

ORIGINAL ARTICLE

CEO Connectedness and Firm Transparency

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ABSTRACT

Our research reveals that CEO connections with Audit Committee directors, established through past employment, education, or social organization memberships, significantly impact firm transparency. These connections increase the likelihood of firms issuing less transparent and readable financial reports. Furthermore, these connections are linked to decreased long-term firm value and increased crash risk. Our findings underscore the crucial role of CEO connectedness in corporate disclosure transparency and firm value. We employed multiple methodologies to address endogeneity concerns. Our results remain robust.

JEL Classification: M42, G34, G14

1 | Introduction

The information environment of firms is important to various stakeholders. Firm transparency strengthens investor confidence, increases shareholder value, causes appropriate capital allocation and decreases financial market instability, leading several scholars to examine factors affecting the information environment and its consequences¹. However, these inquiries mainly ignore the role played by the CEO's connections with governance bodies within the firm. CEOs have substantial influence and discretion to direct corporate behaviour, of which corporate disclosure transparency (or lack thereof) is one potential outcome.

We examine whether firm transparency changes with CEO connectedness. Specifically, corporate activities and firm transparency via corporate financial disclosure often require coordination and communication with, or acquiescence by, CEOs and/or board members, the independent Audit Committee directors. The coordination can take the form of direct involvement when the Audit Committee reviews and approves the information contained in the corporate disclosures. CEOs'

close connections may help obtain the necessary support and facilitate the disclosure of technical details. Alternatively, they may facilitate collusion between the CEO and the Audit Committee to conceal unfavourable information. Closer interpersonal relationships can change the transparency in either scenario, mainly when the corporate information environment is opaque. Whether transparency increases or decreases due to the relationship remains an empirical question, and our paper intends to fill this gap in the literature.

We consider firm transparency by examining the clarity and readability of financial reports, specifically focused on the Management's Discussion and Analysis of Financial Condition and Results of Operations ('MD&A') section. The US Securities and Exchange Commission (SEC) mandates that management must provide shareholders and potential investors with clear disclosure of a company's financial condition, risk factors and prospects in their financial reports, particularly in the MD&A section (Beyer et al. 2010; Schipper 2007; Cole and Jones 2005). As a result, the clarity and readability of MD&A are critical aspects of effective corporate communication and information environment. We investigate whether the connection between

the Chief Executive Officers (CEO) and the Audit Committee directors (denoted CEO-AC director ties) influences firm transparency via linguistic complexity and readability of financial reports. Additionally, we study the effect of CEO connectedness and corporate disclosure transparency on firm value.

To answer this question, we specifically focus on the MD&A section for three reasons. First, management is responsible for preparing the MD&A section in corporate disclosures. Second, the MD&A stands out among the SEC disclosure requirements as it discusses historical data and forward-looking analysis of market trends. The latter, in particular, can significantly affect firm value². Finally, although management is responsible for preparing the MD&A section in corporate disclosures, the Audit Committee oversees the accounting and financial reporting processes and audits of the company's financial statements³. Hence, the CEO's connectedness to the Audit Committee directors has the potential to affect the transparency and readability of the MD&A section more directly than other sections of the financial reports.

Following existing literature, we create an index comprising employment, education and other ties (Duchin and Sosyura 2013; Fracassi and Tate 2012; Khedmati, Sualihu, and Yawson 2019) to capture CEO connections⁴. Utilizing multiple readability measures on a comprehensive sample of US firms from 2000 to 2022, we find that CEO-AC director ties are negatively associated with the transparency and readability of the MD&A section. Firms with strong CEO-AC director ties tend to produce less readable financial reports. This negative association between CEO connection and firm transparency holds, even after controlling for more powerful CEOs, CEOs with lower managerial ability, and firms with co-op boards. These results underscore the potential risks associated with CEO connectedness and the need for proactive and careful monitoring of CEO connections in corporate governance.

To provide more definitive evidence of whether CEO connectedness impacts firm transparency, we utilize several shocks to the CEO-AC connections to observe whether and how firms' information environments change in response to these shocks. The first shocks address the potential self-selection bias issue from the endogenous nature of CEO and/or director appointments. For one, appointing a CEO with extensive Audit Committee director ties may not be random. Director selection could also be influenced by their existing connections with the CEO (Kim and Cannella 2008). To address endogeneity, we use the 2002 Sarbanes Oxley Act (SOX) and the 2009 Nasdaq rule change on board composition and responsibilities for the audit committee. SOX introduced substantial changes in the composition of the board and audit committee. It requires public companies to have a majority of independent directors and all audit committee members to be independent, with at least one financial expert on the committee. These measures aimed to enhance corporate governance by improving oversight and reducing conflicts of interest. In March 2009, NASDAQ amended its rules regarding the overall board independence and responsibilities to strengthen corporate governance and enhance the reliability of financial reporting. Specifically, Rule 5605(c)(3) mandates that the audit committee have at least

three independent directors. AC members must also possess financial literacy and expertise; at least one audit committee member must be a financial expert. Finally, the audit committee oversees the company's accounting and financial reporting processes annually. These rule changes were intended to strengthen the audit committee's role in financial oversight, ensuring more rigorous and independent monitoring of the company's financial practices and disclosures.

As an additional shock, we use the unexpected CEO and/or AC director departure (i.e., death or sudden departure) as an exogenous shock to the connectedness. A final endogeneity issue arises from the possibility of omitted variables. As a result, we control for variables that can impact financial transparency, such as CEO power, incentives, managerial ability and CFO characteristics. Our results remain robust.

Having established that CEO connectedness is associated with less corporate disclosure transparency and readability, we examine the economic consequences of reduced firm transparency due to CEO-audit committee director connections. We find evidence that firms with strong CEO-audit committee director ties exhibit significantly lower long-term performance, where we measure firm value using TOBIN'S Q in year $t+1$, where year t refers to the fiscal year in which the 10-K report is filed. Furthermore, firms with strong CEO-audit committee director ties are more prone to extreme negative stock price movements, reflecting higher crash risk. In contrast, greater corporate disclosure transparency and readability are associated with reduced crash risk and better long-run performance. These results highlight the significant economic impact of CEO-audit committee director ties and the transparency and readability of financial disclosures.

Existing research on corporate disclosure transparency and readability is divided regarding management intentions. Some studies focus mainly on the information obfuscation explanations (Clatworthy and Jones 2001; Courtis 2004; Merkl-Davies and Brennan 2011, Bloomfield 2002; Li 2008), which posit that management might be incentivized to disclose unfavourable information and negative outlooks. Under the new SEC principles-based approach, disclosures are based primarily on management's perspective, which can further exacerbate information obfuscation. In contrast to the information obfuscation theory, a competing explanation provided by Bushee, Gow, and Taylor (2018) explores linguistic complexity and readability based on a provision of informative technical disclosure. Our paper contributes to the literature by addressing potential explanations for mixed findings.

Our study uncovers the intricate relationship between CEO connectedness and financial transparency, with implications for corporate governance within closely connected leadership structures. We find results more consistent with the information obfuscation theory. These results shed light on how CEO-AC director ties may facilitate information obfuscation, emphasizing the importance of vigilant scrutiny of financial report narratives in such contexts. Prior studies document the influence of managerial connections on various corporate decisions, including firm performance (Li 2008), return volatility, and forecast (Loughran and McDonald 2011, 2014), trading volumes

(De Franco et al. 2015; Lang and Stice-Lawrence 2015), stock price crashes (Ertugrul et al. 2017; Kim, Wang, and Zhang 2019), investment efficiency (Biddle, Hilary, and Verdi 2009), analyst coverage and accuracy of forecasts (Lehavy, Li, and Merkley 2011), credit rating (Bonsall and Miller 2017) and cost of capital (Athanasakou et al. 2020; Ertugrul et al. 2017). We extend these studies by uncovering the determinant role of CEO-AC director ties in determining the transparency of corporate disclosures.

In addition, our paper adds to the literature exploring the channel in which CEO connectedness impacts the quality of corporate disclosures. The large stream of literature that examines the linguistic complexity and readability of corporate disclosures has predominantly focused on the readability of the entire 10-K filings (Li 2008; Loughran and McDonald 2016; Guay, Samuels, and Taylor (2016), Dyer, Lang, and Stice-Lawrence (2016). This finding assumes that management is directly involved in preparing the financial report. We contrast prior literature by focusing specifically on the MD&A section. By decomposing the 10-Ks and only examining the section management oversees, we show that CEO connectedness impacts the transparency of the most important section of financial disclosures.

The remainder of this study is organized as follows. Section 2 presents a literature review and the development of hypotheses. Section 3 describes our sample, data and methodology. Section 4 discusses the main results on the association between CEO-AC director ties and the readability of MD&A, addresses endogeneity concerns and analyses the economic impact of CEO connectedness and readability. Section 5 concludes.

2 | Literature Review and Hypothesis Development

2.1 | CEO-Audit Committee Director Ties

We seek to understand the impact of CEOs' connectedness via social networks (i.e., CEO-AC director ties) on firm transparency. A social network is relationships with others—'friends, colleagues, and more general contacts through whom you receive opportunities to use your financial and human capital'. (Burt 1992, p. 9). The CEO and Audit Committee directors can connect socially via various channels, including mutual work experience, club memberships and undergraduate or graduate institutions (Duchin and Sosyura 2013; Fracassi and Tate 2012). Prior studies have employed several measures of CEO-director ties, ranging from a single measure, such as shared education networks (Cohen, Frazzini, and Malloy 2008) or serving together on a different board (Cai and Sevilir 2012; Hoitash 2011), to a multi-dimension measure, such as nonprofessional ties that include education and friendship ties (Fan et al. 2019), or an index comprising employment, education and other ties (Duchin and Sosyura 2013; Fracassi and Tate 2012; Khedmati, Sualihu, and Yawson 2019). We use the same multi-dimensional approach to measure the CEO's connectedness with the Audit Committee's directors.

2.2 | Corporate Disclosure Transparency Measure and Determinants

Given the importance of corporate disclosure for capital market participants, a burgeoning body of literature uses textual analysis to investigate the measurements and determinants of its linguistic complexity and readability. Loughran and McDonald (2014) define financial report readability as 'the ability of individual investors and analysts to assimilate valuation-relevant information from a financial disclosure' (p. 1649). Commonly used readability measures include the Fog index, which is based on average sentence length and multisyllabic words (Biddle, Hilary, and Verdi 2009; Guay, Samuels, and Taylor 2016; Lawrence 2013; Li 2008); the Bog index, which is based on sentence length, passive voice and a proprietary list of complex words (Bonsall et al. 2017); measurement of the positive and negative tone of 10-Ks (Jegadeesh and Wu 2013); And the use of document length or the number of words contained in the annual report (Ertugrul et al. 2017; Lawrence 2013; Li 2008; Loughran and McDonald 2014).

Various determinants of corporate disclosure readability are documented in the prior literature. For instance, Li (2008) and Bloomfield (2008) show that firms with transitory earnings and poor current and future performance generate less readable annual reports with long sentences and big words. Nelson and Pritchard (2007) show that firms subject to shareholder litigation use more readable language in their 10-K filings. Guay, Samuels and Taylor (2016) report that managers in firms with less readable reports issue more voluntary disclosures to mitigate the negative effect of complex financial statements. They observe that this relationship is more profound when liquidity decreases around the filing of the financial statements. In an international study, Lang and Stice-Lawrence (2015) show that firms with higher liquidity, institutional ownership and analyst following have high-quality, more readable corporate disclosure. Other studies examine the impact of management and governance factors on corporate disclosure readability. Chakrabarty et al. (2018) find that narrative obfuscation is moderated by effective corporate governance. Davis et al. (2015) find a link between managerial optimism and variation in the readability of corporate disclosures. Hasan (2020) finds that managerial ability is significantly positively associated with the readability of narrative disclosures in 10-K reports. Nadeem (2021) observes that a higher proportion of female directors on boards improves financial readability. We consider another possible determinant of financial report readability—the CEO-Audit Committee Director ties (CEO-AC director ties).

2.3 | The Link Between CEO-AC Director Ties and Firm Transparency

We conjecture that the correlation between CEO-AC director ties and the readability of the MD&A section in 10-K filings is determined by two theoretical frameworks. The first is the agency theory (i.e., management obfuscation). Managers can employ complex language to 'obfuscate' the true nature of their firms' present and future performance, potentially increasing information processing costs for investors (Li 2008). To that end, independent Audit Committee directors are expected to

review and approve the information contained in the corporate disclosures. However, close connections between CEOs and the Audit Committee may facilitate collusion to conceal unfavourable details. Alternatively, social network theory implies that the ties between CEO and independent directors facilitate the transfer of knowledge and sharing of information, resources, or strategies across firms (Adler and Kwon 2002; Barroso-Castro, Villegas-Periñan, and Casillas-Bueno 2016; Burt 1992; Hillman and Dalziel 2003). Bushee, Gow, and Taylor (2018) decompose linguistic complexity into obfuscation and information. The authors challenge the general interpretation that using complex language equates to managerial obfuscation. They argue that less financial report readability may be necessary to convey technical information about a firm's business transactions and operating strategy. CEOs' close connections with Audit Committee directors may help obtain the necessary support and thereby facilitate the disclosure of technical information. We may observe strong CEO-AC director ties lead to less corporate disclosure transparency and readability under either theory. In the next section, we disentangle the two opposing theories by examining the economic impact of CEO connectedness.

H1: *Stronger CEO-audit committee (AC) director ties are associated with less readable MD&A sections.*

2.4 | Economic Impact of CEO Connectedness and Firm Transparency

Prior literature is divided regarding the effect of the CEO network on various aspects of firm operation and performance. Consistent with the information obfuscation theory, some studies have observed a negative or no impact of CEO-director connections on firms' operations and performance. Fan et al. (2019) find that CEO friendships with the Board negatively and economically impact firm value. Fracassi and Tate (2012) report that CEO-outside director relationships impair corporate governance, reduce firm value and lead to more value-destroying acquisitions and distortions in company investments. Wincent, Anokhin, and Örtqvist (2010) claim that managerial ties may not directly relate to firm performance. Likewise, using an aggregate measure of CEO-outside director ties, Khedmati, Sualihu, and Yawson (2019) find that the connection between the CEO and the independent director leads to inefficient labour investment. Hence, based on the information obfuscation theory, we expect to find a negative value effect of CEO connectedness.

H2: *Stronger CEO-AC directors are associated with lower long-term firm value.*

Alternatively, consistent with the Social Network Theory, other studies show that network ties foster trust and transparency, enhance information exchanges between the CEO and the Board and among the connected companies, and increase shareholders' wealth (Adams and Ferreira 2007; Hoitash 2011; Westphal 1999). For instance, Kim (2005) finds that board members of elite school networks were positively associated with the firm performance of large, publicly traded Korean companies. Barroso-Castro, Villegas-Periñan, and Casillas-Bueno (2016) show that the overlap in tenure or shared experience of board directors positively

influences the performance of companies listed on the Madrid Stock Exchange. Mosey and Wright (2007) link founders' social connections to improved start-up performance. Duchin and Sosyura (2013) report that board connections increase investment efficiency and firm value via information transfers under high information asymmetry. Cai and Sevilir (2012) find that the link between outside director ties is crucial in corporate investments and contributes to value generation. As a result, we expect to see a positive economic impact of CEO connectedness under the Social Network Theory.

3 | Sample and Methodology

3.1 | Sample Selection

We obtain corporate governance and core executive biographical data from the BoardEx database for 2000–2022. Data consists of current and past employment, job titles, corporate board membership, educational background (institutions, graduation years and degrees), and memberships in social organizations, such as charities, religious organizations and social clubs. We count the number of times the CEO has under each category to the audit committee members and create a continuous measure of CEO-audit committee director ties as the percentage of the audit committee board members with whom the CEO has a connection. We use two measures of readability: the SMOG index and the Flesch Reading Ease (FRE)⁵. Firm-level accounting variables are collected from Compustat. The final sample comprises 57,592 firm-year observations. We winsorize variables at the 1% level to avoid the influence of extreme outliers.

3.2 | CEO-Audit Committee Director Ties

Our primary variable of interest is CEO-audit committee director ties. We follow Fracassi and Tate (2012) and Khedmati, Sualihu, and Yawson (2019) To construct a comprehensive measure that comprises multiple categories to capture the breadth and depth of the connections between CEOs and audit committee independent directors. We consider connections from past and present employment, education and other activities.

- Employment ties (PTIEEMP): Past employment ties are recorded on overlapping prior employment in any firm other than the firm for which the CEO is currently working, irrespective of their roles. Current employment ties capture any external directorships the CEO and the independent director hold in the same firm.
- Education ties (PTIEEDU): We determine that a CEO and a director are education-tied if they graduated from the same educational institution.
- Friendship ties (PTIEOTHER): CEOs and directors are identified as friendship-tied if they share memberships of social organizations, such as golf clubs, charities, trusts and other nonprofessional or voluntary associations, either currently or in the past.

We follow Khedmati, Sualihu, and Yawson (2019) To construct the aggregate measure of CEO-audit committee director ties

(PTIES) as the percentage of independent directors with at least one connection with the CEO based on education, employment, or other friendship activities⁶.

3.3 | MD&A Transparency and Readability

We use two measures of the MD&A's readability: the SMOG index (SMOG) and the Flesch Reading Ease (FLESCHEASE). In unreported tests, we also used a variety of other measures but only reported these two for brevity⁷. Additionally, Chircop and Tarsalewska (2020) suggest that the SMOG grading index and the Flesch reading ease index are superior to other measures as they are widely used to gauge the degree to which documents are written in plain English. Similarly, Mac et al. (2022) posit that the SMOG index is the best readability indicator. We explain the definition and interpretation of our two readability measures below.

The Simple Measure of Gobbledygook (SMOG) index was developed by G. Harry McLaughlin in 1969 to improve the Gunning Fog Index. The Gunning Fog Index is also a readability test that measures the number of polysyllabic words and the average sentence length. However, the SMOG index is more accurate because it considers the number of sentences read. It is calculated by counting the number of polysyllabic words in three 10-sentence samples of a text and adding 3 to the square root of that number. A SMOG score of 6 or below is considered easy to read, while a score of 8 or above is considered difficult to read. We multiply -1 with the raw SMOG index to make the results intuitive. A higher SMOG index in the paper indicates better readability.

The Flesch Ease Index measures the readability of written text. It provides a numerical score indicating whether a text is easy or difficult to read and understand. The score is based on two factors: average sentence length and average number of syllables per word. A higher score indicates greater readability.

3.4 | Analytical Models

To test the correlation between CEO-audit committee director ties and MD&A readability, we employ ordinary least squares regression (OLS) to estimate the following regression model:

$$\begin{aligned}
 READ_{it+1} = & \beta_0 + \beta_1 PTIES_{it} + \beta_2 ROA_{it} + \beta_3 LOGAT_{it} \\
 & + \beta_4 LEV_{it} + \beta_5 CAPEX_{it} + \beta_6 GROWTH_{it} \\
 & + \beta_7 MTB_{it} + \beta_8 TOBINQ_{it} + \beta_9 MA_{it} \\
 & + \beta_{10} LOGNBSEG_{it} + \beta_{11} LOGNGSEG_{it} \\
 & + \beta_{12} LOGBDSIZE_{it} + \beta_{13} LOGFIRMAGE_{it} \\
 & + \beta_{14} PINDIR_{it} + \beta_{15} LOGNETWORKSIZE_{it} \quad (1) \\
 & + \beta_{16} INTERLOCK_{it} + \beta_{17} FINDISTRESS_{it} \\
 & + \beta_{18} EARNINGSMGT_{it} + \beta_{19} RETURNVOLT_{it} \\
 & + \beta_{20} INSTOWN_{it} \\
 & + \beta_{21} LOGNUMANALYST_{it} \sum Year \\
 & + \sum Firm + \varepsilon_{it}.
 \end{aligned}$$

The dependent variable READ is measured by the SMOG index (SMOG) and the Flesch Reading Ease (FLESCHEASE), respectively. The proxy for CEO-AC director ties is the percentage of the audit committee directors who had either employment, education, or friendship ties with the CEO at the end of the year before the year of the 10-K filing (PTIES).

We include various control variables for factors mechanically correlated to readability. The first group of variables includes firms' financials because it is impossible to completely separate the fundamental complexity of the firm's business from the language complexity of its corporate disclosures (Loughran and McDonald 2014). Specifically, we control for firm financials, such as leverage (LEV) to capture financial distress likelihood, capital expenditures (CAPEX) for future growth opportunities, and market valuation (MTB and TOBINQ) to reflect business complexity. Moreover, complex language may be necessary to convey detailed technical information about a firm's operating strategy, particularly in a complex and competitive business environment. Additional controls include return on assets (ROA) for profitability, firm size (LOGAT), merger and acquisition activity (MA), the number of business segments (LOGNBSEG) and geographic segments (LOGNGSEG), as more diversified firms tend to have more complex disclosures (Hasan 2020; Nadeem 2021).

Existing literature documents that control weakness significantly impacts accounting conservatism (Goh and Li 2011) and financial reporting fraud (Donelson, Ege, and McInnis 2017). Therefore, we control for corporate governance characteristics such as board size (LOGBSIZE) and independence (PINDIR). Furthermore, we control for the CEO network size (LOGNETWORKSIZE) and interlocking directors (INTERLOCK) to capture joint control and coordination across firms (Khanna and Thomas 2009). Furthermore, firm age (LOGFIRMAGE), financial distress (FINDISTRESS), earnings management (EARNINGSMGT), return volatility (RETURNVOLT), institutional ownership (INSTOWN) and the number of analysts (LOGNUMANALYST) are included in all regressions to account for various aspects that could impact disclosure transparency⁸. Year and industry effects are included to account for time- and industry-specific factors.

4 | Analyses and Results

4.1 | Descriptive Statistics

Table 1 reports summary statistics. We tabulate the standard summary statistics for the two readability measures in their absolute value (i.e., raw score) in Panel A. For instance, the mean and median of the SMOG index of the MD&A section are 18.630 and 18.597 words, respectively. This score implies that the MD&A section readability is appropriate for a graduate-level student in the United States. The mean value of the Flesch Reading Ease index (FLESCHEASE_ACTUAL) is 20.094. We use the inverse score of SMOG and Flesch Reading Ease in the multivariate analyses for the straightforward interpretation that the higher the inverse score, the better the readability and transparency⁹.

Summary statistics of the CEO-audit committee directors ties are tabulated in Panel B. On average, the CEO connects with

TABLE 1 | Descriptive statistics.

	Mean	Std. Dev.	Min	Median	Max
Panel A: Dependent variables					
SMOGINDEX_ACTUAL	18.630	1.116	10.411	18.597	25.254
FLESCHEASE_ACTUAL	20.094	5.028	-0.937	20.157	47.217
Panel B: Independent variable					
PTIES	0.305	0.349	0.000	0.250	1.000
PTIEEMP	0.188	0.321	0.000	0.000	1.000
PTIEEDU	0.055	0.142	0.000	0.000	1.000
PTIEOTHER	0.268	0.346	0.000	0.000	1.000
Panel C: Financial variables					
ROA	0.047	0.278	-1.746	0.103	0.506
AT (million)	6472.531	38,187.604	0.423	664.170	3,221,972.000
LOGAT	6.504	2.104	-0.860	6.499	14.986
LEV	0.247	0.282	0.000	0.198	17.781
CAPEX	0.045	0.060	-0.186	0.027	1.457
GROWTH	0.170	0.572	-0.811	0.073	3.987
MTB	3.215	5.925	-19.703	2.122	36.591
TOBINQ	2.160	1.767	0.623	1.567	12.907
MA	0.392	0.488	0.000	0.000	1.000
NBSEG	6.737	6.754	1.000	4.000	152.000
LOGNGSEG	1.755	0.747	0.693	1.609	5.030
NBSEG	5.917	4.712	1.000	3.000	42.000
LOGNBSEG	1.730	0.627	0.693	1.386	3.761
FIRM AGE	18.822	10.467	1.000	18.000	43.000
LOGFIRMAGE	2.824	0.605	0.693	2.944	3.784
FIN DISTRESS	4.143	7.321	-28.216	3.160	40.390
EARNINGS MGT	-0.068	1.054	-19.179	-0.084	240.420
RETURN VOL	0.385	10.546	0.002	0.116	797.672
Panel D: Corporate governance variables					
BDSIZE	8.231	2.296	1.000	8.000	33.000
LOGBDSIZE	2.192	0.247	0.693	2.197	3.526
PINDIR	0.619	0.211	0.000	0.667	1.000
NETWORK SIZE	16,069.759	15,467.138	0.000	11,942.000	267,202.000
LOGNETWORKSIZE	9.293	0.968	0.000	9.388	12.496
SUM_INTERLOCK	1.029	2.204	0.000	0.000	48.000
LOGSUMINTERLOCK	0.430	0.647	0.000	0.000	3.892
INST OWN	0.293	0.358	0.000	0.000	1.000
NUM ANALYSTS	6.607	7.031	0.000	4.000	47.000
LOGNUM_ANALYSTS	1.577	1.011	0.000	1.609	3.871

Note: This table presents the descriptive statistics for the primary dependent variables in Panel A, the independent variables in Panel B, firm-level financial control variables in Panel C, and corporate governance variables in Panel D. We provide definitions of the variables in the Appendix.

30.5% of the Board's independent audit committee members, which comprise 18.88% employment ties, 5.5% education ties and 26.8% other ties¹⁰. Panel C reports firms' financials. On average, firms included in our sample have \$6472.531 million in total assets, have been established for 18.822 years, and have a leverage ratio of 24.7%. The average capital expenditure,

market-to-book ratio, and Tobin's Q of firms are 4.5%, 3.215% and 2.160%, respectively. On average, firms operate 6.737 business segments and 5.917 geographical segments. Corporate governance statistics are shown in Panel D. The average board size in our sample is about eight directors, with 61.9% being independent directors. The mean (median) natural log of

network size is 9.293 (9.388) and the mean (median) number of interlocks is 1.028 (0.000). These statistics are consistent with prior studies (Fan et al. 2019; Khanna, Kim, and Lu 2015) (Table 2).

4.2 | CEO-Audit Committee Director Ties and Corporate Disclosure Readability

We estimate Equation (1) to test our hypotheses on the relationship between CEO-audit committee director ties and MD&A readability. The dependent variables are the SMOG Index in Model 1 and the Flesch Ease Index in Model 2. Irrespective of the readability measures used, we find consistent evidence that companies with more CEO-audit committee director ties are associated with less transparent and readable financial reports. For example, the coefficient of PTIES is negative (−0.0129) and significant at the 1% level ($p = 0.00$) in column (1), where the SMOG index is the primary dependent variable. Similarly, more significant CEO-audit committee director ties are associated with a lower Flesch Ease Index, as evidenced by a coefficient of −0.0361, also significant at the 1% level. Economically, the presence of CEO-audit committee director ties results in a reduction in readability equivalent to 1.14% of one standard deviation of the SMOG index and a similar decrease in the Flesch Ease index¹¹. These findings highlight the detrimental impact of CEO-audit committee director ties on the clarity and transparency of MD&A sections.

The coefficients of most of the control variables are in line with prior studies (Hasan 2020; Lo et al. 2017). We find that large firms (LOGAT), firms with high leverage (LEV) and firms with operational complexity (LOGNBSEG) demonstrate poor readability of their MD&A section. Moreover, mature (LOGFIRMAGE) and profitable (ROA) firms are associated with more readable corporate disclosures. We also find evidence that firms with larger boards have better readability, while higher board independence is negatively associated with the reading ease of financial reports. It is interesting to note that interlocking boards and CEO network size are unrelated to readability. Similarly, we find no relationship between readability and economic distress or earnings management.

4.3 | Endogeneity Concerns

Asserting that CEO connections to audit committee directors are associated with less readable MD&A sections requires considering the endogenous nature of the CEO and/or director selection and financial reporting process. Our results may suffer from various endogeneity issues. To provide more definitive evidence of whether CEO connectedness impacts firm transparency, we utilize several shocks to the CEO-AC connections to observe whether and how firms' information environments change in response to these shocks.

4.3.1 | Regulatory Change

The first shocks used to address the potential endogenous nature of CEO-Audit Committee connections are regulatory

TABLE 2 | CEO-audit committee director ties and readability of MD&A reports.

	SMOG (1)	FLESCHEASE (2)
PTIES	−0.0129*** (0.00)	−0.0361*** (0.00)
ROA	0.0037*** (0.00)	0.0132** (0.01)
LOGAT	−0.0031*** (0.00)	−0.0219*** (0.00)
LEV	−0.0033*** (0.00)	−0.0055 (0.23)
CAPEX	−0.0008 (0.83)	−0.0228 (0.27)
GROWTH	0.0002 (0.54)	0.0030* (0.05)
MTB	0.0001 (0.27)	0.0002 (0.13)
TOBINQ	0.0001 (0.99)	−0.0009 (0.24)
MA	−0.0006* (0.09)	−0.0038* (0.06)
LOGNBSEG	−0.0005 (0.29)	−0.0052* (0.07)
LOGNGSEG	0.0001 (0.94)	−0.0020 (0.45)
LOGFIRMAGE	0.0022** (0.03)	0.0005 (0.93)
FIN DISTRESS	0.0001*** (0.01)	0.0004** (0.03)
EARNINGS MGT	−0.0001 (0.55)	−0.0008 (0.32)
RETURN VOL	0.0001 (0.92)	−0.0001 (0.60)
LOGBDSIZE	0.0021* (0.09)	0.0119* (0.09)
PINDIR	−0.0031*** (0.01)	−0.0165*** (0.01)
LOGNETWORKSIZE	−0.0014*** (0.00)	−0.0113*** (0.00)
SUMINTERLOCK	−0.0004 (0.21)	−0.0001 (0.97)
INSTOWN	0.0015** (0.05)	0.0013 (0.76)
LOGNUM ANALYSTS	0.0016*** (0.00)	0.0065*** (0.00)

(Continues)

TABLE 2 | (Continued)

	SMOG (1)	FLESCHEASE (2)
CONSTANT	-2.9228*** (0.00)	3.3313*** (0.00)
Year F.E.	Yes	Yes
Firm F.E.	Yes	Yes
R ²	0.3520	0.2632
N	57,472	57,472

Note: This table presents the regression results of the CEO-audit committee director ties effect on MD&A reports' readability with other control variables. *p*-values are given in parentheses. We control for year and firm fixed effects. The superscripts ***, ** and * correspond to statistical significance at the 1%, 5% and 10% levels, respectively. We provide definitions of the variables in the Appendix.

changes. For one, appointing a CEO with extensive director ties may not be random. Director selection could also be influenced by their existing connections with the CEO (Kim and Cannella 2008). Therefore, we examine how regulatory changes might affect the link between readability and CEO-audit committee director ties, focusing on the Sarbanes Oxley (SOX) in 2002 as well as the Nasdaq Rule 5605(c)(3) changes in 2009.

SOX and the Nasdaq rule change introduced stricter independence and responsibility standards for boards, aiming to enhance corporate governance and accountability. These regulations can be seen as external shocks to CEO-audit committee ties for two reasons. First, these regulations likely disrupted existing networks and necessitated adjustments in the composition and functioning of audit committees. Therefore, firms with existing CEO-audit committee director ties re-evaluate and possibly reconfigure these relationships to comply with the new standards. Second, these regulations promoted better governance practices and increased scrutiny of financial disclosures, indirectly influencing how CEO-audit committee ties impact the firm's adherence to these requirements.

By comparing the changes in financial statement readability between firms with high and low CEO-audit committee ties before and after these regulatory changes, we aim to isolate the effect of these external shocks on the relationship between audit director ties and financial disclosure practices. This approach assumes that any significant difference in changes in readability between the treatment and control groups can be attributed to the impact of the Sarbanes-Oxley Act and the Nasdaq rule change, highlighting the role of CEO-audit committee ties in shaping firms' responses to new governance and disclosure requirements. We estimate the following model to test whether these regulatory shocks impacted the relationship between audit director ties and firm readability.

Table 3 examines the above two shocks and how these regulatory changes impacted CEO connections. We employ a propensity score matching in unreported first-stage results. Propensity score matching helps mitigate endogeneity by ensuring that the treatment and control groups are comparable in terms of observed covariates, thus reducing the bias from confounding variables and improving the accuracy of causal inferences (Rosenbaum and Rubin 1983). For the first stage, we

TABLE 3 | CEO-audit committee director ties and readability of MD&A reports: diff-in-diff tests.

Panel A: SOX (2002)		
	SMOG (1)	FLESCHEASE (2)
DPTIES	-0.0158*** (0.00)	-0.0414*** (0.00)
POSTSOX	-0.0764*** (0.00)	-0.3608*** (0.00)
DPTIES * POSTSOX	0.0095*** (0.00)	0.0273*** (0.00)
CONSTANT	-2.9216*** (0.00)	3.4012*** (0.00)
Controls	Yes	Yes
Year F.E.	Yes	Yes
Firm F.E.	Yes	Yes
R ²	0.3263	0.2397
N	33,344	33,344
Panel B: NASDAQ rule (2009)		
	SMOG (1)	FLESCHEASE (2)
DPTIES	-0.0143*** (0.00)	-0.0300*** (0.00)
POSTNASDAQ	-0.0791*** (0.00)	-0.3623*** (0.00)
DPTIES * POSTNASDAQ	0.0120*** (0.00)	0.0228*** (0.00)
CONSTANT	-2.9267*** (0.00)	3.3897*** (0.00)
Controls	Yes	Yes
Year F.E.	Yes	Yes
Firm F.E.	Yes	Yes
R ²	0.3325	0.2407
N	33,344	33,344

Note: In the first stage (not reported), we use the sample median CEO-audit committee director ties each year to divide the sample firms into high and low-connection firms. We assign a value of one for high-connection firms and zero for low-connection firms. We then estimate a logistic model with this categorical variable (DPTIES) as the dependent variable, including financial, governance, industry and year-fixed effects as control variables. Next, we use the propensity scores from the first-stage logistic regression model to select the optimal match based on the nearest neighbour technique. This ensures that each high CEO-director ties firm (treated group) is paired with a low CEO-director ties firm (control group) with the lowest difference in propensity scores. We apply a caliper distance of 0.01 in the matching process, resulting in a matched sample of 33,494 observations. We show regressions on the effects of the SOX change in the audit committee in 2002 (Panel A), the NASDAQ change in audit committee makeup in 2009), and CEO-audit committee director ties on the readability of MD&A reports with other control variables on the propensity-matched sample at 0.001 calipers. POSTSOX is an indicator variable that equals one after the SOX regulation (post-2002) period and zero otherwise. POSTNASDAQ is an indicator variable that equals one after the Nasdaq regulations (post-2009) period and zero otherwise. *p*-Values are presented in parentheses. The superscripts ***, ** and * correspond to statistical significance at the 1%, 5% and 10% levels, respectively. We provide definitions of the variables in the Appendix.

use the sample median CEO-audit committee director ties each year to bifurcate the sample firms into high and low-connection firms. Specifically, we use an indicator variable (DPTIES) for bifurcation. DPTIES has a value of one (zero) for high (low) CEO-audit committee director ties firms.

We then use the propensity scores from the first-stage logistic regression model to select the optimal match based on the nearest neighbour technique. Our matching criteria include financial, governance, industry and year-fixed effect in Equation (1). This ensures that each high CEO-director ties firm (treated group) is paired with a low CEO-director ties firm (control group) with the lowest difference in propensity scores. We apply a caliper distance of 0.01 in the matching process, resulting in a matched sample of 33,344 observations. We conduct a univariate analysis (untableted) for CEO-director ties deterministic variables to test the differences in means between treatment and control groups. The mean of our readability measure SMOG (FLESH) is -2.9895 (-2.9760) for the treatment group and 2.9781 (3.0111) for the control group, statistically significant at the 1% level. The mean differences of other variables are statistically insignificant, revealing a strong similarity between the two groups regarding their financial characteristics, operation and corporate governance practices, indicating that our matching procedure successfully achieves balance in the covariates. Using the propensity-matched sample, we then test whether the regulatory changes had any impact on readability using the following model:

$$\begin{aligned} READ_{it+1} = & \beta_0 + \beta_1 DPTIES_{it} + \beta_2 POSTREG_{it} \\ & + \beta_3 DPTIES * POSTREG_{it} \\ & + \beta_{4-14} FIRMCONTROLS_{it} + \sum Year \\ & + \sum Firm + \varepsilon_{it}. \end{aligned}$$

POSTREG is an indicator variable that captures whether the regulation passed using SOX in 2002 (called *POSTSOX* in Table 3 Panel A) and the Nasdaq rule change in 2009 (called *POSTNASDAQ* in Table 3 Panel B). *DPTIES* is the proportion of audit committee directors who share at least one connection with the CEO based on social networks.

The first regulation change that impacts CEO connection is the shock of the 2002 Sarbanes-Oxley (SOX) regulation on CEO-audit committee director ties. SOX introduced substantial changes in the composition of the board and audit committee. It requires public companies to have a majority of independent directors and all audit committee members to be independent, with at least one financial expert on the committee. These measures aimed to enhance corporate governance by improving oversight and reducing conflicts of interest. We utilize a two-stage approach with propensity matching. Panel A shows the results.

Similar to our previous results, on average, strong CEO connections to audit committee directors correlate with worse MD&A readability. Furthermore, the overall MD&A readability declines post SOX. Increased regulatory scrutiny in financial disclosures appears to lead firms to disclose more technical information and less readable financial reports. However, the

interaction term between SOX and CEO-audit committee director ties is positive and significant at the 1% level. Perhaps an unintended consequence of the regulatory framework change introduced by SOX is that it mitigates the adverse effects of CEO connectedness on corporate disclosure readability and transparency.

In Panel B, we use the change in Nasdaq regulations regarding audit committee independence. In 2009, Nasdaq introduced a rule change that mandated stricter independence and responsibility standards for audit committee members. Before this requirement, investors expressed concern that the audit committee might lack the necessary independence and oversight capabilities to ensure transparent and accurate financial disclosures. This exogenous regulatory change directly influenced the relationship between CEOs and audit committee members. Our findings in Panel B mirror those in Panel A. CEO-audit committee director ties are associated with reduced readability of the MD&A section. Similarly, the Nasdaq ruling is linked to decreased readability, likely due to the increased regulatory and disclosure requirements. However, the interaction term between the Nasdaq ruling and CEO-audit committee director ties is positive. This suggests that the enhanced governance standards introduced by the Nasdaq ruling mitigate the adverse effects of director ties on readability, resulting in more straightforward and transparent financial disclosures despite the initial complexity. These results emphasize the significance of regulatory changes in shaping the dynamics between corporate governance structures and financial disclosure practices, reinforcing the role of stringent governance reforms in promoting transparency and clarity in corporate communications.

4.3.2 | Sudden Departures

The second shock addresses the potential self-selection bias issue from the endogenous nature of CEO and/or director appointments. For one, appointing a CEO with extensive Audit Committee director ties may not be random. Director selection could also be influenced by their existing connections with the CEO (Kim and Cannella 2008). To address endogeneity, we use the unexpected CEO and/or AC director departure (i.e., sudden death or turnover) as an exogenous shock to the connectedness. Table 4 shows the results. We utilize a two-stage least-squares approach with instrumental variables. Panel A (B) exhibits the results when sudden CEO/audit committee director departures are caused by sudden death (sudden CEO turnover unrelated to death) and are used as an exogenous shock. In the first stage, we predict the new CEO's connectedness to audit committee directors after the shock. The predicted CEO-audit committee director ties are then used as a primary independent variable in the second stage.

In the first-stage regression, unexpected CEO or director departures (i.e., sudden death or turnover) significantly reduce the CEO-audit committee director ties. Specifically, the coefficient of $DEATH_{t-1}$ ($CEO_DEPARTURE_{t-1}$) is -0.0721 (-0.0529) and significant at the 1% level. These numbers indicate that, on average, the CEO/audit committee director's sudden death reduces connectedness by 7.21%. In addition, a CEO's sudden departure, unrelated to death, reduces connectedness by 5.29%.

TABLE 4 | CEO-audit committee director ties and readability of MD&A: Instrumental variables.

Panel A: CEO/audit committee director death			
	First stage PTIEALL (1)	Second stage	
		SMOG (2)	FLESCHEASE (3)
DEATH	-0.0721*** (0.00)		
Predicted PTIES		-0.0129*** (0.00)	-0.0362*** (0.00)
Controls	Yes		
Constant	Yes		
Year F.E.	Yes		
Industry F.E.	Yes		
R ²	0.0366	0.2536	0.1528
N	57,472	57,472	57,472
Weak identification test			
Kleibergen-Paap rk Wald test	(0.00)		
Wald chi-squared test of homogeneity			
χ^2 statistics	—	388.88	93.27
p-value		(0.00)	(0.00)
Panel B: CEO Sudden departure			
	First stage PTIEALL (1)	Second stage	
		SMOG (2)	FLESCHEASE (3)
CEO_DEPARTURE	-0.0529*** (0.00)		
Predicted PTIES		-0.0129*** (0.00)	-0.0360*** (0.00)
Controls	Yes		
Constant	Yes		
Year F.E.	Yes		
Industry F.E.	Yes		
R ²	0.0359	0.2536	0.1528
N	57,472	57,472	57,472
Weak identification test			
Kleibergen-Paap rk Wald test	(0.00)		
Wald chi-squared test of homogeneity			
χ^2 statistics	—	386.45	92.35
p-value		(0.00)	(0.00)

Note: This table reports the endogeneity-corrected regression results using the probit model with instrumental variables. The first stage uses CEO/director deaths (DEATH) at $t - 1$ as an instrument to predict ties in time t in Panel A and sudden CEO departures (CEO DEPARTURE) at $t - 1$ to predict ties at time t in Panel B. The second-stage regression output regresses readability at $t + 1$ on the predicted CEO-audit committee director ties at time t and other control variables. p -Values are presented in parentheses. The superscripts ***, ** and * correspond to statistical significance at the 1%, 5% and 10% levels, respectively. We provide definitions of the variables in the Appendix.

Our second-stage results are perfectly consistent with the baseline OLS regression results in Table 3. We find that stronger predicted CEO-audit committee director ties (*DPTIES*) are significantly associated with lower SMOG and Flesch Ease scores. The coefficients were negative and significant at the 1% level. So far, evidence suggests that CEO

connectedness to audit committee directors is associated with less readable and transparent corporate disclosures. The economic impact of CEO connectedness and readability will be further analyzed in Section 4.5 to determine whether it aligns more with the Information Obfuscation Theory or the Social Network Theory.

4.4 | Additional Controls

A final endogeneity issue arises from the possibility of omitted variables. As a result, we control for additional variables that can impact financial transparency, such as CEO power, incentives, managerial ability and CFO characteristics. Table 5 shows the results¹².

We control for additional CFO characteristics in columns 1 and 2, including CFO age, CFO tenure and an indicator variable for whether the CFO holds a position on the board. Older and more tenured CFOs typically possess greater experience and more profound knowledge of the firm's financial operations, which can influence the clarity and comprehensiveness of financial disclosures, particularly the

TABLE 5 | CEO-audit committee director ties and readability of MD&A: Additional controls.

	SMOG (1)	FLESCHEASE (2)	SMOG (3)	FLESCHEASE (4)
PTIES	−0.0149*** (0.00)	−0.0433*** (0.00)	−0.0107*** (0.00)	−0.0149* (0.10)
CFOBRDPOSITION	0.0007 (0.35)	−0.0015 (0.70)		
LOGCFOTENURE	0.0017*** (0.00)	0.0055** (0.03)		
LOGCFOAGE	0.0067*** (0.01)	0.0645*** (0.00)		
COOPTED			−0.0026** (0.05)	−0.0055 (0.48)
EINDEX			−0.0004 (0.30)	−0.0044* (0.06)
MA SCORE			0.0048* (0.09)	0.0008 (0.96)
CEOPOWER			−0.0008* (0.07)	−0.0031 (0.26)
CEOPAY			−0.0007 (0.20)	−0.0034 (0.26)
CEOVEGA			−0.0004 (0.19)	−0.0023 (0.20)
CEODELTA			0.0004 (0.26)	−0.0015 (0.47)
DIRPAY			0.0007 (0.37)	0.0027 (0.54)
DIRVEGA			0.0001 (0.79)	−0.0009 (0.74)
DIRDELTA			0.0001 (0.92)	−0.0020 (0.42)
CONSTANT	−2.9481*** (0.00)	3.1048*** (0.00)	−2.8939*** (0.00)	3.4813*** (0.00)
Other controls	Yes	Yes	Yes	Yes
Year F.E.	Yes	Yes	Yes	Yes
Firm F.E.	Yes	Yes	Yes	Yes
R ²	0.3055	0.2364	0.2503	0.1801
N	46,667	46,667	14,825	14,825

Note: This table presents the regression results of CEO-audit committee director ties on the readability of the MD&A section of the financial report with other control variables, including CFO characteristics in columns (1–2) and CEO and director incentive in columns (3–4). *p*-Values are presented in parentheses. The superscripts ***, ** and * correspond to statistical significance at the 1%, 5% and 10% levels, respectively. We provide definitions of the variables in the Appendix.

MD&A section. These CFOs might be more involved in strategic decision-making and communication policies, leading to careful crafting of financial reports to meet regulatory and stakeholder expectations for clarity and transparency. We find results consistent with our prediction. Although the CEO-audit committee director ties are still negatively correlated to readability, we see the CFO characteristics positively associated with readability measures.

In columns 3–4, we control for managerial characteristics that may impact readability. These characteristics include corporate governance quality, organizational ability, co-op boards (COOPTED) and CEO and director incentives. We use the entrenchment index (EINDEX) and managerial ability scores (MA SCORE) to analyze the effect of internal governance mechanisms on corporate disclosure transparency. We find that EINDEX is unrelated to readability, but better managerial ability improves readability using the SMOG index (Column 3). There is no significance for the Flesch Reading measure. This result implies that managers with higher competency are more effective in communicating complex financial information clearly and transparently in corporate disclosures. This communication is mainly through using polysyllabic words (words with three or more syllables).

Additional variables of interest include the proportion of co-opted independent directors and CEO power. Prior studies find readability and quality of financial reporting decrease with higher proportions of co-opted directors (Rahman and Kabir 2023; Huang, Lim, and Ng 2019). Similarly, some studies prove that CEO power significantly affects firm outcomes (e.g., Boumosleh and Cline 2023; Morse, Nanda, and Seru 2011). Our findings show that the negative association between CEO-audit committee director ties and readability persists even

after accounting for these factors. Interestingly, co-op boards and CEO power significantly reduce corporate disclosure readability by using technical words (words with three or more syllables).

We last control the CEO and director compensations. CEO and director compensation structures can significantly impact managerial behaviour and decision-making processes, including crafting financial reports. Variables to capture CEO incentives include CEO total compensation, CEO option delta and vega. Variables to capture audit committee director incentives consist of director compensation and director option delta and vega, all from Execucomp. These compensation variables are critical to understanding the incentives that might influence financial reporting practices and, consequently, the readability of financial disclosures. CEO total compensation includes various components such as salary, bonuses and stock options. Option delta and vega measure the sensitivity of the CEO's and directors' wealth to stock price changes and stock return volatility, respectively. Higher CEO pay and option sensitivity might incentivize CEOs to manage earnings and disclosures to maximize compensation strategically. Similarly, director compensation and option sensitivity can influence their oversight functions.

Our findings reveal that the negative correlation between CEO connectedness and corporate disclosure readability remains after controlling for incentive measures. After controlling for CEO-audit committee director ties, none of the CEO incentive variables are correlated with readability. We observe similar results for director compensation. Including these controls helps isolate the effect of CEO-audit committee director ties on readability, ensuring our findings are robust and account for the potential influence of compensation structures on financial reporting practices.

TABLE 6 | CEO-audit committee director ties and readability of MD&A reports.

	OLS		Random effects	
	SMOG (1)	FLESCHEASE (2)	SMOG (3)	FLESCHEASE (4)
PTIES	−0.0156*** (0.00)	−0.0564*** (0.00)	−0.0133*** (0.00)	−0.0410*** (0.00)
CONSTANT	−2.8801*** (0.00)	3.6349*** (0.00)	−2.8940*** (0.00)	3.5133*** (0.00)
Controls	Yes	Yes	Yes	Yes
Year F.E.	Yes	Yes	No	No
Industry F.E.	Yes	Yes	No	No
F-test: F.F. vs. OLS	(0.00)	(0.00)		
BP Lagrange test: Random vs. OLS			(0.00)	(0.00)
Hausman test: FF vs. Random			(0.00)	(0.00)
R ²	0.3310	0.2482	0.4510	0.3549
N	57,472	57,472	57,472	57,472

Note: Alternative estimation models. This table presents the regression results of the effect of CEO-audit committee director ties on the readability of the MD&A section of the financial report with other control variables using OLS in columns (1–2) and random effect in columns (3–4) in Panel A. *p*-Values clustered by the firm are presented in parentheses. The superscripts ***, ** and * correspond to statistical significance at the 1%, 5% and 10% levels, respectively. We provide definitions of the variables in the Appendix.

TABLE 7 | CEO-audit committee director ties and readability of MD&A.

Panel A: Descriptive statistics						
	Before entropy balancing					
	Treatment: High PTIEALL			Control: Low PTIEALL		
	Mean	Variance	Skewness	Mean	Variance	Skewness
ROA	-0.001	0.112	-2.697	0.070	0.059	-3.169
LOGAT	6.490	4.757	0.097	6.510	4.268	0.160
LEV	0.269	0.081	3.939	0.236	0.077	10.320
CAPEX	0.046	0.004	4.245	0.043	0.003	4.352
GROWTH	0.226	0.481	3.493	0.143	0.252	4.629
MTB	3.428	41.98	1.931	3.114	31.82	2.120
TOBINQ	2.255	3.813	2.872	2.116	2.792	3.175
MA	0.372	0.233	0.527	0.401	0.240	0.402
LOGNBSEG	1.628	0.519	0.467	1.816	0.565	0.223
LOGNGSEG	1.703	0.402	0.404	1.743	0.388	0.301
LOGFIRMAGE	2.627	0.421	-0.078	2.916	0.312	-0.593
FIN DISTRESS	3.757	64.69	1.316	4.326	48.24	1.242
EARNINGS MGT	-0.049	3.298	126.000	-0.076	0.076	61.41
RETURN VOL	0.479	150.8	54.920	0.340	92.500	67.65
LOGBDSIZE	2.182	0.063	-0.053	2.197	0.059	-0.114
PINDIR	0.603	0.048	-1.375	0.626	0.042	-1.613
LOGNETWORKSIZE	9.317	0.895	-0.935	9.282	0.957	-0.778
LOGSUMINTERLOCK	0.444	0.430	1.343	0.422	0.413	1.419
INST OWN	0.247	0.113	0.929	0.314	0.133	0.570
LOGNUM ANALYSTS	1.577	0.986	-0.235	1.578	1.040	-0.145
After entropy balancing						
	Treatment: High PTIEALL			Control: Low PTIEALL		
	Mean	Variance	Skewness	Mean	Variance	Skewness
ROA	-0.001	0.112	-2.697	-0.001	0.121	-2.714
LOGAT	6.490	4.757	0.097	6.490	4.525	0.158
LEV	0.269	0.081	3.939	0.269	0.127	13.79
CAPEX	0.046	0.004	4.245	0.046	0.005	4.956
GROWTH	0.226	0.481	3.493	0.226	0.496	3.549
MTB	3.428	41.98	1.931	3.428	43.02	2.054
TOBINQ	2.255	3.813	2.872	2.255	3.828	2.993
MA	0.372	0.233	0.527	0.372	0.233	0.527
LOGNBSEG	1.628	0.519	0.467	1.628	0.544	0.431
LOGNGSEG	1.703	0.402	0.404	1.703	0.380	0.410
LOGFIRMAGE	2.627	0.421	-0.078	2.627	0.413	-0.193
FIN DISTRESS	3.757	64.69	1.316	3.757	60.67	0.990
EARNINGS MGT	-0.049	3.298	126.000	-0.049	0.422	36.96
RETURN VOL	0.479	150.800	54.920	0.479	158.200	52.400
LOGBDSIZE	2.182	0.063	-0.053	2.182	0.058	-0.085
PINDIR	0.603	0.048	-1.375	0.603	0.050	-1.412
LOGNETWORKSIZE	9.317	0.895	-0.935	9.317	0.901	-0.813

(Continues)

TABLE 7 | (Continued)

	After entropy balancing					
	Treatment: High PTIEALL			Control: Low PTIEALL		
	Mean	Variance	Skewness	Mean	Variance	Skewness
LOGSUMINTERLOCK	0.444	0.430	1.343	0.444	0.442	1.374
INST OWN	0.247	0.113	0.929	0.247	0.119	0.946
LOGNUM ANALYSTS	1.577	0.986	-0.235	1.577	0.998	-0.154

Panel B: Regression results using entropy-balanced sample		
	SMOG (1)	FLESCHEASE (2)
DPTIES	-0.0065*** (0.00)	-0.0126*** (0.00)
CONSTANT	-2.9651*** (0.00)	3.1890*** (0.00)
Controls	Yes	Yes
Year F.E.	Yes	Yes
Firm F.E.	Yes	Yes
R ²	0.6875	0.7453
N	57,472	57,472

Note: Entropy balanced sample. This table presents the regression results using the entropy balancing method to mitigate the systematic differences in CEO-audit committee director ties across firms. Panel A reports the treatment and control groups' mean, variance and skewness before and after the entropy balancing. Panel B reports the multivariate regression analysis using the entropy-balanced sample. *p*-Values are presented in parentheses. We control for year and firm fixed effects. The superscripts ***, ** and * correspond to statistical significance at the 1%, 5% and 10% levels, respectively. We provide definitions of the variables in the Appendix.

4.5 | Alternative Models

4.5.1 | OLS Versus Random Effects

To determine the most efficient model for analyzing panel data, namely fixed-effect (F.E.), random-effect (RE), or pooled OLS, we conducted several diagnostic tests, including the *F*-test, the Breusch-Pagan Lagrange multiplier test (B.P.) and the Hausman test (H.T.). Table 6 shows the results. The results of these tests were statistically significant, indicating that the F.E. models employed in our previous analysis are the most appropriate choice. In Table 6, we estimate OLS (columns 1–2) and RE regressions (columns 3–4) as alternative models to provide a comparative perspective. Regardless of the model specification, the coefficients on our primary variable of interest remain negative and statistically significant.

4.5.2 | Entropy Balanced Sample

Since the CEO-audit committee director ties are usually endogenously determined, our findings may be driven by the random and systematic difference between two groups: those with more and fewer CEO-audit committee director ties. To address this issue, we follow Hainmueller (2012) Entropy Balancing (E.B.) approach and bifurcate the sample into treatment and control groups based on the industry median of CEO-audit committee director ties (*PTIEALL*) by year. This estimation helps adjust the difference in random and systematic inequalities in variable distributions between the treatment and control groups. It assigns weights to the mean, variance and skewness of all covariates for each observation of the control group. We

aim to achieve a covariate balance between the treatment and control-matched groups (Madsen and McMullin 2020; Leone, Li, and Liu 2021). Table 7 shows the results.

Panel A shows the univariate analysis results in the entropy-balanced sample when balancing the treatment and control groups based on the industry median of CEO-audit committee director ties (*PTIEALL*) by year (*High PTIEALL* = 1 and *Low PTIEALL* = 0). We find no differences between the treatment and control groups regarding mean, variance and skewness of covariates after entropy balancing. Panel B shows the multivariate results for the treatment and control groups, respectively. Specifically, Columns (1) and (2) show that the entropy balancing results are significant at the 1% level (coefficient of *DPTIES* = -0.0065, *p* = 0.01 for *SMOG* and coefficient of *DPTIES* = -0.0126, *p* = 0.00 for *FLESCHEASE*) which are consistent with our primary analysis. The E.B. method validates our earlier results and supports the conclusion that CEO-audit committee director ties are associated with reduced MD&A readability.

4.5.3 | Economic Impact of CEO Connectedness and Corporate Disclosure Readability

Information Obfuscation and Social Network Theory predict that CEO connectedness is associated with less readable and transparent corporate disclosures. However, the two opposing theories differ in management intentions when disclosing technical information. The last part of our analysis focuses on disentangling the two opposing theories. We investigate the economic impact of CEO-audit committee director connections

TABLE 8 | CEO-audit committee director ties, readability of MD&A, and long-term effects.

Panel A: TOBINQ						
	TOBINQ1 (1)	TOBINQ1 (2)	TOBINQ2 (3)	TOBINQ2 (4)	TOBINQ3 (5)	TOBINQ3 (6)
PTIES	-2.3653* (0.07)	0.3198 (0.16)	-1.3132 (0.35)	0.1045 (0.68)	-4.1553** (0.04)	0.5475 (0.12)
SMOG	0.1891 (0.35)		0.0272 (0.90)		0.1695 (0.58)	
PTIES * SMOG	-0.6778 (0.12)		-0.3121 (0.51)		-1.3827** (0.04)	
FLESCHEASE		0.0421 (0.27)		0.0331 (0.43)		0.0130 (0.82)
PTIES * FLESCHEASE		-0.2218*** (0.00)		-0.1623** (0.05)		-0.1934* (0.09)
CONSTANT	5.9078*** (0.00)	5.2301*** (0.00)	4.9515*** (0.00)	4.7729*** (0.00)	5.8614*** (0.00)	5.3305*** (0.00)
Controls	Yes	Yes	Yes	Yes	Yes	Yes
Year F.E.	Yes	Yes	Yes	Yes	Yes	Yes
Firm F.E.	Yes	Yes	Yes	Yes	Yes	Yes
R ²	0.1366	0.1372	0.0836	0.0838	0.0032	0.0032
N	52,020	52,020	47,430	47,430	42,883	42,883
Panel B: Crash risk_{t+1}						
	NCSKEW (1)	NCSKEW (2)	DUVOL (3)	DUVOL (4)		
PTIES	2.0676*** (0.01)	0.4470*** (0.00)	1.2995*** (0.00)	-0.1275 (0.11)		
SMOG	-0.1056 (0.40)		0.0034 (0.96)			
PTIES * SMOG	0.5095** (0.05)		0.3574** (0.02)			
FLESCHEASE		0.0256 (0.27)			-0.0189 (0.17)	
PTIES * FLESCHEASE			0.0337 (0.45)		0.1204*** (0.00)	
CONSTANT	-0.1688 (0.67)	0.0552 (0.75)	-0.1930 (0.41)	-0.1487 (0.14)		
Controls	Yes	Yes	Yes	Yes		
Year F.E.	Yes	Yes	Yes	Yes		
Firm F.E.	Yes	Yes	Yes	Yes		
R ²	0.1093	0.1093	0.0986	0.0982		
N	57,153	57,153	57,371	57,371		

Note: This table presents the regression estimates on the economic impact of CEO connections and corporate disclosure readability on firm value (Panel A) and crash risk (Panel B). We measure firm value using TOBIN'S Q for the years $t + 1$, $t + 2$ and $t + 3$, where year t refers to the fiscal year in which the 10-K report is filed. We measure crash risk at year $t + 1$, where year t refers to the fiscal year in which the 10-k is filed. NCSKEW represents the negative skewness of firm-specific weekly returns over the fiscal year. DUVOL represents the natural logarithm of the standard deviation of down-week to up-week firm-specific weekly returns, respectively. p -Values are presented in parentheses. We control for year and firm fixed effects. The superscripts ***, ** and * correspond to statistical significance at the 1%, 5% and 10% levels, respectively. We provide definitions of the variables in the Appendix.

and readability on long-term firm value and crash risk. If less corporate disclosure transparency and readability stems from management's intention to obfuscate negative information, we should observe worse long-run firm value and greater crash risk.

Whether a lack of corporate disclosure transparency and readability stems from management's intention to obfuscate negative information or to disclose necessary technical details depends on the long-term value effect. These long-term value effects are measured by both firm value and crash risk. The 1-, 2- and 3-year TOBIN'S Q is the main dependent variable of interest for firm value, where year t refers to the fiscal year in which the 10-K report is filed. Following Chen, Hong, and Stein (2001), we measure crash risk using two alternate proxies, NCSKEW and DUVOL. NCSKEW represents the negative skewness of firm-specific weekly returns over the fiscal year. DUVOL represents the natural logarithm of the standard deviation of down-week to up-week firm-specific weekly returns, respectively. For both variables, a higher value indicates greater crash risk.

Table 8 presents the findings. Panel A shows the results when 1-, 2- and 3-year Tobin's Q are used as the main dependent variables. We find that CEO-audit committee director ties are negatively associated with firm value, with the coefficients on PTIES being negative and significant at the 10% level in year 1% and 5% in year 3. Notably, the results reveal a stronger negative effect when we interact the CEO connectedness variable with readability measures. Specifically, when Flesch is the readability measure, the interaction terms are negative and significant at the 1% level in the first year and the 5% and 10% levels in the second and third years, respectively. These findings suggest that CEO connections to audit committee directors and lower MD&A readability are linked to worse long-term firm value. This supports the Information Obfuscation Theory, implying that more connected CEOs may use less transparent language to obscure negative information and the firm's outlook.

Panel B exhibits the results when crash risk is the main dependent variable of interest. Following Chen, Hong, and Stein (2001), we measure crash risk using two alternate proxies, NCSKEW and DUVOL. NCSKEW represents the negative skewness of firm-specific weekly returns over the fiscal year. DUVOL represents the natural logarithm of the standard deviation of down-week to up-week firm-specific weekly returns, respectively. For both variables, a higher value indicates greater crash risk. Columns 1–2 (3–4) show the result when the NCSKEW (DUVOL) is the dependent variable. We find strong evidence that CEO-audit committee director ties are related to crash risk, as indicated by the positive coefficients on PTIES for both NCSKEW and DUVOL measures of crash risk, which are significant at the 1% level. The coefficients are also positive and significant when we interact the CEO connectedness variable with the readability measures. These results highlight the significant economic impact of CEO-audit director connections and the transparency and readability of financial disclosures on a firm's crash risk. We argue that the complexity of CEO connectedness is not merely a matter of firm transparency but has substantial implications for firm value and risk.

5 | Conclusion

We investigate the association between CEO connectedness and firm transparency, measured by the readability of the Management's Discussion and Analysis of Financial Condition and Results of Operations (MD&A) section. Our findings indicate that firms with stronger CEO-audit committee director connections tend to issue less transparent and readable MD&As. Our results remain robust even in the face of regulatory and turnover shocks that unexpectedly disrupt these connections. This negative association between CEO connection and firm transparency holds, even after controlling for more powerful CEOs, CEOs with lower managerial ability and firms with co-op boards. Additionally, connections between CEOs and Audit Committee directors are associated with decreased long-term firm value and increased crash risk. We conduct various robustness tests to address potential endogeneity issues, and our results remain robust.

Our findings offer valuable insights for practitioners, investors, and policymakers. Corporate leaders can use our research to make informed decisions about communication strategies and understand the potential impact of CEO-audit committee director relationships on corporate disclosure transparency. Investors gain a deeper understanding of how these ties might influence their perceptions of corporate disclosures and managerial intentions. Policymakers can utilize our insights when formulating governance guidelines that encourage balanced board compositions and effective oversight, ensuring transparency and accountability in corporate reporting. By bridging the gap between academic research and practical relevance, our study contributes to more informed decision-making across corporate stakeholders.

Conflicts of Interest

The authors declare no conflicts of interest.

Data Availability Statement

The data supporting this study's findings are available from BoardEx. However, restrictions apply to the availability of these data, which were used under license for this study.

Endnotes

¹A number of prior studies investigate the impact of firms' information environment and firm-level outcomes (see, e.g., Derrien, Kecskés, and Mansi 2016; Pan et al. 2015; Aggarwal, Cao, and Chen 2012).

²In 2019, the SEC adopted several amendments to Regulation S-K, transitioning from specific disclosure items to a principles-based approach. The updated approach grants management greater flexibility and discretion to disclose firm-specific facts and circumstances. A well-written MD&A, thus, enables investors to 'see through management's eyes'. SEC Release No. 33-10618, *FAST Act Modernization and Simplification of Regulation S-K*.

³Nasdaq Rule 5605(c)(3).

⁴CEO network data are obtained from BoardEx.

⁵Two additional measures of readability: total word count of the MD&A section as well as the Coleman-Liau Index (CLI) were used in the robustness tests but not included in the main analysis.

⁶In unreported tests, we use each of these measures individually rather than the aggregate and find that regardless of the measure, audit director ties matter.

⁷We also use the Bog index developed by Bonsall et al. (2017), the FOG index, total sentence count, total word count excluding numbers, and the Automated index. Our results remain robust with any of these measures.

⁸We understand that accruals can be a noisy measure of earnings management (Ball and Shivakumar 2005). However, discretionary accruals may impact corporate disclosure transparency.

⁹In our multivariate analysis, we multiply the SMOG index by -1 to simplify the interpretation, as this transformation allows for higher values to represent improved readability. It is important to note that this transformation is not a mathematical inverse ($1/x$), but rather a directional change for ease of interpretation, where an increase in the transformed score corresponds to better readability.

¹⁰The percentage of employment ties, education ties and other ties do not exactly add to 30.5% of all ties because one director may have multiple ties with the CEO.

¹¹The economic significance is calculated as follows: For the SMOG index, the reduction is -0.0129 . Given the standard deviation of the SMOG index is 1.11, the percentage reduction is $-0.0129/1.11 \times 100 \approx -1.14\%$.

¹²We are losing observations when controlling for additional CFO and director characteristics due to data limitations. CEO and Director incentives data are from Risk Metrics and Execucomp, which cover larger firms than the BoardEx database.

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Appendix 8
Table A1

TABLE A1 | Definitions of variables.

Variable	Definition
Main variables of interest	
PTIES	The proportion of audit committee directors who share at least one connection with the CEO based on <ol style="list-style-type: none"> i. employment (audit committee directors who share an overlapping prior employment in any firm other than the firm that the CEO is currently working for, irrespective of their role); ii. education (audit committee directors who graduated from the same educational institution as the CEO) iii. other friendship activities (audit committee directors who share memberships of social organizations, such as golf clubs, charities, trusts, and other nonprofessional or voluntary associations with the CEO, either currently or in the past).
DPTIES	Indicator variable if the firm has above median CEO-audit committee director ties in a given year and zero otherwise.
Dependent variables	
SMOG	$-1 \times$ the natural logarithm of the Smog index is calculated based on the Management Discussion and Analysis Section of the 10-K filing.
FLESCHEASE	The natural logarithm of the Flesch Reading Ease index is calculated using the Management Discussion and Analysis Section of the 10-K filing.
Firm characteristics	
ROA	The firm's return on assets equals the income before extraordinary items are scaled by the book value of assets.
AT	The firm's total assets are in the millions.
LOGAT	The natural logarithm of the firm's total assets.
LEV	The firm's short-term debt plus long-term debt is divided by total assets.
CAPEX	The firm's capital expenditure to acquire, upgrade, and maintain physical assets is divided by total assets.
GROWTH	Firm's ratio of change in sales to prior-year sales
MTB	The firm's market value of equity is divided by the book value of equity.
TOBINQ	The firm's market value of total assets divided by the book value of total assets. The market value of assets is calculated as the book value of total assets minus the book value of common equity plus the number of common shares outstanding times the stock price.
M.A.	An indicator variable equal to 1 if a firm was involved in a merger and acquisition and 0 otherwise
LOGNBSEG	The natural logarithm of the number of business segments.
LOGNGSEG	The natural logarithm of the number of geographic segments.
LOGFIRMAGE	The natural logarithm of the age of the firm.
FIN DISTRESS	Altman's (1968) Z score measures the firm's risk of financial distress.
EARNINGS MGT	The Jones Discretionary Accruals Model measures the firm's earnings management (Jones 1991).
RETSVOL	The 12-month stock returns standard deviation.
Governance characteristics	
LOGBDSIZE	The natural logarithm of the total number of directors of the firm.
PINDDIR	The fraction of independent directors on the Board.
LOGNETWORKSIZE	The natural logarithm of the CEO's connections. The BoardEx database measures network size by quantifying the number and types of direct and indirect connections executives and directors have based on their professional relationships and affiliations.
SUMINTERLOCK	The natural logarithm of the number of interlocking directors to capture joint control and coordination across firms (Khanna and Thomas 2009)
INSTOWN	Institutional ownership of the firm's common stock
LOGNUM ANALYSTS	The natural logarithm of the number of analysts following.
Variables used in additional tests	
POSTSOX	An indicator variable equals one if the year is post SOX (after 2002) and zero otherwise.

(Continues)

TABLE A1 | (Continued)

Variable	Definition
POSTNASDAG	An indicator variable equal to one if the year is post NASDAQ Audit committee composition change (after 2009) and zero otherwise.
DEATH	An indicator variable that takes the value of one if a CEO or audit committee director died in the previous year $t - 1$ to the PTIES measure in year t and zero otherwise.
CEO_DEPARTURE	An indicator variable that equals one if the CEO suddenly departs in the previous year ($t - 1$) due to death, illness, job performance, and other, dismissed due to personal issues, for example, where the CEO violated company HR policy, expense account cheating, etc.
CFOBRDPOSITION	An indicator variable that is equal to one if the CFO is also on the Board and zero otherwise
LOGCFOTENURE	The natural logarithm of the CFO's tenure at the firm
LOGCFOAGE	The natural logarithm of the CFO's Age
COOPTED	The proportion of co-opted directors to the total number of directors on a board.
EINDEX	Entrenchment index (Bebchuk, Cohen, and Wang 2013)
MA SCORE	Managerial abilities (Demerjian et al. 2013)
CEO POWER	The CEO Power index is computed based on the CEO's number of titles, equity ownership, tenure, age, compensation, and duality.
CEOPAY	The natural logarithm of the CEO's total compensation.
CEOVEGA	The natural logarithm of the CEO's vega.
CEODELTA	The natural logarithm of the CEO's delta.
DIRPAY	The natural logarithm of the directors' total compensation.
DIRDELTA	The natural logarithm of the directors' vega.
DIRVEGA	The natural logarithm of the directors' delta.
TOBINQ1	Firm performance using Tobin's Q for the years $t + 1$, where year t refers to the fiscal year in which the 10-K report is filed.
TOBINQ2	Firm performance using Tobin's Q for the years $t + 2$, where year t refers to the fiscal year in which the 10-K report is filed.
TOBINQ3	Firm performance Tobin's Q for the years $t + 3$, where year t refers to the fiscal year in which the 10-K report is filed.
NCSKEW	Crash risk measures the negative skewness of firm-specific weekly returns over the fiscal year. A higher NCSKEW indicates greater crash risk.
DUVOL	Crash Risk is the natural logarithm of the standard deviation of down-week to up-week firm-specific weekly returns. A higher DUVOL indicates greater crash risk.