assets. Stock return volatility, *StockVolatilities,* is measured as the standard deviation of daily stock returns over a given year. In addition, Wang et al. (2010) find stock turnover is positively related to fraud detection because, "High stock turnover implies that more investors are affected by the company's stock price and thus it is easier to identify a class of plaintiff investors" (p. 2267). The variable *StockTurnover* is the number of shares traded in a year divided by the number of shares outstanding.

Litigation intensity can be correlated among firms within an industry. Many firms in an industry may adopt similar practices that fall foul of the laws and, perhaps, enforcement authorities learn through experience how to detect fraud in particular industries. High industry litigation intensity may increase an individual firm's litigation risk (Wang et al. (2010)). We control for abnormal industry litigation activities with *IndustryLitigation,* the yearly deviation from the average litigation intensity in an industry. The level of litigation intensity in an industry is measured by the number of lawsuits in the FSR, SEC, and SSCAC databases against publicly-listed firms in an industry in a given year (prior to application of any litigation screens) divided by the number of firms covered by Compustat in the same industry in the same year.[10] We also control for industry Q, because frauds tend to be revealed more during industry downturns, and industry concentration, because concentrated and fragmented industries are subject to different information environments. Industry concentration ratio (ICR) is measured by the sum of the market share of the four biggest firms in sales among all firms in Compustat in the same industry in a given year.[11] A lower ratio indicates greater competition.

[10] When a fraud case is covered by more than one data source, it is counted only once.

[11] The Economic Census uses the largest 4, 8, 20, or 50 companies to compute ICRs. Because Compustat covers only public firms, we rely on the four largest companies to minimize the possibility of excluding private firms.

In addition, we control for firm size, sales growth rate, and leverage. Frauds by larger firms (Wang et al. (2010)) and higher-growth firms are more likely to be detected because they attract more investor attention. Firms with higher financial leverage may be more closely monitored by banks and fixed-income investors. We measure firm size as the log of the book value of total assets, *Ln(TotalAssets)*; growth rate as the five-year annual growth rate in sales as reported in ExecuComp, *SalesGrowth_5Yr*; and financial leverage as the sum of short- and long-term debt divided by total assets, *Leverage*.

- *CEO Characteristics*

Our controls for CEO characteristics include CEO tenure, *CEO_Tenure;* whether the CEO chairs the board, *CEO_Chair*, and/or is a founder, *CEO_Founder;* CEO share ownership, *CEO_OWN*; and the log of CEO age, *Ln(CEO_Age)*. We control for CEO tenure because FTA and FDA are related to the current CEO's tenure and a CEO with longer tenure may be more capable and have more influence. CEOs chairing the board tend to be more powerful, which may help prevent detection of fraud. A founder CEO may also be more effective in evading fraud detection because he tends to be more knowledgeable about the organization and more powerful. A CEO is considered a founder if he was the CEO five years prior to going public, where the date of going public is assumed to be the first date the firm appears in the CRSP database (Bebchuk, Cremer, and Peyer (2011)). Larger share ownership gives the CEO more voting rights, increasing her ownership-related power, which may help cover up fraud. CEO age is added because older CEOs tend to be more experienced, which may help evade fraud detection.

B.3.2. Fraud Commission Variables

Some variables may directly influence the likelihood of wrongdoing even if they also affect detection. For example, *Tobin's Q* and *Ebitda/TA*, which are included in the detection equation, may also directly affect fraud incidence, as fraud is more likely when a firm is suffering operating troubles (Arlen and Carney (1992); Alexander and Cohen (1999)). Higher leverage may increase fraud incidence by providing the incentive for firms to inflate reported earnings and other accounting measures to avoid violating debt covenants. CEO share ownership aligns CEOs' self-interest with the appearance of firm

performance and affects risk taking. We add CEO_OWN^2 because Kim and Lu (2011) show *CEO_OWN* is related to firm performance and risk-taking in a hump-shaped fashion. Career concerns may discourage younger CEOs from committing frauds. Founder CEOs are more venturesome, a characteristic that may be extended to activities of uncertain legality. In addition, Wang et al. (2010) argue the incidence of fraud is related to investor beliefs about industry prospects and provide evidence of a hump-shaped relation with *IndustryQ*, so we also add $(IndustryQ)^2$.

The bivariate probit model estimation requires that the fraud commission and detection equations do not contain the same set of variables such that at least one vector has one or more variables absent in the other vector. The variable satisfying this condition is stock options owned by the CEO. Stock options affect the incentive to commit fraud by aligning CEOs' self-interest with stock price (Efendi, Srivastava, and Swanson (2007); Peng and Röell (2008)), but are unlikely to be related to detection. Unlike common stocks, stock options do not give voting rights and, hence, do not affect ownership power that can be helpful in covering up fraud.[12] No prior studies include CEOs' stock options as a variable influencing the likelihood of detection leading to a lawsuit by either the SEC or shareholders (e.g., Cox et al. (2003); Bowen et al. (2010); Dyck et al. (2010)). We follow Efendi et al. (2007) and define *StockOption* as the value of in-the-money exercisable and un-exercisable stock options (in billion dollars) owned by a CEO.[13]

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[12] The lack of ownership-related power accompanying stock options also leads to an important difference in how CEO stock option ownership affects firm performance vis-à-vis stock ownership. When Kim and Lu (2011) examine the hump-shaped relation between CEO ownership and firm performance, they find that the value-reducing effect of very large CEO ownership is confined to stocks. Stock options show no such negative effects. They argue the difference arises because very large stock ownership provides sufficient control rights allowing CEOs to entrench themselves without the fear of dismissal and/or other shareholder challenges, whereas stock options do not provide such protection due to the lack of voting power.

[13] It is possible more powerful CEOs get more stock options. However, the potential effects of CEO power on detection of fraud is accounted for by the inclusion of two explicit proxies for CEO power, CEOs chairing the board and CEO-founders, as well as two other variables also related to CEO power, CEO share ownership and the length of CEO tenure. Another potential concern is that larger option grants may attract more attention from the public and regulators (especially after the option backdating cases) thereby leading to an association between option grants and the likelihood of detection. However, Shue and Townsend (2014) show that until 2006, the number of stock option grants were quite rigid in that changing conditions did not really change the number of options granted. The last year

The variable is taken from ExecuComp. The Appendix provides all key variable definitions and their data sources.

C. Sample Construction

CEO and executive data are taken from ExecuComp; board information, from RiskMetrics; firm characteristics and accounting data, from Compustat; stock return and trading data, from CRSP; analyst coverage data, from I/B/E/S from Thomson Reuters; and institutional ownership data, from the CDA Spectrum database. Merging these databases with fraud data provides a large panel dataset from 1996 to 2006.

Table I reports the sample distribution of all firms with data available to construct *FTA* or *FDA* and of firms with identified fraud in which the CEO is a named respondent. Panel A shows the sample distribution by year. The total number of sample firms is relatively stable over time, while the number of firms with frauds varies considerably. In the first few observation years, fraud firms are small both in number and percentage, but they increase as years progress. The peak is 2001, a year with an unusually large number of business scandals. The year of fraud is defined as the year when fraud took place, not the year of detection. When a fraud lasts more than one year, we have multiple firm-year observations associated with that fraud.

Panel B shows the sample distribution by *FTA* and *FDA,* and their abnormal measures, *AFTA* and *AFDA*. The variable *FTA* has five values because we consider only four non-CEO executives, so we separate *FTA* and *FDA* into five groups by 0.25 increments, and *AFTA* and *AFDA* into quintiles. Column (4) shows the percentage of firms engaged in wrongdoing decreases initially in *FTA* but increases from *FTA* = 0.25. This bi-modal pattern is accentuated in its abnormal measure, *AFTA*, which is separated into quintiles, with the percentage of firms with alleged fraud sharply increasing from the middle quintile. The variable *FDA* shows a similar pattern as *FTA*, but *AFDA* does not. The number of observations is smaller

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of our sample period is 2006, so at least during our sample period the number of stock options granted is unlikely to be related to the attention a firm attracts from regulators or others who help detect corporate fraud.

for *FDA* than *FTA,* because director appointment date is available only from 1998. The *FTA* calculation starts in 1996.

D. Summary Statistics

Table II contains summary statistics for all key variables. The statistics for the full sample are reported in Panel A. The mean *Fraud* is 0.05, indicating fraud observations account for 5% of all firm-year observations. On average it takes 1081 days (about 3 years) from the commencement of fraudulent activity to the fraud detection date. Most frauds in our sample involve accounting-related matters (93%), while 34% and 41% of frauds involve real business activities and executives taking advantage of their positions, respectively. The sum exceeds 100% because a fraud may belong to multiple categories. These fraud statistics are based on cases in which the CEO is a named respondent.

The mean and median *FTA* is 0.41 and 0.5, suggesting that at a typical firm-year, about half of the top four non-CEO executives are appointees of the current CEO. The mean and median *FDA* is 0.37 and 0.33, indicating that at a typical firm-year, about one-third of directors on the board are appointed during the current CEO's tenure. The regression residuals, *AFTA* and *AFDA*, are close to zero.[14]

Panel B reports the mean of each variable separately for the fraud and non-fraud sample in Columns (6) and (7). Columns (8) and (9) show the difference in the means and the P-value of the t-test for the difference. The fraud sample shows significantly higher values for most measures of appointment-based CEO connectedness than the non-fraud sample. (Including alternative proxies used for robustness tests, there are 13 different appointment-based CEO connectedness measures.) But the same cannot be said about network tie-based CEO connectedness measures. Control variables show, on average, fraud firms are larger and more volatile; have higher Q, lower Ebitda margins, higher leverage, higher sales growth rates, greater stock turnovers, more frequent board meetings, larger audit committees, more

[14] The summary statistics show more CEO-director ties than those reported in Fracassi and Tate (2012). This is because we count ties between all directors and the CEO, whereas they count ties only between outside directors and the CEO.

financial analysts, and smaller institutional ownership concentration; and belong to industries with higher Q and more litigation. Fraud firms also show more founder CEOs, CEOs chairing the board, younger CEOs, and CEOs with more stock options and longer tenure.

E. CEO Named- vs. CEO Unnamed Fraud Cases

Table III presents pair-wise correlations between the fraud indicator and FTA or FDA, separately for CEO named- and CEO unnamed fraud cases. This is to see whether appointment-based CEO connectedness is related to fraud even when the CEO is unnamed. When a CEO is not a named respondent, he is unlikely to be culpable. As expected, both FTA and FDA are significantly and positively correlated to fraud incidence in CEO-named cases, but are uncorrelated to fraud in CEO-unnamed cases. The table also reports their cross-sectional correlations with the number of days it took to detect a fraud and the number of people charged. The difference between CEO-named and CEO-unnamed cases is striking. When the CEO is named, all correlations are positive and significant in five out of six; when the CEO is unnamed, none of the correlations is positive and significant. CEO connectedness seems to matter only in frauds the CEO is named. Thus, all regressions are based on the 309 CEO named fraud cases.

II. Appointment-based CEO Connectedness and Fraud

A. Main Results

Table IV reports the bivariate probit estimation results for appointment-based CEO connectedness. The first two columns rely on *FTA* as the measure of connectedness; the next two columns, *FDA*; and the last two columns, an equally weighted combined measure of *FTA* and *FDA, FTA+FDA,* which measures CEO connectedness in both executive suites and the board room. The variables FTA and FDA may overlap because an executive appointed during a CEO's tenure may also be appointed to the board during the CEO's tenure. In our sample, 16% of top four non-CEO executives appointed during the CEO tenure serve on the board. Such overlaps increase the CEO's overall connectedness. Odd numbered columns are for the commission equation; even numbered columns, the detection equation.

The coefficients on the variables of main interest, *FTA, FDA*, and *FTA+FDA,* are all statistically significant. Appointment-based CEO connectedness with top executives and directors is associated with greater fraud incidence and a lower likelihood of detection. The estimated coefficients of *FTA* suggest that a firm with all top four executives appointed during the CEO's tenure (FTA = 1) has 19.5% higher fraud probability and 12.1% lower likelihood of detection than a firm with no top four executives appointed during the CEO tenure (FTA = 0). A firm with all directors appointed during the CEO's tenure (FDA = 1) has 19.3% higher fraud probability and 13.7% lower likelihood of detection than a firm with none of the directors appointed during the CEO's tenure (FDA = 0).

The majority of control variables also show significant coefficients that are mostly consistent with our conjectures: Firm performance as measured by *Tobin's Q* and *Ebitda/TA* is negatively related to the incidence of fraud, while firms with higher leverage and greater stock price volatility are more likely to be associated with fraud. More frequent board meetings are associated with a higher likelihood of detection and fewer fraud incidences. Firms in an industry with greater litigation intensity and larger firms, which face greater public scrutiny, have a higher likelihood of fraud detection.

The variables *Turnover* and *Industry Q* also show significant coefficients consistent with Wang et al. (2010); stock turnover is positively related to fraud detection because of the ease of identifying a plaintiff class of investors, and the incidence of fraud is related to Industry Tobin's Q in a hump-shaped fashion. Faster sales growth rate is related to higher incidence of fraud, perhaps due to misleading sales figures inflating past sales growth rates. We also find firms with larger boards have fewer fraud incidences and a higher likelihood of detection. Although prior studies argue larger boards tend to be less effective monitors, in so far as fraud with CEO involvement is concerned, the size of the board seems to help. Surprisingly, less independent boards are associated with a lower incidence of fraud and a higher likelihood of detection. Prior studies show no correlation between board independence and the likelihood of accounting fraud (Beasley (1996); Agrawal and Chadha (2005)).

Coefficients on CEO characteristics are also mostly consistent with our intuitions. Powerful CEOs—*CEO_Founder* and *CEO_Chair*—and older CEOs are less likely to be detected and have a higher incidence of fraud; and CEO share ownership is related to fraud commission in a hump-shaped fashion. CEO tenure is negatively related to commission and positively related to detection. A CEO survives longer when he performs better and such CEOs are less likely to misbehave. But if he commits fraud, a longer tenure means more time to get caught.

Finally, the variable excluded from the detection equation, *StockOption*, is positively and significantly related to the likelihood of wrongdoing. This finding is consistent with the findings in Efendi et al. (2007) and Peng and Röell (2008).

B. Endogeneity Issues

Appointment-based CEO connectedness is endogenous, and its significant relations with fraud incidence and detection may not be causal. To infer causality, we construct instrumental variables (IVs) related to FTA and FDA that are unlikely to be directly related to wrongdoing and estimate two-stage regressions. Our IVs are deaths of top four non-CEO executives or non-CEO directors: *Exe_Death* and *Dir_Death* are, respectively, the number of the top executives and directors who left their positions due to death during the current CEO's tenure up to the current year, so they are defined year by year. These deaths change FTA and FDA. To check whether the deaths are related to fraud, we search media articles from Factiva on the cause of deaths. None can be attributed to suicide.

We also use the yearly average top four non-CEO executive or non-CEO director turnover ratios in the same industry, *Ind_Exe_Turnover* or *Ind_Dir_Turnover* as an IV. The turnover ratio is the percentage of top four non-CEO executives (or non-CEO directors) who are not on the list of top four non-CEO executives (or the board) in the previous year. Industry is defined by 48 Fama-French (1997) industry groupings. They are calculated for each sample firm, excluding the firm so as to avoid capturing firm-specific factors directly related to fraud. The industry averages are likely to reflect industry shocks such as industry business cycles and merger and restructuring waves, which tend to affect executive and

director turnovers, in turn affecting FTA and FDA. They could also be related to fraud or detection at the industry level. However, the fact that the regressions control for industry-wide fraud commission and/or detection related variables, such as *IndustryLitigation, Industry Q, Industry* Q^2, and *ICR*, helps satisfy the exclusion restriction.

The first-stage estimation results are reported in Table V, Columns (1)-(2) and (5)-(6). Columns (1) and (5) are for commission equations; Columns (2) and (6), detection equations. Control variables (unreported) are the same as those in Table IV. We have two first-stage regressions for FTA and FDA each, because fraud commission and detection regressions have different sets of control variables. We estimate system equations in the first stage because when we estimate the bivariate model in the second stage, the error terms of the fraud commission and detection regressions are allowed to be correlated. FTA increases with executive death and the relation is significant at the 1% level. F-statistics (IVs) are well above 10. FDA is also positively related to director death and the industry-wide director turnover ratio, but is statistically significant only with the average turnover ratio. The insignificant relation between FDA and director death could be due to the fact that a director vacancy does not have to be filled during the same or even later years. F-statistics (IVs) for FDA are also well above 10.

The second-stage estimates are reported in Columns (3)-(4) and Columns (7)-(8). Control variables (unreported) are again the same as those in Table IV. The predicted values of FTA and FDA are positively related to the incidence of fraud and negatively related to detection given fraud.

III. Expected Costs of Committing Fraud

We assume individuals weigh the expected cost of fraud against the expected benefit in deciding whether or not to commit fraud. Thus, if CEO connectedness reduces the cost, it will increase the incidence of fraud. In this section we investigate three possible channels through which appointment-based CEO connectedness reduces the cost of committing frauds. Because the expected cost depends on penalties for wrongdoing and the likelihood of detection, we examine how CEO connectedness affects the likelihood of the CEO losing his job when tainted with fraud, an important penalty, and how CEO

connectedness helps delay or evade detection. We also examine how CEO connectedness is related to the coordination costs required for fraudulent activities. We focus on the cost side, as we do not have testable predictions on how CEO connectedness affects the benefits of engaging in fraud.

A. Forced CEO Turnover-Fraud Sensitivity

When CEOs' involvement in wrongdoing is detected, they may receive court determined penalties, such as civil and criminal penalties (e.g., jail, monetary sanctions); and market determined penalties, such as reputational loss and dismissals (Khanna (1996)). Unlike court determined fines or jail terms, dismissal of a CEO is largely a firm level decision. The authority to dismiss a CEO belongs to the board and, hence, closer connections with board members may help a CEO tainted by fraud retain his job. The board does not make the decision in isolation, however. It also considers the opinions of other top executives and their possible reactions to CEO dismissal. If other top executives oppose the dismissal and highly valued executives are likely to leave the firm with the CEO, then the board may be less inclined to dismiss the CEO. In this section we relate both FTA and FDA to the likelihood of forced CEO turnover given the detection of fraud.

Forced CEO turnover is identified following the procedure in Parrino (1997) and Jenter and Kanaan (2014). If a CEO's departure is reported by the press as fired, forced out, or retired/resigned due to policy differences or pressure, it is classified as forced. All other departures for CEOs who are 60 years of age or older are classified as voluntary, unless they resign due to litigation or fraud. All departures for CEOs under 60 years of age are evaluated further and are classified as forced if the article does not report the reason as death, poor health, or acceptance of another position (including the chairmanship of the board); or if the article reports that the CEO is retiring, but does not announce the retirement at least six months before the succeeding CEO takes office.[15] Finally, cases classified as forced are reclassified as voluntary if press

[15] Age 60 instead of the usual retirement age of 65 is used as the cutoff point to reduce the possibility of wrongly classifying a CEO turnover as forced when it is voluntary. We use this conservative approach in identifying forced CEO turnovers because media stories are often ambiguous even during the additional search process.

reports convincingly explain the departure is due to previously undisclosed personal or business reasons that are unrelated to the firm's activities. This identification process yields 562 forced CEO turnovers.[16]

The dependent variable is $Forced\_CEO\_Turnover_{it}$, an indicator for forced CEO turnover. We use two alternative estimation methods: the OLS with firm- and year-fixed effects and the firm level conditional logit model controlling for year dummies. Robust standard errors are clustered at the firm level. The variable relating a detected fraud to forced CEO turnover in year *t* is $Fraud\_{t\text{-}3\text{-}t}$, which is equal to one if fraud takes place anytime during the four-year period over year *t-3* to year *t*. We construct this variable based on the commission date rather than the detection date, because by the time a fraud is detected the CEO involved in the fraud may already be replaced by a new CEO unassociated with the fraud. The four-year period allows time for the fraud to be detected and for the firm to decide on the fate of the CEO. The variable of main interest is the interaction of $Fraud\_{t\text{-}3\text{-}t}$ with *FTA* or *FDA*. The interaction term measures how CEO connectedness affects the likelihood of dismissing a CEO named in a fraud.

One key control variable is *CEO_Jail&Bar,* which equals one if a CEO goes to jail and/or is barred from serving as CEO of public companies. A barred CEO cannot serve as CEO of a public company and a jailed CEO of a public company would, in all likelihood, not retain his position regardless of his connectedness. Other control variables include firm performance measures such as *Q, Ebitda/TA,* and *SalesGrowth_5Yr*; firm size, *Ln(TotalAssets)*; external monitoring, *IOC* and *Ln(analysts)*; product market competition, *ICR*; CEO characteristics, *CEO_Founder*, *CEO_Chair, CEO tenure*, and *Ln(CEO_Age)*; board characteristics, *%_NonIndepDirectors, Ln(BoardMeeting)*, and *Ln(BoardSize);* and industry litigation intensity, *IndustryLitigation.* We control for these variables because a CEO is less likely to be dismissed if the firm performs better, is subject to less external monitoring, has a more powerful CEO, and operates in

[16] We identify more than the 533 forced CEO turnovers identified by Fee, Hadlock, and Pierce (2013) during 1990-2006. The difference is mainly due to difference in the sampling procedure. Fee et al. exclude financial firms (SIC codes 6000-6999), utilities (SIC codes 4900-4949), non-US firms, and firms with less than $10 million in assets (in 1990 US dollars), none of which we exclude. Thus, we have a substantially larger population of firms from which we can identify forced turnovers. It is always possible that, regardless of how carefully one constructs the sample of forced CEO turnovers, some of turnovers identified as forced may not be truly forced. Such possible misclassification adds noise, weakening the power of the test.

an industry less tainted by litigation. We also control for firm size, board characteristics, and industry competition, because they also may influence the dismissal decision.

The estimation results are reported in Table VI. The variable of main interest, the interaction of $Fraud\_{t\text{-}3\text{-}t}$ with *FTA, FDA,* or *FTA+FDA* shows significantly negative coefficients under both specifications. The estimated coefficients in Column (4) indicate that the probability of forced CEO turnover following a fraud is 8.27% lower for a firm with FTA = 1 than for a firm with FTA = 0. Column (5) shows the probability of forced CEO turnover is 13.69% lower when a firm has FDA = 1 than when FDA = 0.

As expected, *CEO_Jail&Bar* and $Fraud\_{t\text{-}3\text{-}t}$ are significantly and positively related to the likelihood of forced CEO turnover. Other control variables indicate that forced CEO turnovers in general are more likely when the CEO is less connected to top executives and directors, is a non-founder, and has a longer tenure; institutional ownership concentration is higher; the board meets more frequently; and the industry is under greater litigation risk.

B. Fraud Detection Duration

CEO connectedness may also reduce the expected costs of wrongdoing by reducing the likelihood of detection. Top executives are often in a position to receive internal information about wrongdoing and do something to interdict it (Dyck et al. (2010); Bowen et al. (2010)). If the executives owe their current positions to the CEO, they might be less enthusiastic about revealing information about wrongdoing or may actively help to cover it up. Connected board members may also be less eager to take actions required for detection even when they sense something is wrong. Favors can go the other way as well. When a connected executive or director commits wrongdoing, the CEO may be more forgiving and "look the other way."

If connectedness hinders fraud detection, the more connected a CEO, the longer it would take to detect a fraud and the lower would be the probability of detection. Thus, we relate CEO connectedness to fraud detection duration, *DetecDuration*, the number of days from the commencement of fraudulent

activity to its detection date. The estimation is based on cross-sectional data for each fraud case. Independent variables are the average *FTA, FDA*, *FTA+FDA,* and control variables over each fraud period, defined as the beginning to the ending date of fraudulent activities.

Control variables include the total value of settlement, *Tot_Settlement,* because of its possible correlation with fraud duration. The attorneys who bring private class action suits, all else equal, prefer fraud cases with longer duration because they are likely to have more shareholders trading before detection. With more shareholders trading, the likely harm is larger. [17] Because these attorneys usually receive a percentage of the total recovery or settlement as their fees, they prefer suits with more plaintiffs and more harm. SEC attorneys are not motivated by legal fees, but the SEC may decide to expend its scarce enforcement resources on longer duration frauds because they may generate more harm. To avoid reducing the sample size, we set *Tot_Settlement* to zero if it is missing and include *Tot_Settlement_D*, a dummy variable equal to one if *Tot_Settlement* is not missing. Other control variables which might be related to detection duration include stock performance, stock volatility, stock turnover, Ebitda/TA, firm size, leverage, sales growth rate, industry litigation, the number of financial analysts, CEO-chair, CEO-founder, CEO tenure, and CEO share ownership. Stock performance is measured by the average annual buy-and-hold stock return over the fraud period. Data requirements reduce the sample to 291 unique fraud cases from the original 309 fraud cases. We account for possible correlations among fraud cases in the same industry by clustering robust standard errors at the industry level.

Table VII, Panel A shows that the number of days a fraud remains undetected is positively related to all three measures of CEO connectedness, with the relation being significant for *FTA* and *FTA+FDA*. Panel B estimates a duration model in which the dependent variable is the hazard ratio for the Cox regression, the probability of detection in the next unit of time. Consistent with OLS estimates, the hazard ratio is significantly and negatively related to all three measures of CEO connectedness. Both panels show

[17] We thank an anonymous referee for pointing this out to us.

higher levels of statistical significance for FTA than for FDA, which reflects the fact that access to information is the key to fraud detection. Executives have more direct access to relevant information for fraud detection than outside directors, who tend to rely on management for firm-specific information.

The estimated coefficient in Column (1) suggests that a fraud conducted by a firm with all top four executives appointed during the CEO's tenure (FTA = 1) will take 288 days longer to be detected than a fraud by a firm with FTA = 0. The estimated coefficients on control variables imply that frauds are detected sooner with greater industry litigation, more financial analysts, weaker stock performance, and smaller settlements.

C. Coordination Costs and the Number of People Charged

With more connected top executives and directors, the environment becomes more conducive for coordinated activities, making it easier to engage in frauds requiring more coordination. We test this hypothesis by relating the log of the number of people charged plus one, *Ln*(*Num_Charged +1),* to *FTA, FDA, FTA + FDA*. If coordination costs of wrongdoing are lower in firms with closer CEO connectedness, then it is less costly to involve more people in frauds and, hence, we might witness more people being involved with, and charged in, wrongdoing. We include all employees charged because each top-four connected executive may also have his own lower-tier connected managers and employees, and there are other executives appointed by the CEO who are not on the top-four list. That is, some of the non-top-four executives and midlevel managers charged can be connected to the CEO directly or indirectly though top-four non-CEO executives.

The set of control variables differs sharply from previous regressions. Some types of misbehavior may require more coordination than others and involve more people. For example, inflating earnings requires a number of people such as the CEO, CFO, accountants, and lawyers, to agree to the earnings figures (or at least not oppose them), compared to insider trading where the perpetrator requires no help. Thus, we categorize frauds into three different types: *Accounting*, *Operating,* and *Executive*. Accounting frauds are defined as misleading information about financial condition, expected growth, and financial

statements; misleading information to inflate stock price; violations of GAAP; and restating financial statements. Operating frauds include cases related to real business activities. For example, a pharmaceutical company not disclosing dangerous side effects when announcing and marketing a new drug; a company violating environmental regulations; and a bank misleading customers. Executive frauds are defined as executives taking unlawful advantage of their positions to obtain a profit: for example, insider trading, unratified related party transactions, and so on. A fraud case may belong to multiple types.

We also control for the total value of settlement, *Tot_Settlement*, because a large settlement tends to indicate large scale and/or scope in wrongdoing, which may require more participants. Industry dummies are included to account for the variation in the nature of frauds across industries and potential correlation among frauds in the same industry. Other controls include CEO tenure, Tobin's Q, Ebitda/TA, sales growth, and leverage. The estimation is again based on cross-sectional data, so CEO connectedness variables and control variables are their averages over each case's fraud period. Because this analysis includes fewer control variables than the fraud detection duration analysis, there are fewer missing variables, allowing us to use 302 unique fraud cases.

Table VIII reports estimation results, which show the number of people charged is positively and significantly related to all three connectedness variables. The low coordination costs due to close appointment-based CEO connectedness seem to be an important facilitator of corporate wrongdoing.

IV. Network Tie-based CEO Connectedness and Fraud

Appointment and recruitment are not the only ways CEOs can be connected with their executives and board members. They can also be connected through social ties. In this section we examine how CEOs' pre-existing network ties with top executives and board members affect fraud. Chidambaran et al. (2012) find higher fraud probability when CEOs are more connected to board members via nonprofessional social connections, but find lower likelihood of fraud when the network ties are through past employment overlaps. We extend their analyses to account for the partial observability problem in fraud samples by estimating the bivariate probit model. We also investigate how CEO-top executive and

CEO-board network tie relationships are related to the likelihood of fraud detection, forced CEO turnover-fraud sensitivity, detection duration, and the number of people charged.

Preexisting network ties are obtained by manually matching an individual's name and age and company name in ExecuComp and RiskMetrics with those in BoardEx, which provides information for past employment, education background, and membership in social organizations (e.g., philanthropic and religious organizations, social clubs, and professional organizations). We count the number of network ties established during overlapping years through past employment, education, and membership in social organizations. We use the number of network ties for each category to capture the depth of past connections. We also sum the three types of ties to arrive at the total number of ties. To avoid reverse causality, we include only network ties formed prior to the CEO, the director, and the top executive joining the company. Similar measures of social connections have been used in previous papers (e.g., Cohen, Frazzini, and Malloy (2008); Fracassi and Tate (2012); Duchin and Sosyura (2013)).

Information on network ties is often missing or incomplete because BoardEx does not cover all relevant individuals. This problem is especially severe prior to 2000. To avoid reducing the sample size, we do not drop the missing observations; instead, when information on network ties is missing or incomplete, we assume there is no tie, which leads to underestimation of network ties. To offset this problem, we include as controls *Pct_Known_Exe_Tie* or *Pct_Known_Dir_Tie,* the percent of top executives or directors whose preexisting network ties to their CEOs is known.

Table IX re-estimates the bivariate probit model, the forced CEO turnover-fraud sensitivity, fraud detection duration, and the number of people charged with CEOs' network ties with top executives instead of FTA. Four measures of network ties are considered: the number of overlapping ties through employment, *Exe_Tie_Emp*; ties through education, *Exe_Tie_Edu*; ties through membership to social organizations, *Exe_Tie_Soc*; and the sum of the three, *Exe_Tie_All*. The control variables (unreported) are the same as in Tables IV, VI, VII, and VIII. Estimation results reported in Panels A through D show insignificant coefficients on all variables of interest. CEO connectedness with top executives through preexisting

network ties does not have significant effects on fraud or variables affecting the expected costs of wrongdoing.

We also investigate CEOs' network ties with board members by repeating the same estimations for directors. The estimation results are reported in Table X. Most coefficients on variables of main interest are insignificant. Only education ties show a negative effect on forced CEO turnover-fraud sensitivity in the conditional logit model at the 10% level and on the hazard ratio at the five percent level.

Overall, it seems safe to conclude that in so far as corporate fraud is concerned, network tie-based CEO connectedness in the executive suite or the boardroom has insignificant effects. As hypothesized at the outset of the paper, the loyalty factor in appointment-based CEO connectedness seems to have much stronger effects on fraud than the familiarity bias arising from sharing common experiences.

V. Robustness Tests on Appointment-based CEO Connectedness

In this section we test the robustness of our results concerning appointment-based CEO connectedness to an alternative bivariate probit model specification and to three alternative measures of the connectedness. We also examine whether the effects of the connectedness with independent directors are different from that with non-independent directors.

A. Alternative Bivariate Probit Specification

In our baseline model, all control variables in the detection equation are included in the commission equation. This is not the norm among studies using the bivariate probit model to study fraud (e.g., Wang et al. (2010)). We relax this part of our baseline model by including in the commission equation only performance variables, firm size, leverage, growth rate, IndustryQ, IndustryQ^2, ICR, CEO characteristics, and the CEO's stock options, while excluding variables mainly related to monitoring. The detection variables remain unchanged. The reestimation results, reported in Table IA.I of the Internet Appendix, are robust.

B. Alternative Measures of Appointment-based CEO Connectedness

B.1. Abnormal Measures of FTA and FDA

The variables *FTA* and *FDA* may be correlated with CEO tenure, the average tenure of non-CEO top executives and board members, whether the CEO is recruited from outside, and whether she is in her first year in office. (A new CEO appointment is sometimes followed by several top executive or director turnovers.) Thus, we estimate the following regressions in Table IA.II, Panel E, of the Internet Appendix, and use the residuals as abnormal measures of FTA and FDA, AFTA and AFDA.

$$FTA_{it} = a_0 + a_1 CEO\_Tenure_{it} + a_2 CEO\_Tenure_{it}^2 + a_3 Execsen_{it} + a_4 Outside_{it} + a_5 Unknown\_Exe_{it} + a_6 FTA\_1Y\_Exe_{it} + a_7 FTA\_1Y\_Unknown\_Exe_{it} + Year_t + \varepsilon_{it} \quad (4a)$$

$$FDA_{it} = a_0 + a_1 CEO\_Tenure_{it} + a_2 CEO\_Tenure_{it}^2 + a_3 Dircsen_{it} + a_4 Outside_{it} + a_5 FDA\_1Y\_Dir_{it} + Year_t + \varepsilon_{it} \quad (4b)$$

The variable CEO_Tenure_{it} is the number of years firm i's CEO has been in office by year t. We include $CEO\_Tenure_{it}^2$ to allow for a non-linear relation between CEO tenure and the connectedness variables because the maximum of FTA and FDA is one. [18] The variables $Execsen_{it}$ and $Dircsen_{it}$ are the average number of years firm i's top four non-CEO executives and directors have held their positions, respectively, by year t. The variable $Outside_{it}$ is an indicator equal to one if a CEO is from outside the firm. The variable $Unknown\_Exe_{it}$ is the fraction of executives whose first year on the list of the top four non-CEO executives cannot be identified based on data provided by ExecuComp. [19] This variable is designed to control for noise in FTA_{it} and $Execsen_{it}$ due to ambiguity about the precise year in which some of the top executives were appointed. The fraction of top executives (directors) appointed during a CEO's

[18] If a CEO leaves the position and returns later, ExecuComp reports only the latest appointment date. Thus, simply comparing the CEO appointment date reported by ExecuComp with the current year may generate negative CEO tenure. We correct for this problem by backtracking the previous appointment year using the CEO and company names.

[19] ExecuComp provides appointment dates for CEOs, but not for other top executives (except for the CFO beginning in 2006). Hence, if an executive is already one of the top four non-CEO executives when the firm first appears in ExecuComp, we cannot determine when he first obtained the position. For such cases, we use the year the executive first appears in ExecuComp as the year of appointment to the top executive position and compare it with the year the current CEO took office to determine whether the executive was appointed during the CEO's tenure. Since this method overestimates *FTA,* we include *Unknown_Exec* as a control variable to mitigate the overestimation problem. We do not need similar unknown controls for FDA because the director appointment date is rarely missing after 1998.

first year in office is designated by $FTA\_1Y\_Exe_{it}$ ($FDA\_1Y\_Dir_{it}$). The variable $FTA\_1Y\_Unknown\_Exe_{it}$ is the fraction of top executives for whom we cannot determine whether their appointment occurred during a CEO's first year in office. This controls for noise in $FTA\_1Y\_Exe_{it}$. The regression also controls for year-fixed effects to account for macroeconomic factors affecting appointment and retention decisions of top executives and directors.

Using the residuals of the regressions as AFTA and AFDA, we reestimate Tables IV, V, VI, and VII and report the results in Table IA.II, Panels A through D, of the Internet Appendix. The results are robust.

B.2. Tenure Weighted FTA and FDA

In calculating FTA and FDA we treat all top executives and directors equally. However, their relative influence may vary with their tenure. For example, a director who has been on the board for a long time may have greater influence than a newly-recruited director. A similar argument can be made for a top executive with long tenure. Thus, we calculate tenure weighted FTA_WT and FDA_WT by weighting each top executive and director (appointed during the CEO's tenure) by the executive's and the director's tenure. (The weight is each individual's tenure divided by the sum of all executives' or directors' tenure). We also calculate their abnormal measures, AFTA_WT and AFDA_WT, using the regression residuals based on FTA_WT and FDA_WT. Reestimation results using these alternative measures are reported in Table IA.III of the Internet Appendix. The results are robust.

B.3. Compensation Weighted FTA

The top non-CEO executives' relative influence may also vary across rank; for example, a CEO's connectedness with the second highest-paid executive may matter more than her connectedness with the fourth highest-paid executive. Thus, we weight FTA by executives' salaries and bonuses. FTA_WC is calculated the same way as FTA_WT, except the weight is based on non-CEO executives' salaries and bonuses. AFTA_WC is the regression residual based on FTA_WC. We do not compensation-weight FDA or AFDA because of the lack of variation in director compensation. Reestimation results based on

FTA_WC and AFTA_WC are reported in Table IA.IV, Panels A through D, of the Internet Appendix. The results are robust.

C. Appointment-based CEO Connectedness with Independent vs. Non-independent Directors

FDA covers all board members. However, CEO connectedness with independent directors may have different ramifications on corporate frauds than with non-independent directors. Non-independent directors include executives and others with a material relationship with the firm, such as major stockholders, former executives, family members of a CEO or a major stockholder, suppliers, clients, strategic alliance partners, and interlocked partners. These directors are likely to have different relationships with the CEO than independent directors, who are required to have no material relationship with the firm. Thus, we separately calculate the fraction of independent directors appointed (FIDA) during the current CEO's tenure among independent directors and the fraction of non-independent directors appointed (FNIDA) during the CEO's tenure among non-independent directors. (Because the denominator is different, FIDA and FNIDA do not sum to FDA.)

We reestimate the four key regressions separately for FIDA and FNIDA and report the results in Table IA.V of the Internet Appendix. Because the finer breakdown of FDA reduces variation in each variable, a number of variables show weaker statistical significance. However, all signs are consistent with those based on FDA.

Interestingly, CEO connectedness with non-independent directors (FNIDA) seems to have stronger effects on fraud commission, detection, and the hazard ratio. In our sample, 44% of non-independent directors (excluding the CEO) are current executives, and 16% of top four non-CEO executives appointed during the CEO's tenure serve on the board. These overlaps suggest that some of the identified effects of FDA are related to FTA.

In contrast to fraud commission and detection, the negative forced CEO turnover-fraud sensitivity is significant only for the connectedness with independent directors, illustrating the importance of independent directors' role in CEO dismissal decisions (Weisbach (1988)). Independent directors

connected to the CEO through appointment seem to be more effective in protecting CEOs tainted with fraud than connected non-independent directors.

C. CONCLUSION

The collective behavior of corporate leaders is often critical in corporate wrongdoing, and the CEO frequently plays the central role. Yet there is no comprehensive study exploring how CEOs and their connectedness within the executive suite and the boardroom impact corporate wrongdoing. This paper focuses on the effects of CEOs' social influence accumulated during the CEO's tenure through top executive and director appointment decisions.

We find appointment-based CEO connectedness is positively related to the likelihood of corporate fraud and negatively related to the likelihood of detection, given fraud. The relation is economically meaningful, statistically significant, and robust to two-stage instrumental variables regressions. The relation is also robust to an alternative model specification and a number of alternative measures of appointment-based CEO connectedness.

We also identify likely channels through which appointment-based CEO connectedness facilitates wrongdoing – by delaying detection, lowering the likelihood of CEO dismissal after fraud discovery, and reducing coordination costs of conducting frauds, all of which reduce the expected costs of wrongdoing.

CEOs can also be connected to their executives and board members by sharing common network ties established through past employment, education, and membership to various social organizations. We investigate the link between these connections and fraud incidence, detection, forced CEO turnover-fraud sensitivity, and the number of people charged in fraud. The estimation results show CEOs' preexisting network ties with top executives or board members have mostly insignificant relations to fraud incidence, its detection probability, the ability of CEOs named in fraud to retain their jobs, and the coordination cost of wrongdoing.

Taken together, these results imply that the fraction of top executives and board members appointed during a CEO's tenure is a critical factor in assessing a firm's likelihood of engaging in

wrongdoing and thus is worth the close attention of investors, regulators, and governance specialists. Further, our results underscore the importance of CEO connections built through personnel decisions in assessing the quality of governance and in managing risk, as the connections seem to heighten the risk of corporate fraud.

Appendix

Variable Definitions and Data Sources

Variables	Definitions	Sources
	Panel A: Fraud Variables	
Fraud	Indicator equal to one if a firm-year observation shows an alleged fraud, and zero otherwise.	Federal Securities Regulation (FSR) Database, Stanford Securities Class Action Clearinghouse (SSCAC), and the SEC Litigation Releases (SEC)
Fraud_$_{t\text{-}3\text{-}t}$	Indicator equal to one if alleged fraud takes place anytime during the period over year *t*-3 to year *t*, and zero otherwise.	
DetecDuration	The number of days from the commencement of fraudulent activity to the fraud detection date. For the fraud cases covered by the FSR database, the fraud detection date is the earliest of the following dates: (1) The date the target firm first announced it received an informal request by regulators for information related to the subsequent enforcement action. (2) The date the target firm first announced it received a notice of a formal order of investigation, received a subpoena, or was named a respondent in a warrant issued by regulators related to the subsequent enforcement action. (3) The date of the first regulatory proceeding filed in the related enforcement action. (4) The date of the first public announcement of an activity that reveals to investors a possible enforcement action in the future. This date is identified in the documents associated with regulatory proceedings; related private civil class action lawsuits; information associated with informal inquiries, formal investigations, and Wells Notices; or information released by the firm. (5) The first date of the announcement of a receipt of a Wells Notice by an intended respondent to an enforcement action or the date the firm announces they have reached a settlement in an intended enforcement action. (6) The date on which the first related private civil class action lawsuit was filed for the same activity described in the enforcement action by regulators. For alleged fraud cases that are not in the FSR database but were found in either the SEC or SSCAC database, the earliest date provided by the relevant databases was used unless an earlier date was discovered in a media source. In the latter case the earlier media date was used.	
Num_Charged	The number of people charged in the litigation or enforcement action.	
Accounting	Indicator equal to one, if a fraud is identified as involving accounting matters.	
Operating	Indicator equal to one, if a fraud is identified as involving real business activities.	
Executive	Indicator equal to one if a fraud is identified as involving executives taking unlawful advantage of their positions for personal benefits.	
CEO_Jail&Bar	Indicator equal to one if a CEO is sentenced to jail and/or barred from serving as a CEO of a publicly listed firm, and zero otherwise.	
Tot_Settlement	Value of total settlement. The unit is 10 million dollars. Missing values are replaced by zero.	
Tot_Settlement_D	Indicator equal to one, if *Tot_Settlement* is not missing, and zero otherwise.	
	Panel B: CEO Connectedness Variables	
FTA	Fraction of top four non-CEO executives appointed during the current CEO's tenure.	ExecuComp
AFTA	Abnormal fraction of top four non-CEO executives appointed during the current CEO's tenure.	
FTA_WT	Fraction of top four non-CEO executives appointed during the current CEO's tenure, weighted by the executives' tenure.	
AFTA_WT	Abnormal fraction of top four non-CEO executives appointed during the current CEO's tenure, weighted by the executives' tenure.	
FTA_WC	Fraction of top four non-CEO executives appointed during the current CEO's tenure, weighted by the executives' salaries and bonuses.	
AFTA_WC	Abnormal fraction of top four non-CEO executives appointed during the current CEO's tenure, weighted by the executives' salaries and bonuses.	
FDA	Fraction of directors appointed during the current CEO's tenure, excluding the CEO from both the numerator and denominator if the CEO is on the board.	ExecuComp, RiskMetrics
AFDA	Abnormal fraction of directors appointed during the current CEO's tenure, excluding the CEO from both the numerator and denominator if the CEO is on the board.	
FDA_WT	Fraction of directors appointed during the current CEO's tenure, weighted by the directors' tenure.	
AFDA_WT	Abnormal fraction of directors appointed during the current CEO's tenure, weighted by the directors' tenure.	
FTA+FDA	Sum of FTA and FDA divided by 2.	
FIDA	Fraction of independent directors appointed during the current CEO's tenure (i.e., the number of independent directors appointed during the current CEO's tenure divided by the total number of independent directors).	
FNIDA	Fraction of non-independent directors appointed during the current CEO's tenure (i.e., the number of non-independent directors appointed during the current CEO's tenure divided by the total number of non-independent directors.)	
Dir_Tie_All	The sum of *Dir_Tie_Emp, Dir_Tie_Edu,* and *Dir_Tie_Soc*	ExecuComp, RiskMetrics, BoardEx
Dir_Tie_Emp	The total number of preexisting network ties a CEO has with directors through past employment (either working as an employee or serving on the board) divided by the number of directors on the board. Only network ties established during overlapping years are included.	
Dir_Tie_Edu	The total number of preexisting network ties a CEO has with directors through past educational institutions divided by the number of directors on the board. Only network ties established during overlapping years are included.	
Dir_Tie_Soc	The total number of preexisting network ties a CEO has with directors through past membership in social and professional organizations divided by the number of directors on the board. Only network ties established during overlapping years are included.	
Pct_Known_Dir_Tie	The percent of the directors whose preexisting network ties to their CEOs are known.	

Variable Definitions and Data Sources (Continued)

Variables	Definitions	Sources
Exe_Tie_All	The sum of *Exe_Tie_Emp, Exe_Tie_Edu,* and *Exe_Tie_Soc*.	ExecuComp, BoardEx
Exe_Tie_Emp	The total number of preexisting network ties a CEO has with the top four non-CEO executives through past employment (either working as an employee or serving on the board) divided by 4. Only network ties established during overlapping years are included.	
Exe_Tie_Edu	The total number of preexisting network ties a CEO has with the top four non-CEO executives through past educational institutions divided by 4. Only network ties established during overlapping years are included.	
Exe_Tie_Soc	The total number of preexisting network ties a CEO has with the top four non-CEO executives through past membership in social and professional organizations divided by 4. Only network ties established during overlapping years are included.	
Pct_Known_Exe_Tie	The percent of the top four non-CEO executives whose preexisting network ties to their CEOs are known.	
Panel C: Variables to Construct AFTA and AFDA		
Outside	Indicator equal to one, if a CEO comes from outside the firm and zero otherwise.	ExecuComp
Execsen	The average tenure of the top four non-CEO executives.	
FTA_1Y_Exe	The fraction of the top four non-CEO executives appointed during a CEO's first year in office.	
Unknown_Exe	The fraction of executives whose first year on the list of the top four non-CEO executives cannot be identified.	
FTA_1Y_Unknown_Exe	The fraction of the top four non-CEO executives whose appointment cannot be determined as occurring during a CEO's first year in office.	
Dircsen	The average tenure of non-CEO directors.	ExecuComp, RiskMetrics
FDA_1Y_Dir	The fraction of directors appointed during a CEO's first year in office.	
Panel D: Firm Characteristics and Business Condition Variables		
Tobin's Q	The market value of common equity plus the book value of total liabilities divided by the book value of total assets.	Compustat
Ebitda/TA	Earnings before interest, taxes, depreciation, and amortization divided by the book value of total assets.	Compustat
StockReturns	Annual buy-and-hold stock returns.	CRSP
Leverage	Sum of short- and long-term debt divided by the book value of total assets.	Compustat
SalesGrowth_5Yr	The 5-year least squares annual growth rate of sales in percentage.	ExecuComp
Ln(TotalAssets)	Logged value of the book value of total assets.	Compustat
IndustryQ	The median Tobin's Q in an industry in a given year. Industries are defined by Fama-French (1997) industry groupings.	Compustat
ICR	Industry concentration ratio, as measured by the sum of the percentage market share (in sales) of the four biggest firms among all firms in Compustat in each industry in each year. Industries are defined by Fama-French (1997) industry groupings.	Compustat
Panel E: Monitoring Variables		
Ln(BoardSize)	Logged value of one plus the number of directors on the board.	Risk Metrics
%_NonIndep Directors	The number of non-independent directors, as defined by IRRC, divided by the total number of directors on the board.	Risk Metrics
Ln(BoardMeetings)	Logged value of one plus the number of board meetings held during a given year.	ExecuComp
%_NonIndep Directors_Audit	The number of non-independent directors as defined by IRRC on the audit committee, divided by the total number of audit committee members.	Risk Metrics
Ln(AuditComSize)	Logged value of one plus the number of audit committee members.	Risk Metrics
Ln(Analyst)	Logged value of one plus the number of analysts following a firm in a given year.	I/B/E/S
IOC	The sum of percentage share ownership held by the top five institutional investors.	CDA Spectrum
Panel F: Litigation Risk Variables		
StockVolatilities	Standard deviation of a firm's daily stock returns in a given year.	CRSP
IndustryLitigation	The yearly deviation from the average litigation intensity in an industry. The level of litigation intensity in an industry is the number of all alleged frauds against publicly listed firms in an industry in a given year, divided by the total number of firms in Compustat for the same industry and the same year. Detection date is defined in the detection duration entry. Industries are defined by Fama-French (1997) industry groupings.	FSR, SSCAC, SEC and Compustat
StockTurnover	(Number of shares traded in a year) / (Number of shares outstanding).	CRSP
Panel G: CEO Characteristics Variables		
CEO_OWN	The percentage of outstanding common shares held by a CEO.	ExecuComp
StockOption	The value of "in the money" stock options owned by the CEO including exercisable and unexercisable stock options. Unit: Billion dollars.	
CEO_Founder	Indicator equal to one, if a CEO was the CEO five years prior to the first date when the firm appears in CRSP or Compustat, and zero otherwise.	
CEO_Chair	Indicator equal to one when a CEO also chairs the board, and zero otherwise.	
Ln(CEO_Age)	Logged value of CEO age.	
CEO_Tenure	The number of years a CEO has been CEO.	
Forced_CEO_Turnover	Indicator for forced CEO turnover, identified by following the procedures used in Parrino (1997) and Jenter and Kanaan (2011). The details are described in the text.	ExecuComp and Factiva

Variable Definitions and Data Sources (Continued)

Variables	Definitions	Sources
Panel H: Instrumental Variables for Appointment-based CEO Connectedness Variables		
Exe_Death	The number of top four non-CEO executives who left the position due to death during the current CEO's tenure up to the current year.	ExecuComp and Factiva
Dir_Death	The number of non-CEO directors who left the director position due to death during the current CEO's tenure up to the current year.	RiskMetrics and Factiva
Ind_Exe_Turnover	The yearly industry average top four non-CEO executive turnover ratio, excluding each sample firm in calculating the average. The turnover ratio is the percentage of top four non-CEO executives who are not on the list of top four non-CEO executives in the previous year. Industry is defined by the Fama-French industry grouping.	ExeComp Compustat
Ind_Dir_Turnover	The yearly industry average non-CEO director turnover ratio, excluding each sample firm in computing the average. The turnover ratio is the percentage of non-CEO directors who are not on the board in the previous year. Industry is defined by the Fama-French industry grouping.	Riskmetrics Compustat

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Table I
Sample Distribution

This table describes the sample firm-year observations. Panel A lists the sample distribution by year. Panel B lists the sample distribution by the fraction of executives appointed (FTA) and the fraction of directors appointed (FDA) during a CEO's tenure, and by their abnormal measures (AFTA and AFDA). The Appendix provides definitions of these variables. Column (2) shows the total number of firms with data available to calculate FTA or FDA. Columns (3) and (4) report the number and the percentage of firms alleged to have committed fraud among the sample firms. The sample covers the period 1996 to 2006.

Panel A: Sample Distribution by Year

Year	# of Firms	# of Firms with Frauds	%_Fraud
(1)	(2)	(3)	(4)
1996	1,518	34	2.240
1997	1,551	55	3.546
1998	1,607	58	3.609
1999	1,684	90	5.344
2000	1,670	110	6.587
2001	1,562	118	7.554
2002	1,574	104	6.607
2003	1,630	86	5.276
2004	1,637	78	4.765
2005	1,628	74	4.545
2006	1,736	66	3.802
Total	17,797	873	4.905

Panel B: Sample Distribution by FTA and FDA

FTA	# of Firms	# of Firms with Frauds	%_Fraud
FTA=0.00	4,988	220	4.411
FTA=0.25	3,586	149	4.155
FTA=0.50	4,033	203	5.033
FTA=0.75	3,268	176	5.386
FTA=1.00	1,922	125	6.504
AFTA≤20 Percentile	3,562	187	5.250
20 Percentile <AFTA≤40 Percentile	3,557	163	4.583
40 Percentile <AFTA≤60 Percentile	3,560	134	3.764
60 Percentile <AFTA≤80 Percentile	3,559	184	5.170
80 Percentile <AFTA	3,559	205	5.760
FDA	# of Firms	# of Firms with Frauds	%_Fraud
FDA=0.00	2,395	131	5.470
0.00<FDA≤0.25	2,396	115	4.800
0.25<FDA≤0.50	2,690	130	4.833
0.50<FDA≤0.75	2,032	132	6.496
0.75<FDA≤1.00	1,550	116	7.484
AFDA≤20 Percentile	2,213	130	5.874
20 Percentile <AFDA≤40 Percentile	2,213	142	6.417
40 Percentile <AFDA≤60 Percentile	2,212	120	5.425
60 Percentile <AFDA≤80 Percentile	2,213	119	5.377
80 Percentile <AFDA	2,212	113	5.108

Table II
Summary Statistics of Key Variables for the Full, Fraud, and Non-Fraud Samples

Panel A contains the statistics for the full sample. Panel B reports the mean of each variable separately for the fraud and non-fraud samples. Columns (8) and (9) show for each variable the difference in the means between the fraud and non-fraud samples and the P-value of the differences, respectively. Definitions of all variables are provided in the Appendix. Coefficients marked with *, **, and *** are significant at 10%, 5%, 1% level, respectively.

	Panel A: Full Sample					*Panel B: Fraud and Non-Fraud Firm Samples*			
Variable	Mean	Median	Std. Dev.	Min	Max	Fraud	Non-Fraud	Fraud - Non-Fraud	P-value
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
Fraud Variables									
Fraud	0.049	0.000	0.218	0.000	1.000				
Fraud $_{t-3-t}$	0.072	0.000	0.259	0.000	1.000				
CEO_Jail&Bar	0.003	0.000	0.051	0.000	1.000				
DetecDuration	1080.638	796.000	923.189	53.000	5548.000				
Num_Charged	4.828	3.000	3.899	1.000	24.000				
Tot_Settlement	5.126	0.300	44.563	0.000	762.700				
Tot_Settlement_D	0.693	1.000	0.462	0.000	1.000				
Accounting	0.932	1.000	0.252	0.000	1.000				
Operating	0.340	0.000	0.474	0.000	1.000				
Executive	0.414	0.000	0.493	0.000	1.000				
CEO Connectedness Variables									
FTA	0.409	0.500	0.336	0.000	1.000	0.453	0.407	0.046***	(0.000)
AFTA	0.000	0.008	0.292	-0.907	1.096	0.012	-0.001	0.013	(0.206)
FTA_WT	0.347	0.263	0.323	0.000	1.000	0.391	0.345	0.047***	(0.000)
AFTA_WT	0.000	-0.030	0.285	-0.837	1.009	0.013	-0.001	0.014	(0.156)
FTA_WC	0.389	0.374	0.336	0.000	1.000	0.441	0.386	0.055***	(0.000)
AFTA_WC	0.000	-0.011	0.292	-0.895	1.076	0.021	-0.001	0.022**	(0.027)
FDA	0.369	0.333	0.301	0.000	1.000	0.410	0.366	0.044***	(0.000)
AFDA	0.000	-0.006	0.147	-1.095	0.798	-0.009	0.001	-0.010	(0.112)
FIDA	0.435	0.400	0.359	0.000	1.000	0.476	0.433	0.043***	(0.004)
FNIDA	0.211	0.000	0.286	0.000	1.000	0.256	0.208	0.047***	(0.000)
FDA_WT	0.220	0.113	0.254	0.000	1.000	0.258	0.218	0.041***	(0.000)
AFDA_WT	0.000	-0.022	0.145	-0.831	0.783	-0.006	0.000	-0.006	(0.326)
FTA+FDA	0.420	0.429	0.260	0.000	1.000	0.448	0.418	0.030***	(0.005)
Dir_Tie_All	0.541	0.556	0.425	0.000	3.333	0.533	0.541	-0.008	(0.583)
Dir_Tie_Emp	0.365	0.308	0.349	0.000	3.000	0.348	0.366	-0.018	(0.127)
Dir_Tie_Edu	0.090	0.100	0.071	0.000	0.833	0.093	0.090	0.002	(0.343)
Dir_Tie_Soc	0.085	0.091	0.066	0.000	0.778	0.093	0.085	0.008***	(0.000)
Pct_Known_Dir_Tie	0.709	1.000	0.421	0.000	1.000	0.756	0.707	0.049***	(0.001)
Exe_Tie_All	0.282	0.000	0.448	0.000	4.500	0.302	0.281	0.021	(0.181)
Exe_Tie_Emp	0.273	0.000	0.443	0.000	4.500	0.286	0.272	0.014	(0.365)
Exe_Tie_Edu	0.008	0.000	0.048	0.000	0.750	0.014	0.008	0.006***	(0.001)
Exe_Tie_Soc	0.001	0.000	0.017	0.000	0.500	0.002	0.001	0.001**	(0.038)
Pct_Known_Exe_Tie	0.823	1.000	0.295	0.000	1.000	0.854	0.821	0.033***	(0.001)
Firm Characteristics and Business Condition Variables									
Tobin's Q	2.097	1.503	2.604	0.298	105.090	2.538	2.075	0.463***	(0.000)
Ebitda/TA	0.129	0.127	0.123	-2.948	0.991	0.114	0.130	-0.016***	(0.000)
StockReturns	0.068	0.108	0.483	-3.836	3.303	-0.101	0.076	-0.177***	(0.000)
Leverage	0.223	0.214	0.175	0.000	0.959	0.245	0.222	0.023***	(0.000)
SalesGrowth_5Yr	17.649	10.293	57.421	-74.682	3559.292	28.506	17.089	11.416***	(0.000)
Log(TotalAssets)	0.639	0.461	1.742	-5.419	7.541	1.307	0.604	0.703***	(0.000)
IndustryQ	1.509	1.344	0.491	0.842	3.497	1.591	1.504	0.087***	(0.000)
ICR	0.327	0.301	0.141	0.087	0.984	0.325	0.327	-0.002	(0.749)
CEO Characteristics Variables									
CEO_OWN	0.025	0.003	0.062	0.000	0.761	0.023	0.025	-0.002	(0.306)
CEO_Founder	0.137	0.000	0.344	0.000	1.000	0.203	0.134	0.069***	(0.000)
CEO_Chair	0.494	0.000	0.500	0.000	1.000	0.542	0.492	0.050***	(0.004)
Ln(CEO_Age)	3.313	3.367	0.290	0.000	4.159	3.252	3.316	-0.064***	(0.000)
StockOption	0.016	0.003	0.142	0.000	17.017	0.034	0.015	0.018***	(0.000)
CEO_Tenure	6.703	4.000	7.142	0.000	55.000	7.482	6.663	0.819***	(0.001)
Forced_CEO_Turnover	0.029	0.000	0.169	0.000	1.000	0.038	0.029	0.009	(0.134)
Monitoring Variables									
Ln(BoardSize)	2.350	2.303	0.267	0.693	3.689	2.364	2.350	0.014	(0.227)
%_NonIndepDirectors	0.336	0.308	0.174	0.000	1.000	0.335	0.336	-0.002	(0.817)
Ln(BoardMeetings)	2.070	2.079	0.351	0.000	4.220	2.159	2.065	0.095***	(0.000)
%_NonIndepDirectors_Audit	0.033	0.000	0.068	0.000	0.778	0.033	0.033	0.000	(0.938)
Ln(AuditComSize)	1.262	1.386	0.604	0.000	2.485	1.384	1.255	0.128***	(0.000)
Ln(Analyst)	1.966	2.197	1.059	0.000	3.951	2.212	1.953	0.259***	(0.000)
IOC	0.413	0.386	0.139	0.162	1.000	0.392	0.414	-0.022***	(0.000)
Litigation Risk Variables									
StockVolatilities	0.028	0.024	0.016	0.000	0.231	0.033	0.028	0.006***	(0.000)
IndustryLitigation	0.009	0.004	0.021	-0.022	0.129	0.015	0.009	0.006***	(0.000)
StockTurnover	1.842	1.272	1.852	0.000	51.324	2.785	1.793	0.992***	(0.000)
Instrumental Variables for CEO Connectedness Variables									
Exe_Death	0.019	0.000	0.167	0.000	2.000	0.009	0.020	-0.011*	(0.061)
Dir_Death	0.015	0.000	0.124	0.000	2.000	0.021	0.015	0.006	(0.166)
Ind_Exe_Turnover	0.246	0.237	0.054	0.000	1.000	0.256	0.245	0.011***	(0.000)
Ind_Dir_Turnover	0.037	0.037	0.016	0.000	0.233	0.039	0.037	0.001**	(0.034)

Table III

Pair-wise Correlations between Appointment-based CEO Connectedness and Fraud-related Variables

This table reports the pair-wise correlations between appointment-based CEO connectedness variables and the fraud indicator, fraud detection duration in days, and the number of people charged in litigation or enforcement actions. Panel A reports the correlations for fraud cases in which the CEO is a named respondent; Panel B, fraud cases in which the CEO is unnamed. The pair-wise correlations between the fraud indicator and FTA or FDA are based on the panel data of all firm-year observations. The pair-wise correlations of FTA or FDA with detection duration and the number of people charged are based on the cross-sectional data at the fraud case level, using the average FTA or FDA over the fraud period. Definitions of all variables are provided in the Appendix. Coefficients marked with *, **, and *** are significant at 10%, 5%, 1% level, respectively.

		FTA	FDA
Panel A: CEO-Named Cases	Fraud	0.030***	0.034***
	DetecDuration	0.097*	0.099
	Num_Charged	0.103*	0.142**
Panel B: CEO-Unnamed Cases	Fraud	0.002	-0.013
	DetecDuration	-0.053	0.072
	Num_Charged	-0.034	-0.299*

Table IV

Bivariate Probit Model Estimation for Corporate Frauds and Appointment-based CEO Connectedness

This table reports the bivariate probit model estimation results. Columns (1), (3), and (5) report the estimated relations between appointment-based CEO connectedness and the incidence of fraud, and Columns (2), (4), and (6) report the estimated relations between appointment-based CEO connectedness and the likelihood of detection, given fraud. The sample covers the period 1996 to 2006. Definitions of all variables are provided in the Appendix. All regressions include year dummies. Robust standard errors clustered at the industry level are reported in parentheses. Industries are classified by Fama-French 48 industry groupings. Coefficients marked with *, **, and *** are significant at 10%, 5%, 1% level, respectively.

	Fraud	Detect|Fraud	Fraud	Detect|Fraud	Fraud	Detect|Fraud
VARIABLES	(1)	(2)	(3)	(4)	(5)	(6)
FTA	0.490***	-0.208**				
	(0.144)	(0.088)				
FDA			0.730***	-0.273*		
			(0.254)	(0.159)		
FTA+FDA					0.654***	-0.550***
					(0.174)	(0.110)
Tobin's Q	-0.355***	0.009	-0.160***	-0.010	-0.151***	-0.014
	(0.046)	(0.025)	(0.026)	(0.014)	(0.028)	(0.015)
Ebitda/TA	-3.586***	-0.611	-1.515***	-0.713	-1.777***	-0.601
	(0.842)	(0.492)	(0.584)	(0.559)	(0.468)	(0.552)
Leverage	1.082***	0.031	2.461***	-0.621**	2.233***	-0.451
	(0.306)	(0.223)	(0.444)	(0.315)	(0.364)	(0.276)
SalesGrowth_5Yr	0.044***	0.000	0.026***	-0.000	0.028***	-0.000
	(0.006)	(0.001)	(0.004)	(0.001)	(0.004)	(0.001)
Log(TotalAssets)	-0.062	0.201***	0.100**	0.198***	0.064	0.208***
	(0.059)	(0.035)	(0.045)	(0.046)	(0.047)	(0.043)
CEO_OWN	19.449***	-0.804	2.057	1.913	4.273*	0.602
	(4.226)	(2.137)	(2.152)	(2.407)	(2.183)	(2.590)
$(CEO\_OWN)^2$	-80.688***	4.228	-20.040***	-2.129	-25.249***	1.088
	(14.834)	(8.293)	(7.645)	(7.735)	(8.210)	(8.526)
CEO_Founder	3.332***	-0.318**	3.973***	-0.860***	4.036***	-0.882***
	(0.411)	(0.135)	(0.680)	(0.200)	(0.628)	(0.202)
CEO_Chair	1.167***	-0.202*	0.725***	-0.372**	0.683***	-0.318**
	(0.167)	(0.113)	(0.155)	(0.149)	(0.123)	(0.161)
Ln(CEO_Age)	2.296***	-0.642***	1.257***	-0.799***	1.644***	-0.917***
	(0.351)	(0.188)	(0.313)	(0.210)	(0.328)	(0.210)
Ln(BoardSize)	-2.789***	0.797***	-1.831***	1.300***	-1.754***	1.222***
	(0.368)	(0.298)	(0.334)	(0.332)	(0.324)	(0.322)
%_NonIndepDirectors	-2.580***	0.945**	-1.339**	0.977**	-1.760***	1.038**
	(0.629)	(0.417)	(0.544)	(0.487)	(0.539)	(0.482)
Ln(BoardMeetings)	-0.956***	0.389***	-0.284	0.451***	-0.107	0.378***
	(0.179)	(0.096)	(0.219)	(0.125)	(0.197)	(0.120)
%_NonIndepDirectors_Audit	-1.050	-0.600	-1.129	0.015	-0.912	-0.004
	(0.817)	(0.885)	(1.077)	(0.978)	(1.023)	(0.860)
Ln(AuditComSize)	0.015	0.328**	-0.190	0.267	-0.577***	0.404**
	(0.277)	(0.161)	(0.241)	(0.170)	(0.210)	(0.174)
StockVolatilities	162.490***	-5.227	55.216***	-5.645	54.396***	-4.384
	(16.284)	(3.276)	(9.642)	(3.967)	(6.577)	(3.710)
IndustryLitigation	9.778***	2.141*	1.656	3.044**	0.991	3.306**
	(1.934)	(1.264)	(1.655)	(1.202)	(1.380)	(1.377)
CEO_Tenure	-0.191***	0.036***	-0.157***	0.060***	-0.163***	0.068***
	(0.023)	(0.009)	(0.029)	(0.011)	(0.027)	(0.011)
Ln(Analyst)	0.167**	0.067	-0.045	0.052	-0.012	0.038
	(0.071)	(0.051)	(0.101)	(0.088)	(0.095)	(0.097)
IOC	-2.375***	1.096***	0.384	0.670	0.531	0.681
	(0.733)	(0.388)	(0.495)	(0.448)	(0.476)	(0.448)
Turnover	-0.303***	0.149***	-0.055	0.158***	-0.072**	0.158***
	(0.045)	(0.026)	(0.038)	(0.027)	(0.032)	(0.029)
StockOption	5.310***		11.685***		13.847***	
	(0.859)		(2.214)		(2.649)	
IndustryQ	1.659***	0.737*	1.571***	0.170	1.195**	0.415
	(0.604)	(0.420)	(0.459)	(0.458)	(0.466)	(0.463)
$(IndustryQ)^2$	-0.305**	-0.085	-0.270**	0.039	-0.208*	-0.004
	(0.130)	(0.095)	(0.105)	(0.102)	(0.110)	(0.102)
ICR	-2.481***	1.029***	-1.243***	1.081***	-1.352***	1.132***
	(0.390)	(0.184)	(0.264)	(0.211)	(0.254)	(0.218)
Constant	-2.389	-5.038***	-1.579	-5.046***	-2.069	-4.855***
	(1.455)	(0.992)	(1.338)	(1.168)	(1.372)	(0.995)
Year Dummies	Y	Y	Y	Y	Y	Y
Observations	7,865	7,865	6,243	6,243	6,243	6,243
Prob> Chi^2	0.000	0.000	0.000	0.000	0.000	0.000
log likelihood	-1218	-1218	-1060	-1060	-1057	-1057

Table V
Instrumental Variable Regression Results

This table reports the instrumental variable regression estimation results for the bivariate probit model. The endogenous variables are *FTA* and *FDA*. The instrumental variables are *Exe_Death* and *Ind_Exe_Turnover* for *FTA*; *Dir_Death* and *Ind_Dir_Turnover* for *FDA*. The first-stage regression estimation results are reported in Columns (1)-(2) and (5)-(6); the second-stage regression estimation results are reported in Columns (3)-(4) and (7)-(8). Control variables (unreported) are the same as those in Table IV. All regressions control for year dummies. The variable *FXA_Hat* is *FTA_Hat* in Columns (3) and (4) and *FDA_Hat* in Columns (7) and (8). F-test of joint significance of instrumental variables is reported in the first-stage regressions. The sample covers the period 1996 to 2006. Definitions of all variables are provided in the Appendix. Robust standard errors are reported in parentheses. Coefficients marked with *, **, and *** are significant at 10%, 5%, and 1% level, respectively.

	1st Stage		2nd Stage		1st Stage		2nd Stage	
	FTA		Fraud	Detect|Fraud	FDA		Fraud	Detect|Fraud
VARIABLES	FTA				FDA			
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
FXA_Hat			61.490***	-49.024***			37.007*	-18.030
			(8.837)	(10.229)			(20.800)	(14.565)
Exe(Dir)_Death	0.057***	0.057***			0.012	0.012		
	(0.018)	(0.018)			(0.018)	(0.018)		
Ind_Exe(Dir)_Turnover	0.094	0.094			0.490***	0.490***		
	(0.082)	(0.082)			(0.135)	(0.135)		
Year Dummies	Y	Y	Y	Y	Y	Y	Y	Y
Observations	7,504	7,504	7,504	7,504	6,242	6,242	6,242	6,242
Adjusted R^2	0.160	0.160			0.552	0.552		
Log likelihood			-1113	-1113			-1065	-1065
F-statistics (IVs)	12.13	12.05			13.75	13.67		
Prob > F (IVs)	0.002	0.002			0.001	0.001		

Table VI

Forced CEO Turnover-Fraud Sensitivity and Appointment-based CEO Connectedness

This table estimates the impact of appointment-based CEO connectedness on forced CEO turnover-fraud sensitivity. The dependent variable is an indicator of forced CEO turnover. The relations are estimated by the OLS; and by the conditional logistic model (Clogit). OLS regressions control for firm and year fixed effects. Conditional logistic regressions control for year dummies. The sample covers the period 1996 to 2006. Definitions of all variables are provided in the Appendix. Robust standard errors clustered at the firm level are reported in parentheses. Coefficients marked with *, **, and *** are significant at 10%, 5%, 1% level, respectively.

	Forced_CEO_Turnover					
	OLS			Clogit		
VARIABLES	(1)	(2)	(3)	(4)	(5)	(6)
Fraud $_{t-3-t}$*FTA	-0.190***			-2.935*		
	(0.065)			(1.591)		
FTA	-0.128***			-3.771***		
	(0.017)			(0.538)		
Fraud $_{t-3-t}$*FDA		-0.163**			-7.464**	
		(0.070)			(3.049)	
FDA		-0.183***			-5.504***	
		(0.026)			(1.034)	
Fraud $_{t-3-t}$*(FTA+FDA)			-0.219**			-5.250**
			(0.085)			(2.272)
FTA+FDA			-0.202***			-5.629***
			(0.027)			(0.835)
Fraud $_{t-3-t}$	0.125***	0.053	0.098**	1.459**	0.736	1.373*
	(0.046)	(0.038)	(0.049)	(0.728)	(0.593)	(0.834)
Tobin's Q	-0.000	0.002	0.001	0.024	0.073	0.054
	(0.003)	(0.003)	(0.003)	(0.205)	(0.145)	(0.181)
Ebitda/TA	-0.051	-0.068	-0.063	-2.720	-3.783	-4.161
	(0.060)	(0.065)	(0.065)	(2.961)	(2.906)	(3.165)
SalesGrowth_5Yr	0.000	0.000	0.000	0.002	0.024*	0.008
	(0.000)	(0.000)	(0.000)	(0.013)	(0.014)	(0.017)
Log(TotalAssets)	-0.006	-0.006	-0.003	-0.342	-0.370	-0.491
	(0.013)	(0.015)	(0.015)	(0.505)	(0.509)	(0.548)
ICR	-0.102**	-0.154***	-0.136**	-3.864	-3.388	-4.235*
	(0.051)	(0.056)	(0.057)	(2.427)	(2.444)	(2.433)
CEO_Founder	-0.085**	-0.099**	-0.093**	-1.606*	-2.069**	-1.599*
	(0.033)	(0.040)	(0.040)	(0.828)	(0.933)	(0.898)
CEO_Chair	-0.012	-0.014	-0.013	-0.543	-0.649*	-0.607
	(0.011)	(0.013)	(0.013)	(0.358)	(0.364)	(0.380)
Ln(CEO_Age)	0.024	0.064*	0.074**	0.141	0.692	0.823
	(0.027)	(0.035)	(0.034)	(0.642)	(0.722)	(0.734)
Ln(BoardSize)	-0.020	0.006	-0.016	-0.870	-0.031	-0.913
	(0.022)	(0.025)	(0.025)	(0.956)	(0.896)	(0.927)
%_NonIndepDirectors	-0.013	-0.034	-0.037	0.376	-1.138	-0.731
	(0.033)	(0.036)	(0.037)	(1.474)	(1.678)	(1.787)
Ln(BoardMeetings)	0.048***	0.043***	0.043***	1.169**	0.838*	0.770
	(0.014)	(0.016)	(0.015)	(0.499)	(0.475)	(0.530)
CEO_Tenure	0.006***	0.009***	0.008***	0.140***	0.179***	0.147***
	(0.001)	(0.002)	(0.002)	(0.047)	(0.047)	(0.046)
Ln(Analyst)	-0.022*	-0.020	-0.019	-0.746*	-0.876**	-0.589
	(0.012)	(0.014)	(0.014)	(0.412)	(0.342)	(0.400)
IOC	0.095**	0.103**	0.099**	3.607**	3.292**	2.270
	(0.039)	(0.045)	(0.045)	(1.749)	(1.620)	(1.755)
IndustryLitigation	0.379**	0.381**	0.373**	11.338***	7.395*	9.492**
	(0.157)	(0.165)	(0.165)	(4.094)	(3.775)	(4.017)
CEO_Jail&Bar	0.051	0.029	0.043	11.917***	10.173***	10.679***
	(0.058)	(0.053)	(0.052)	(1.352)	(1.282)	(1.419)
Constant	0.023	-0.150	-0.123			
	(0.110)	(0.139)	(0.136)			
Firm FE	Y	Y	Y	N	N	N
Year FE (Dummies)	Y	Y	Y	Y	Y	Y
Observations	8,260	6,540	6,540	1,324	1,000	1,000
Adjusted R^2	0.123	0.128	0.140			
Wald				372.5	301.0	341.7

Table VII

Fraud Detection Duration, the Hazard Ratio, and Appointment-based CEO Connectedness

This table relates appointment-based CEO connectedness to fraud detection duration and the hazard ratio. The sample covers 291 fraud cases over the period 1996 to 2006. Panels A and B report estimation results by the OLS and the Cox regressions, respectively. The dependent variable in Panel A is the logged value of the number of days from the commencement of fraudulent activity to the detection date; in Panel B, the hazard ratio for the Cox regression. All regressions control for industry dummies. CEO connectedness and control variables are their average values over the fraud period. Definitions of all variables are provided in the Appendix. Robust standard errors clustered at the industry level are reported in parenthesis. Industries are classified by Fama-French 48 industry groupings. Coefficients marked with *, **, and *** are significant at 10%, 5%, 1% level, respectively.

	Panel A: Ln(DetecDuration)			Panel B: _t		
VARIABLES	(1)	(2)	(3)	(4)	(5)	(6)
FTA	0.323**			-0.741***		
	(0.134)			(0.229)		
FDA		0.319			-0.516*	
		(0.250)			(0.303)	
FTA+FDA			0.518*			-1.097***
			(0.260)			(0.388)
Tot_Settlement	0.001***	0.001***	0.001***	-0.002***	-0.001***	-0.001***
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
Tot_Settlement_D	-0.655***	-0.558***	-0.559***	0.909***	0.750***	0.776***
	(0.105)	(0.174)	(0.170)	(0.161)	(0.235)	(0.227)
Ln(TotalAssets)	-0.056*	0.033	0.021	0.069	-0.097	-0.086
	(0.031)	(0.037)	(0.038)	(0.054)	(0.063)	(0.057)
StockReturn	0.344***	0.344***	0.322**	-0.736***	-0.996***	-0.913***
	(0.095)	(0.120)	(0.132)	(0.247)	(0.318)	(0.349)
Ebitda/TA	0.316	1.298**	1.256*	-0.700	-2.754***	-2.665**
	(0.616)	(0.613)	(0.637)	(1.021)	(1.033)	(1.075)
Leverage	0.167	0.203	0.265	0.032	-0.250	-0.304
	(0.295)	(0.370)	(0.386)	(0.413)	(0.698)	(0.615)
SalesGrowth_5Yr	0.002**	0.004***	0.004***	-0.002	-0.005	-0.005
	(0.001)	(0.001)	(0.001)	(0.002)	(0.003)	(0.003)
StockVolatilities	-9.977*	-7.539	-8.171	7.202	-2.348	0.236
	(5.007)	(6.739)	(6.908)	(6.849)	(10.666)	(10.585)
StockTurnover	-0.011	-0.007	-0.002	0.022	0.007	0.001
	(0.032)	(0.050)	(0.049)	(0.062)	(0.093)	(0.091)
IndustryLitigation	-5.953***	-6.084***	-6.181***	9.123***	8.478***	8.933***
	(1.833)	(1.618)	(1.655)	(2.525)	(2.374)	(2.287)
Ln(Analyst)	-0.104	-0.363***	-0.367***	0.176*	0.528***	0.574***
	(0.065)	(0.090)	(0.089)	(0.090)	(0.120)	(0.129)
CEO_Chair	0.108	0.025	0.016	-0.258	-0.277	-0.236
	(0.117)	(0.126)	(0.125)	(0.191)	(0.215)	(0.216)
CEO_Founder	-0.257	-0.361	-0.335	0.485	0.459	0.477
	(0.278)	(0.377)	(0.376)	(0.476)	(0.501)	(0.477)
CEO_Tenure	0.021**	0.021	0.018	-0.043***	-0.036**	-0.029*
	(0.009)	(0.014)	(0.013)	(0.017)	(0.017)	(0.016)
CEO_OWN	-0.522	-2.133	-1.509	-1.392	2.127	1.035
	(2.299)	(3.177)	(3.118)	(3.856)	(4.021)	(4.029)
$(CEO\_OWN)^2$	0.968	-0.281	-2.308	5.103	3.659	5.686
	(7.224)	(10.509)	(10.537)	(11.713)	(14.543)	(14.705)
Constant	7.578***	7.789***	7.720***			
	(0.263)	(0.345)	(0.344)			
Industry Dummies	Y	Y	Y	Y	Y	Y
Observations	291	226	226	291	226	226
Adjusted R^2	0.274	0.302	0.309			
Wald				44172	56137	12952

Table VIII

Number of People Charged in Fraud and Appointment-based CEO Connectedness

This table estimates the relations between appointment-based CEO connectedness and the number of people charged in litigation or enforcement actions. The dependent variable, *Ln(Num_Charged+1)*, is the logged value of the number of people charged in litigation or enforcement actions plus one. The sample covers 302 fraud cases over the period 1996 to 2006. The CEO connectedness variables and the control variables are their average values over the fraud period. All regressions control for industry dummies. Definitions of all variables are provided in the Appendix. Robust standard errors clustered at the industry level are reported in parentheses. Industries are classified by Fama-French 48 industry groupings. Coefficients marked with *, **, and *** are significant at 10%, 5%, 1% level, respectively.

	Ln(Num_Charged+1)		
VARIABLES	(1)	(2)	(3)
FTA	0.208**		
	(0.087)		
FDA		0.533**	
		(0.254)	
FTA+FDA			0.556**
			(0.231)
Tobin's Q	-0.011	-0.009	-0.008
	(0.009)	(0.007)	(0.007)
Ebitda/TA	0.471*	0.435	0.314
	(0.245)	(0.290)	(0.269)
SalesGrowth_5Yr	0.002	0.001	0.001
	(0.001)	(0.001)	(0.001)
Leverage	0.287	0.292	0.278
	(0.198)	(0.178)	(0.173)
Accounting	0.395***	0.251	0.280*
	(0.129)	(0.149)	(0.152)
Operating	0.178**	0.112	0.093
	(0.078)	(0.104)	(0.100)
Executive	0.160**	0.122	0.106
	(0.077)	(0.098)	(0.096)
CEO_Tenure	0.003	-0.008	-0.004
	(0.005)	(0.006)	(0.005)
Tot_Settlement	0.002***	0.002***	0.002***
	(0.000)	(0.000)	(0.000)
Tot_Settlement_D	0.043	0.022	0.020
	(0.086)	(0.098)	(0.094)
Constant	0.873***	1.114***	1.044***
	(0.204)	(0.223)	(0.246)
Industry Dummies	Y	Y	Y
Observations	302	232	232
Adjusted R^2	0.117	0.116	0.115

Table IX

Preexisting Network Ties between the CEO and Top Executives and Corporate Fraud

This table reestimates Tables IV, VI, VII, and VIII using preexisting network ties between the CEO and top 4 non-CEO executives as the measure of CEO connectedness. The variable *Exe_Tie* is *Exe_Tie_All, Exe_Tie_Emp, Exe_Tie_Edu*, or *Exe_Tie_Soc*. The variable *Exe_Tie_Emp* is the total number of preexisting network ties a CEO has with top 4 non-CEO executives through past employment (either working as an employee or serving on the board) divided by four. The variable *Exe_Tie_Edu* is the total number of preexisting network ties a CEO has with top four non-CEO executives through past educational institutions divided by four. The variable *Exe_Tie_Soc* is the total number of preexisting network ties a CEO has with top four non-CEO executives through past membership in social and professional organizations divided four. The variable *Exe_Tie_All* is the sum of *Exe_Tie_Emp, Exe_Tie_Edu*, and *Exe_Tie_Soc*. Only network ties established during overlapping years are included. Control variables in Panels A-D (unreported) are the same as those in Tables IV, VI, VII, and VIII, respectively. Definitions of all variables are provided in the Appendix. Robust standard errors reported in parentheses are clustered at the industry level in Panels A, C, and D and at the firm level in Panel B. Coefficients marked with *, **, and *** are significant at 10%, 5%, 1% level, respectively.

Panel A: Bivariate Estimation of Corporate Fraud

	Fraud	Detect|Fraud	Fraud	Detect|Fraud	Fraud	Detect|Fraud	Fraud	Detect|Fraud
	Exe_Tie_All		Exe_Tie_Emp		Exe_Tie_Edu		Exe_Tie_Soc	
VARIABLES	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Exe_Tie	-0.055	-0.010	-0.068	0.000	2.408	-2.445	1.291	0.136
	(0.191)	(0.211)	(0.197)	(0.219)	(12.721)	(13.821)	(1.662)	(1.766)
Pct_Known_Exe_Tie	0.419	-0.666	-6.774	6.778	-7.963	8.369	-2.534**	-4.284***
	(0.435)	(0.498)	(4.833)	(6.198)	(8.754)	(14.434)	(1.053)	(1.192)
Year Dummies	Y	Y	Y	Y	Y	Y	Y	Y
Observations	7,865	7,865	7,865	7,865	7,865	7,865	7,865	7,865
Prob> Chi^2	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
log likelihood	-1220	-1220	-1220	-1220	-1221	-1221	-1219	-1219

Panel B: Forced CEO Turnover for Fraud Sensitivity

	Forced_CEO_Turnover							
	OLS				Clogit			
	Exe_Tie_All	Exe_Tie_Emp	Exe_Tie_Edu	Exe_Tie_Soc	Exe_Tie_All	Exe_Tie_Emp	Exe_Tie_Edu	Exe_Tie_Soc
VARIABLES	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
$Fraud_{t-3-t}$*Exe_Tie	0.063	0.064	-0.212	1.088	0.627	0.642	-5.399	-0.569
	(0.041)	(0.041)	(0.190)	(1.239)	(0.384)	(0.391)	(5.317)	(5.199)
Exe_Tie	-0.016	-0.017	-0.012	0.025	0.035	-0.007	3.030	1.208
	(0.014)	(0.015)	(0.048)	(0.052)	(0.525)	(0.559)	(2.702)	(4.594)
$Fraud_{t-3-t}$	0.011	0.012	0.036*	0.031	0.353	0.366	0.766	0.279
	(0.023)	(0.023)	(0.020)	(0.019)	(0.521)	(0.513)	(0.480)	(0.256)
Pct_Known_Exe_Tie	0.010	0.010	0.007	0.006	0.785	0.796	0.882	0.441
	(0.021)	(0.021)	(0.021)	(0.021)	(0.713)	(0.716)	(0.688)	(0.411)
Year FE (Dummies)	Y	Y	Y	Y	Y	Y	Y	Y
Firm FE	Y	Y	Y	Y	N	N	N	N
Observations	8,260	8,260	8,260	8,260	1,324	1,324	1,324	1,324
Adjusted R^2	0.092	0.092	0.090	0.091				
Wald	.	.	.	.	309.9	330.7	312.8	351.6

Panel C: Fraud Detection Duration

	Ln(DetecDuration)				_t			
	Exe_Tie_All	Exe_Tie_Emp	Exe_Tie_Edu	Exe_Tie_Soc	Exe_Tie_All	Exe_Tie_Emp	Exe_Tie_Edu	Exe_Tie_Soc
VARIABLES	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Exe_Tie	-0.182	-0.168	-0.936	-4.555	0.147	0.147	-0.110	5.759
	(0.128)	(0.126)	(1.158)	(6.872)	(0.140)	(0.145)	(1.177)	(8.347)
Pct_Known_Exe_Tie	0.373***	0.367***	0.348***	0.340***	-0.614***	-0.614***	-0.583***	-0.588***
	(0.120)	(0.119)	(0.114)	(0.123)	(0.197)	(0.197)	(0.194)	(0.197)
Industry Dummies	Y	Y	Y	Y	Y	Y	Y	Y
Observations	291	291	291	291	291	291	291	291
Adjusted R^2	0.279	0.278	0.274	0.275				
Wald					25144	25603	53645	38206

Panel D: The Number of People Charged

	Ln(Num_Charged+1)			
	Exe_Tie_All	Exe_Tie_Emp	Exe_Tie_Edu	Exe_Tie_Soc
VARIABLES	(1)	(2)	(3)	(4)
Exe_Tie	0.014	0.011	0.161	0.937
	(0.069)	(0.071)	(0.995)	(1.234)
Pct_Known_Exe_Tie	0.125	0.126	0.127	0.129
	(0.152)	(0.152)	(0.145)	(0.144)
Industry Dummies	Y	Y	Y	Y
Observations	302	302	302	302
Adjusted R^2	0.106	0.106	0.106	0.106

Table X

Preexisting Network Ties between the CEO and Directors and Corporate Fraud

This table reestimates Tables IV, VI, VII, and VIII using preexisting network ties between the CEO and directors as the measure of CEO connectedness. The variable *Dir_Tie* is *Dir_Tie_All*, *Dir_Tie_Emp, Dir_Tie_Edu* or *Dir_Tie_Soc*. The variable *Dir_Tie_Emp* is the total number of preexisting network ties a CEO has with directors through past employment (either working as an employee or serving on the board) divided by the number of directors on the board. The variable *Dir_Tie_Edu* is the total number of preexisting network ties a CEO has with directors through past educational institutions divided by the number of directors on the board. The variable *Dir_Tie_Soc* is the total number of preexisting network ties a CEO has with directors through past membership in social and professional organizations divided by the number of directors on the board. The variable *Dir_Tie_All* is the sum of *Dir_Tie_Emp, Dir_Tie_Edu,* and *Dir_Tie_Soc*. Only network ties established during overlapping years are included. Control variables in Panels A-D (unreported) are the same as those in Tables IV, VI, VII, and VIII, respectively. Definitions of all variables are provided in the Appendix. Robust standard errors reported in parentheses are clustered at the industry level in Panels A, C, and D and at the firm level in Panel B. Coefficients marked with *, **, and *** are significant at 10%, 5%, 1% level, respectively.

Panel A: Bivariate Estimation of Corporate Fraud

	Fraud	Detect|Fraud	Fraud	Detect|Fraud	Fraud	Detect|Fraud	Fraud	Detect|Fraud
	Dir_Tie_All		Dir_Tie_Emp		Dir_Tie_Edu		Dir_Tie_Soc	
VARIABLES	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Dir_Tie	0.293	-0.358	0.496	-0.542	1.306	-1.847	1.293	0.427
	(0.404)	(0.363)	(0.672)	(0.449)	(2.962)	(2.353)	(1.061)	(0.711)
Pct_Known_Dir_Tie	0.474	-0.449	0.067	-0.120	-0.607	0.403	0.036	-0.433
	(0.750)	(0.653)	(0.491)	(0.405)	(0.503)	(0.394)	(0.288)	(0.276)
Year Dummies	Y	Y	Y	Y	Y	Y	Y	Y
Observations	7,829	7,829	7,829	7,829	7,829	7,829	7,829	7,829
Prob> Chi^2	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
log likelihood	-1224	-1224	-1214	-1214	-1215	-1215	-1206	-1206

Panel B: Forced CEO Turnover for Fraud Sensitivity

	Forced_CEO_Turnover							
	OLS				Clogit			
	Dir_Tie_All	Dir_Tie_Emp	Dir_Tie_Edu	Dir_Tie_Soc	Dir_Tie_All	Dir_Tie_Emp	Dir_Tie_Edu	Dir_Tie_Soc
VARIABLES	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
$Fraud_{t-3-t}$*Dir_Tie	0.008	0.009	-0.207	0.148	-1.416	-1.113	-13.000*	-3.750
	(0.070)	(0.071)	(0.587)	(0.286)	(1.070)	(1.257)	(6.672)	(5.037)
Dir_Tie	-0.035*	-0.011	-0.298***	-0.291**	-0.688	-0.496	-1.591	-3.459
	(0.021)	(0.020)	(0.112)	(0.139)	(0.820)	(1.057)	(2.722)	(2.808)
$Fraud_{t-3-t}$	0.028	0.029	0.053	0.016	1.529*	1.106	2.015**	1.066
	(0.049)	(0.036)	(0.063)	(0.037)	(0.849)	(0.704)	(0.830)	(0.705)
Pct_Known_Dir_Tie	0.024	0.002	0.027	0.024	0.981	0.697	0.592	0.771
	(0.040)	(0.040)	(0.037)	(0.038)	(1.132)	(1.089)	(0.946)	(0.928)
Year FE (Dummies)	Y	Y	Y	Y	Y	Y	Y	Y
Firm FE	Y	Y	Y	Y	N	N	N	N
Observations	8,260	8,260	8,260	8,260	1,324	1,324	1,324	1,324
Adjusted R^2	0.091	0.090	0.093	0.092				
Wald	.	.	.	.	283.7	299.5	281.0	301.8

Panel C: Fraud Detection Duration

	Ln(DetecDuration)				_t			
	Dir_Tie_All	Dir_Tie_Emp	Dir_Tie_Edu	Dir_Tie_Soc	Dir_Tie_All	Dir_Tie_Emp	Dir_Tie_Edu	Dir_Tie_Soc
VARIABLES	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Dir_Tie	0.202	0.213	1.817	-0.416	-0.849	-0.905	-4.724**	-0.009
	(0.296)	(0.301)	(1.841)	(1.335)	(0.526)	(0.593)	(2.072)	(1.531)
Pct_Known_Dir_Tie	-0.013	0.033	-0.107	0.171	0.310	0.128	0.324	-0.245
	(0.238)	(0.177)	(0.302)	(0.196)	(0.439)	(0.334)	(0.405)	(0.269)
Industry Dummies	Y	Y	Y	Y	Y	Y	Y	Y
Observations	291	291	291	291	291	291	291	291
Adjusted R^2	0.266	0.265	0.268	0.263				
Wald					10846	11478	16991	12387

Panel D: The Number of People Charged

	Ln(Num_Charged+1)			
	Dir_Tie_All	Dir_Tie_Emp	Dir_Tie_Edu	Dir_Tie_Soc
VARIABLES	(1)	(2)	(3)	(4)
Dir_Tie	-0.050	0.013	-1.224	-0.843
	(0.173)	(0.200)	(0.852)	(0.577)
Pct_Known_Dir_Tie	0.021	-0.017	0.124	0.085
	(0.164)	(0.144)	(0.129)	(0.119)
Industry Dummies	Y	Y	Y	Y
Observations	302	302	302	302
Adjusted R^2	0.101	0.101	0.108	0.106

Internet Appendix for "CEO Connectedness and Corporate Frauds"

VIKRAMADITYA KHANNA, E. HAN KIM, and YAO LU*

This appendix contains 5 tables reporting estimation results discussed in the paper but not reported.

*Khanna, Vikramaditya, E. Han Kim, and Yao Lu, Internet Appendix for "CEO Connectedness and Corporate Frauds," *Journal of Finance* [DOI STRING]. Please note: Wiley-Blackwell is not responsible for the content or functionality of any supporting information supplied by the authors. Any queries (other than missing material) should be directed to the authors of the article.

Table IA.I

Alternative Specification for the Bivariate Probit Model: Excluding Monitoring Variables from the Commission Equation

This table reports reestimation results of the bivariate probit model while excluding monitoring variables from the commission equation. Coefficients marked with *, ** and *** are significant at 10%, 5%, 1% level, respectively.

	Fraud	Detect|Fraud	Fraud	Detect|Fraud
VARIABLES	(1)	(2)	(3)	(4)
FTA	0.704**	-0.749***		
	(0.294)	(0.269)		
FDA			0.546***	-0.829***
			(0.184)	(0.175)
Ln(BoardSize)		0.185*		1.346***
		(0.106)		(0.256)
%_NonIndepDirectors		0.178		1.430***
		(0.143)		(0.288)
Ln(BoardMeetings)		0.107*		0.528***
		(0.063)		(0.094)
%_NonIndepDirectors_Audit		-0.231		-1.000***
		(0.312)		(0.308)
Ln(AuditComSize)		0.159*		0.397*
		(0.094)		(0.223)
StockVolatilities		5.639**		2.845
		(2.578)		(2.542)
IndustryLitigation		2.158**		2.520**
		(0.918)		(1.239)
Turnover		0.061***		0.097***
		(0.019)		(0.026)
Ln(Analyst)		0.034		-0.051
		(0.031)		(0.057)
IOC		0.480**		-0.217
		(0.224)		(0.377)
Log(TotalAssets)	-0.201**	0.281***	0.039	0.291***
	(0.079)	(0.065)	(0.033)	(0.045)
Tobin's Q	-0.124***	0.081*	-0.006	-0.011
	(0.041)	(0.041)	(0.031)	(0.020)
Ebitda/TA	-2.748**	1.778*	-2.098***	-0.751*
	(1.079)	(1.039)	(0.417)	(0.435)
Leverage	-1.053	1.126	0.606***	-0.019
	(0.725)	(0.722)	(0.230)	(0.276)
SalesGrowth_5Yr	0.008***	-0.001	0.011***	-0.000
	(0.002)	(0.001)	(0.002)	(0.001)
IndustryQ	2.389**	-1.726	0.900**	0.836**
	(1.162)	(1.077)	(0.387)	(0.423)
$(IndustryQ)^2$	-0.470*	0.386	-0.118	-0.118
	(0.271)	(0.248)	(0.090)	(0.095)
ICR	0.272	0.047	-0.417**	1.640***
	(0.961)	(0.927)	(0.190)	(0.246)
Ln(CEO_Age)	-0.523	0.334	0.254	-0.826***
	(0.413)	(0.394)	(0.175)	(0.254)
CEO_Founder	-0.384	0.458	1.847***	-1.187***
	(0.554)	(0.559)	(0.323)	(0.255)
CEO_Chair	0.670**	-0.628**	0.496***	-0.894***
	(0.305)	(0.290)	(0.135)	(0.241)
CEO_Tenure	-0.029	0.031	-0.070***	0.093***
	(0.023)	(0.021)	(0.015)	(0.016)
CEO_OWN	14.373***	-12.880***	3.441	-0.000
	(4.176)	(3.654)	(2.172)	(2.347)
$(CEO\_OWN)^2$	-49.551***	43.486***	-15.331**	6.208
	(13.396)	(12.396)	(7.478)	(8.303)
StockOption	1.422***		1.777***	
	(0.461)		(0.549)	
Constant	-2.285	0.623	-4.063***	-4.793***
	(1.862)	(1.846)	(0.772)	(0.923)
Year Dummies	Y	Y	Y	Y
Observations	7,865	7,865	6,243	6,243
Prob> Chi^2	0.000	0.000	0.000	0.000
log likelihood	-1251	-1251	-1083	-1083

Table IA.II
Abnormal Measures of Appointment-based CEO Connectedness and Corporate Fraud

This table re-estimates Tables IV, VI, VII, and VIII using abnormal measures of appointment-based CEO connectedness. The variable *AFTA* is the abnormal fraction of top four non-CEO executives appointed during the current CEO's tenure, as measured by the residual of the regression in Column (1) of Panel E. The variable *AFDA* is the abnormal fraction of directors appointed during the current CEO's tenure, as measured by the residual of the regression in Column (2) of Panel E. Control variables in Panels A-D (unreported) are the same as those in Tables IV, VI, VII, and VIII, respectively. Definitions of all variables are provided in the Appendix. Robust standard errors reported in parentheses are clustered at the industry level in Panels A, C, and D, and at the firm level in Panels B and E. Coefficients marked with *, **, and *** are significant at 10%, 5%, 1% level, respectively.

Panel A: Bivariate Probit Model

	Fraud	Detect|Fraud	Fraud	Detect|Fraud
	AFTA		AFDA	
VARIABLES	(1)	(2)	(3)	(4)
AFXA	0.703**	-0.556**	1.087**	-0.927**
	(0.298)	(0.282)	(0.463)	(0.414)
Year Dummies	Y	Y	Y	Y
Observations	7,865	7,865	6,243	6,243
Prob> Chi^2	0.000	0.000	0.000	0.000
log likelihood	-1226	-1226	-1072	-1072

Panel B: Forced CEO Turnover-Fraud Sensitivity

	Forced_CEO_Turnover			
	OLS		Clogit	
	AFTA	AFDA	AFTA	AFDA
VARIABLES	(1)	(2)	(3)	(4)
$Fraud_{t-3-t}$*AFXA	-0.310***	-0.168	-3.627**	-5.387
	(0.076)	(0.131)	(1.800)	(3.684)
AFXA	-0.092***	-0.094**	-1.912***	-2.784
	(0.018)	(0.037)	(0.542)	(1.755)
$Fraud_{t-3-t}$	0.059***	0.013	0.675	-0.060
	(0.022)	(0.021)	(0.540)	(0.470)
Firm FE	Y	Y	N	N
Year FE (Dummies)	Y	Y	Y	Y
Observations	8,260	6,540	1,324	1,000
Adjusted R^2	0.113	0.110	318.4	268.7

Panel C: Fraud Detection Duration and the Hazard Ratio

	Ln(DetecDuration)		_t	
	AFTA	AFDA	AFTA	AFDA
VARIABLES	(1)	(2)	(3)	(4)
AFXA	0.232	0.735**	-0.624**	-0.556
	(0.145)	(0.337)	(0.282)	(0.397)
Industry Dummies	Y	Y	Y	Y
Observations	291	226	291	226
Adjusted R^2	0.268	0.312		
Wald			21956	22973

Panel D: The Number of People Charged in Fraud

	Ln(Num_Charged+1)	
	AFTA	AFDA
VARIABLES	(1)	(2)
AFXA	0.178*	0.542*
	(0.090)	(0.289)
Industry Dummies	Y	Y
Observations	302	232
Adjusted R^2	0.113	0.097

Panel E: Regressions to Construct AFTA and AFDA

	FTA	FDA
VARIABLES	(1)	(2)
CEO_Tenure	0.051***	0.065***
	(0.001)	(0.000)
CEO_Tenure^2	-0.001***	-0.001***
	(0.000)	(0.000)
Outside	0.021***	0.016***
	(0.006)	(0.004)
Exe(Dir)csen	-0.054***	-0.029***
	(0.001)	(0.000)
FTA_1Y_Exe(Dir)	-0.169***	-0.349***
	(0.006)	(0.008)
FTA_1Y_Unknown_Exe	0.553***	
	(0.061)	
Unknown_Exe	0.253***	
	(0.020)	
Constant	0.579***	0.338***
	(0.009)	(0.006)
Year FE	Y	Y
Observations	17,797	11,063
Adjusted R^2	0.24	0.76

Table IA.III

Tenure Weighted Appointment-based CEO Connectedness and Corporate Fraud

This table re-estimates Tables IV, VI, VII, and VIII using measures of appointment-based CEO connectedness weighted by the executives' tenure. The variable *XFXA_WT* is *FTA_WT, AFTA_WT, FDA_WT* or *AFDA_WT*. The variable *FTA_WT* is the fraction of top four non-CEO executives appointed during the current CEO's tenure, weighted by the executives' tenure. The variable *AFTA_WT* is abnormal fraction of top four non-CEO executives appointed during the current CEO's tenure based on *FTA_WT*. The variable *FDA_WT* is the fraction of directors appointed during the current CEO's tenure, weighted by the directors' tenure. The variable *AFDA_WT* is abnormal fraction of directors appointed during the current CEO's tenure based on *FDA_WT*. Control variables in Panels A-D (unreported) are the same as those in Tables IV, VI, VII, and VIII, respectively. Definitions of all variables are provided in the Appendix. Robust standard errors reported in parentheses are clustered at the year level in Panel A, at the firm level in Panel B, and clustered at the industry level in Panels C and D. Coefficients marked with *, **, and *** are significant at 10%, 5%, 1% level, respectively.

Panel A: Bivariate Probit Model

	Fraud	Detect|Fraud	Fraud	Detect|Fraud	Fraud	Detect|Fraud	Fraud	Detect|Fraud
	FTA_WT		AFTA_WT		FDA_WT		AFDA_WT	
VARIABLES	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
XFXA_WT	0.954	-0.899*	0.478***	-0.262*	1.165*	-1.002*	1.407**	-1.280**
	(0.582)	(0.507)	(0.176)	(0.147)	(0.670)	(0.598)	(0.633)	(0.552)
Year Dummies	Y	Y	Y	Y	Y	Y	Y	Y
Observations	7,865	7,865	7,865	7,865	6,243	6,243	6,243	6,243
Prob> Chi^2	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
log likelihood	-1219	-1219	-1218	-1218	-1072	-1072	-1070	-1070

Panel B: Forced CEO Turnover-Fraud Sensitivity

	Forced_CEO_Turnover							
	OLS				Clogit			
	FTA_WT	AFTA_WT	FDA_WT	AFDA_WT	FTA_WT	AFTA_WT	FDA_WT	AFDA_WT
VARIABLES	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
$Fraud_{t-3-t}$*XFXA_WT	-0.199***	-0.278***	-0.206***	-0.034	-2.899**	-3.940**	-44.729**	-5.520
	(0.059)	(0.070)	(0.076)	(0.153)	(1.367)	(1.767)	(17.790)	(7.862)
XFXA_WT	-0.085***	-0.085***	-0.036	0.032	-1.959***	-1.823***	-2.256	-0.446
	(0.015)	(0.018)	(0.027)	(0.035)	(0.590)	(0.607)	(3.068)	(2.434)
$Fraud_{t-3-t}$	0.122***	0.055***	0.051*	0.019	1.588**	0.679	1.167*	0.187
	(0.037)	(0.021)	(0.030)	(0.022)	(0.692)	(0.541)	(0.614)	(0.457)
Firm FE	Y	Y	Y	Y	N	N	N	N
Year FE (Dummies)	Y	Y	Y	Y	Y	Y	Y	Y
Observations	8,260	8,260	6,540	6,540	1,324	1,324	1,000	1,000
Adjusted R^2	0.111	0.109	0.110	0.107				
Wald					315.8	346.7	296.7	256.3

Panel C: Fraud Detection Duration and the Hazard Ratio

	Ln(DetecDuration)				_t			
	FTA_WT	AFTA_WT	FDA_WT	AFDA_WT	FTA_WT	AFTA_WT	FDA_WT	AFDA_WT
VARIABLES	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
XFXA_WT	0.381**	0.320*	0.518*	0.902**	-0.817***	-0.744**	-0.860**	-1.062**
	(0.168)	(0.174)	(0.284)	(0.354)	(0.265)	(0.297)	(0.375)	(0.509)
Industry Dummies	Y	Y	Y	Y	Y	Y	Y	Y
Observations	291	291	226	226	291	291	226	226
Adjusted R^2	0.277	0.272	0.309	0.320				
Wald					57867	22303	33173	23165

Panel D: The Number of People Charged in Fraud

	Ln(Num_Charged+1)			
	FTA_WT	AFTA_WT	FDA_WT	AFDA_WT
VARIABLES	(1)	(2)	(3)	(4)
XFXA_WT	0.163*	0.172*	0.290	0.170
	(0.088)	(0.091)	(0.260)	(0.300)
Industry Dummies	Y	Y	Y	Y
Observations	302	302	232	232
Adjusted R^2	0.112	0.112	0.083	0.074

Table IA.IV

Compensation Weighted Appointment-based CEO Connectedness and Corporate Fraud

This table re-estimates Tables IV, VI, VII, and VIII using CEO connectedness measures weighted by the executives' compensation. The variable *XFTA_WC* is *FTA_WC* or *AFTA_WC*. The variable *FTA_WC* is the fraction of top four non-CEO executives appointed during the current CEO's tenure, weighted by the executives' compensation. The variable *AFTA_WC* is the abnormal fraction of top four non-CEO executives appointed during the current CEO's tenure based on *FTA_WC*. Control variables in Panels A-D (unreported) are the same as those in Tables IV, VI, VII, and VIII, respectively. Definitions of all variables are provided in the Appendix. Robust standard errors reported in parentheses are clustered at the industry level in Panels A, C, and D and at the firm level in Panel B. Coefficients marked with *, **, and *** are significant at 10%, 5%, 1% level, respectively.

Panel A: Bivariate Probit Model

	Fraud	Detect|Fraud	Fraud	Detect|Fraud
	FTA_WC		AFTA_WC	
VARIABLES	(1)	(2)	(3)	(4)
XFTA_WC	0.105	-0.279**	0.575***	-0.196*
	(0.118)	(0.109)	(0.171)	(0.113)
Year Dummies	Y	Y	Y	Y
Observations	7,865	7,865	7,865	7,865
Prob> Chi^2	0.000	0.000	0.000	0.000
log likelihood	-1225	-1225	-1213	-1213

Panel B: Forced CEO Turnover-Fraud Sensitivity

	Forced_CEO_Turnover			
	OLS		Clogit	
	FTA_WC	AFTA_WC	FTA_WC	AFTA_WC
VARIABLES	(1)	(2)	(3)	(4)
$Fraud_{t-3-t}$*XFTA_WC	-0.211***	-0.285***	-3.086**	-3.617*
	(0.058)	(0.073)	(1.526)	(2.052)
XFTA_WC	-0.090***	-0.092***	-2.151***	-2.010***
	(0.014)	(0.018)	(0.544)	(0.544)
$Fraud_{t-3-t}$	0.136***	0.058***	1.709**	0.724
	(0.039)	(0.021)	(0.763)	(0.557)
Firm FE	Y	Y	N	N
Year FE (Dummies)	Y	Y	Y	Y
Observations	8,260	8,260	1,324	1,324
Adjusted R^2	0.115	0.111		
Wald			328.6	345.5

Panel C: Fraud Detection Duration and the Hazard Ratio

	Ln(DetecDuration)		_t	
	FTA_WC	AFTA_WC	FTA_WC	AFTA_WC
VARIABLES	(1)	(2)	(3)	(4)
XFTA_WC	1.127**	0.189	-2.714***	-0.556**
	(0.537)	(0.143)	(0.896)	(0.276)
Industry Dummies	Y	Y	Y	Y
Observations	291	291	291	291
Adjusted R^2	0.272	0.267		
Wald			60263	22660

Panel D: The Number of People Charged in Fraud

	Ln(Num_Charged+1)	
	FTA_WC	AFTA_WC
VARIABLES	(1)	(2)
XFTA_WC	0.727*	0.154
	(0.372)	(0.094)
Industry Dummies	Y	Y
Observations	302	302
Adjusted R^2	0.114	0.111

Table IA.V
Appointment-based CEO Connectedness with Independent Directors and Non-Independent Directors and Corporate Fraud

This table re-estimates Tables IV, VI, VII, and VIII using fractions of independent and non-independent directors appointed during the current CEO's tenure. The variable *FXDA* is *FIDA* or *FNIDA*, which is the fraction of independent directors, or non-independent directors, appointed during the current CEO's tenure, respectively. Control variables in Panels A-D (unreported) are the same as those in Tables IV, VI, VII, and VIII, respectively. Definitions of all variables are provided in the Appendix. Robust standard errors reported in parentheses are clustered at the industry level in Panels A, C, and D and clustered at the firm level in Panel B. Coefficients marked with *, **, and *** are significant at 10%, 5%, 1% level, respectively.

Panel A: Bivariate Probit Model

	Fraud	Detect|Fraud	Fraud	Detect|Fraud
	FIDA		FNIDA	
VARIABLES	(1)	(2)	(3)	(4)
FXDA	0.509*	-0.319	0.798**	-0.741**
	(0.276)	(0.228)	(0.381)	(0.374)
Year Dummies	Y	Y	Y	Y
Observations	6,230	6,230	6,239	6,239
Prob> Chi^2	0.000	0.000	0.000	0.000
log likelihood	-1073	-1073	-1073	-1073

Panel B: Forced CEO Turnover-Fraud Sensitivity

	Forced_CEO_Turnover			
	OLS		Clogit	
	FIDA	FNIDA	FIDA	FNIDA
VARIABLES	(1)	(2)	(3)	(4)
$Fraud_{t-3-t}$*FXDA	-0.146***	-0.057	-7.299***	-1.671
	(0.055)	(0.045)	(2.500)	(2.114)
FXDA	-0.095***	-0.012	-3.048**	-0.059
	(0.020)	(0.020)	(1.315)	(1.352)
$Fraud_{t-3-t}$	0.068*	0.029	0.924*	0.423
	(0.036)	(0.027)	(0.557)	(0.473)
Firm FE	Y	Y	N	N
Year FE (Dummies)	Y	Y	Y	Y
Observations	6,526	6,535	1,000	1,000
Adjusted R^2	0.118	0.108		
Wald			279.4	297.5

Panel C: Fraud Detection Duration and Hazard Ratio

	Ln(DetecDuration)		_t	
	FIDA	FNIDA	FIDA	FNIDA
VARIABLES	(1)	(2)	(3)	(4)
FXDA	0.247	0.332	-0.262	-1.093**
	(0.205)	(0.353)	(0.246)	(0.528)
Industry Dummies	Y	Y	Y	Y
Observations	226	226	226	226
Adjusted R^2	0.301	0.304		
Wald			41687	10758

Panel D: The Number of People Charged in Fraud

	Ln(Num_Charged+1)	
	FIDA	FNIDA
VARIABLES	(1)	(2)
FXDA	0.406*	0.256**
	(0.213)	(0.123)
Industry Dummies	Y	Y
Observations	232	232
Adjusted R^2	0.108	0.085