

CEO Network Centrality and Earnings Quality

Xuehu Song*

California State University, Stanislaus

Abstract

This study explores the link between CEO social connectedness and earnings quality, specifically discretionary accruals and accruals quality. Analyzing a panel sample of 5,358 firm-year observations from 2011 to 2020, we find that firms with well-connected CEOs exhibit smaller absolute discretionary accruals and higher accruals quality. These results hold even after controlling for firm, managerial, and board characteristics, as well as firm fixed effects. Additionally, we observe that better-connected CEOs are less likely to avoid reporting losses.

Keywords: social network centrality; earnings quality; CEO

JEL Codes: C12 M10 M40

*contact author: xsong@csustan.edu

CEO Network Centrality and Earnings Quality

1. Introduction

Earnings quality holds substantial significance in financial reporting, given its pivotal role in equity valuation models employed by market participants and academic researchers (Ohlson, 1995). While previous studies have primarily focused on firm characteristics and corporate governance factors, such as firm size, performance, growth, external auditors, and board independence, the influence of CEOs and top executives in shaping corporate practices has garnered attention (Bertrand and Schoar, 2003). Bertrand and Schoar emphasize the significant role individual managers play in firm performance and a multitude of corporate decisions, including research and development (R&D) and capital expenditure. Building upon this perspective, recent studies have discovered links between earnings quality and managerial characteristics, including CEO reputation and managerial ability (Francis *et al.*, 2008; Demerjian *et al.*, 2013).

In this study, our focus lies on exploring the significance of CEO network centrality as another crucial managerial characteristic and its potential association with earnings quality. Specifically, we investigate the relationship between four measures of CEO network centrality and discretionary accruals, as well as accruals quality. CEOs' social network is formed through their connections via the board of directors within their own firm and their board positions in other firms. The collective network comprising board directors from various firms is commonly known as the boardroom network. CEO network centrality quantifies a CEO's position within the boardroom network, reflecting the extent of their connections with other board directors. For instance, a high CEO network centrality indicates that the CEO possesses a substantial number of contacts in the boardroom network, enabling them to readily access diverse sources of information and knowledge.

We analyze a sample of publicly traded firms using data from BoardEx, ExecuComp, Audit Analytics, IBES, and Compustat to investigate the potential relationship between CEO network centrality and earnings quality. The study period encompasses 2011 to 2020. We focus on two widely utilized measures of earnings quality: discretionary accruals and accruals quality. These measures are chosen due to their relevance in capturing the impact of a firm's internal controls, CEO's accounting judgments, and accrual estimation on accruals accuracy. We hypothesize that well-connected CEOs can acquire knowledge of proper accounting practices from other firms, leading to fewer internal errors and better application of complex accounting standards. Furthermore, their extensive network connections may provide valuable information and insights for more precise accrual estimation.

We construct four individual network centrality measures—degree, closeness, betweenness, and eigenvector centrality. Additionally, we create a composite centrality measure by integrating these four measures using principal component analysis. Therefore, our study includes a total of five distinct centrality measures. These measures originate from graph theory and have been widely utilized in the accounting and finance literature. For instance, Larcker *et al.* (2013) employ board membership data from BoardMag to investigate the relationship between board social connectedness and firm performance. Their findings indicate that firms with highly connected directors achieve superior stock returns. El-Khatib *et al.* (2015) explore the association between CEO network centrality and outcomes of mergers and acquisitions (M&A). They discover that CEOs with extensive networks tend to initiate more M&A deals, which, unfortunately, are more likely to result in value destruction. In our primary empirical analysis, we provide evidence that firms with better-connected CEOs exhibit smaller absolute discretionary accruals and higher

accruals quality. In our sensitivity test, we find that that loss avoidance is less associated with better-connected CEOs.

This paper makes two key contributions to the existing literature. Firstly, it contributes to the ongoing debate on the impact of well-connected CEOs on organizations. Previous research by He (2022) examines a sample period from 2001 to 2012 and finds that CEOs and CFOs with high centrality in their networks are more likely to engage in financial misreporting. However, He's study incorporates networks based on current and past employment as well as educational connections. In contrast, our study utilizes more recent data and focuses solely on executives' current employment networks. Our findings complement those of Chahine *et al.* (2021), who find a negative relationship between CEO network centrality and the likelihood of corporate financial reporting fraud. However, the absence of financial reporting fraud alone does not guarantee high-quality earnings. Therefore, we delve into the association between CEO network centrality and various measures of earnings quality, including discretionary accruals, accruals quality, and loss avoidance. Our results reveal that better-connected CEOs are linked to improved earnings quality.

Secondly, our study contributes to the social network literature by highlighting the importance of examining network centrality measures individually. In particular, we find that eigenvector and closeness centrality measures are significantly associated with earnings quality. This suggests that simply expanding one's network is not enough for CEOs to improve earnings quality. Instead, they should focus on developing more centralized connections directly or occupying positions that allow for easier access to valuable information without needing many intermediary contacts.

The rest of this paper is structured as follows. The subsequent section provides a review of the relevant literature. Section three presents the development of our hypotheses. In section four, we outline the research design employed in this study. The test results are discussed in section five. Finally, section six concludes the paper.

2. Literature Review

2.1 Boardroom network

Within the accounting and finance literature, the boardroom network, formed by interlocking board members, is a significant social network. In this network, individual directors serve as nodes, and a link is established when two directors simultaneously serve on the same board. Having well-connected directors in this network can offer several benefits, including access to valuable information and resources pertaining to market trends, industry conditions, and business innovations that can flow through the boardroom network.

Larcker *et al.* (2013) investigate the impact of board members' social connectedness on firm stock performance. Their findings reveal that firms with well-connected directors achieve superior future stock returns compared to those with less-connected directors. The authors argue that well-connected directors possess greater access to information, providing them with a comparative advantage in decision-making. This information encompasses innovative compensation structures, effective corporate governance practices, and efficiency-enhancing technologies that propagate throughout the boardroom network. Firms with well-connected directors can quickly and efficiently acquire such information.

Similarly, Omer *et al.* (2014) demonstrate that firms with well-connected directors exhibit higher market value. Furthermore, in a separate study, Omer *et al.* (2016) examine the relationship between board connectedness and firm financial reporting quality. Their findings indicate that

firms with well-connected directors are less likely to engage in misstatements of their annual financial statements.

2.2 Managerial Characteristics and Earnings Quality

Bertrand and Schoar (2003) highlight the importance of individual managers in influencing firm behavior. Their manager-firm matched sample reveals a significant association between manager fixed effects and corporate practices, including M&A, dividend payout, and R&D investment. Building on this line of research, recent studies in accounting demonstrate a noteworthy link between manager fixed effects and firms' financial reporting practices. For instance, Ge *et al.* (2011) establish that individual CFOs have a significant impact on firms' accounting choices, particularly discretionary accruals. Dejong and Ling (2013) focus on the effects of top management on accruals and find that CEOs exert greater influence on accruals compared to CFOs in terms of magnitude. Additionally, Demerjian *et al.* (2013) discover that managers with higher abilities are associated with higher accruals quality, fewer earnings restatements, and higher earnings persistence.

Moreover, several recent studies investigate the influence of CEO-specific characteristics on accounting practices. For instance, Kuang *et al.* (2014) explore the relationship between accrual-based earnings management and CEO origin, finding that CEOs recruited externally tend to engage in more income-increasing earnings management during the initial years of their tenure. Hsieh *et al.* (2014) examine the connection between CEO overconfidence and earnings management, revealing that overconfident CEOs are more likely to engage in both accrual and real earnings management activities. Similarly, Ali and Zhang (2015) investigate the relationship between CEO tenure and earnings management, observing that CEOs tend to overstate reported earnings more in the early years of their tenure compared to later years. This study extends the existing literature by exploring another CEO characteristic, namely CEO network centrality.

3. Hypothesis Development

Social network theory emphasizes the significance of connections between individuals in influencing behavior and network outcomes (Borgatti *et al.*, 2014). Previous research in social networking has demonstrated that personal connections serve as channels for information transmission, knowledge exchange, and idea sharing (Davis, 1991; Cohen *et al.*, 2010; Larcker *et al.*, 2013). Centrality, as a structural attribute of social networks, has been recognized as important, enabling better access to valuable information and new knowledge, which can positively impact firm innovation and performance (Freeman, 1979; Tsai, 2001; Larcker *et al.*, 2013).

Within social networks, the boardroom network holds particular significance. Scholars argue that directors with extensive connections can access more information and resources, leading to superior stock returns and higher firm values (Larcker *et al.*, 2013; Omer *et al.*, 2014). Similarly, a well-connected CEO is likely to have access to multiple sources of information and valuable resources. For instance, Hong *et al.* (2016) find a positive association between CEO network size and earnings forecast accuracy. Thus, we anticipate that a CEO's ability to make accurate accounting judgments and adopt proper accounting practices will vary based on their position in the boardroom network.

Additionally, a well-connected CEO is expected to possess more information and knowledge not only about their own firm but also the industry and market as a whole. This enables them to consolidate information and provide reliable estimates, ultimately contributing to higher quality earnings (Libby and Luft, 1993). Moreover, well-connected CEOs can learn from other

firms, reducing internal errors and effectively interpreting complex accounting standards. Bikhchandani *et al.* (1992) suggest that when individuals can obtain information from others, the correct choice becomes clearer, leading to convergence towards the correct action. Empirically, Omer *et al.* (2016) conclude that well-connected directors access richer information, avoiding reporting practices that diminish financial reporting quality. Similarly, a well-connected CEO can synthesize information to implement robust internal controls, make informed judgments in recognizing economic transactions, and generate reliable accounting estimates, thereby reducing errors and enhancing earnings quality.

Based on social network theory, well-connected CEOs are better positioned to acquire industry and macroeconomic information through their network contacts. This aids them in making more accurate forward-looking estimations. Furthermore, they can learn from other firms and connected accounting experts to implement effective internal controls, make informed judgments in recognizing economic transactions, and improve earnings quality by reducing errors. This leads to the following hypothesis:

H1: CEO network centrality is positively associated with earnings quality.

4. Research Design

4.1 Discretionary Accruals

Our first measure of earnings quality is based on the absolute value of discretionary accruals estimated from the modified Jones modes with book-to-market ratio and cash flows as additional independent variables (Larcker and Richardson, 2004). Specifically, we estimate the following model for each year t for each of the 48 Fama-French 1997 industry groups with at least ten observations:

$$TA_{i,t} = \beta_0 + \beta_1(\Delta REV_{i,t} - \Delta REC_{i,t}) + \beta_2 PPE_{i,t} + \beta_3 BM_{i,t} + \beta_4 CFO_{i,t} + \varepsilon_{i,t} \quad (1)$$

Where:

$TA_{i,t}$ = firm i 's total accruals in year t ;

$\Delta REV_{i,t}$ = firm i 's change in revenues in year t from year $t-1$;

$\Delta REC_{i,t}$ = firm i 's change in net receivable in year t from year $t-1$;

$PPE_{i,t}$ = firm i 's gross property, plant, and equipment in year t ;

$BM_{i,t}$ = firm i 's book to market ratio in year t

$CFO_{i,t}$ = firm i 's cash flow from operations in year t ;

The industry- and year-specific parameter estimates obtained from (1) are used to estimate firm-specific normal accruals (as a percentage of lagged total assets),

$$NA_{i,t} = \beta_0 + \beta_1(\Delta REV_{i,t} - \Delta REC_{i,t}) + \beta_2 PPE_{i,t} + \beta_3 BM_{i,t} + \beta_4 CFO_{i,t} \quad (2)$$

We scale variables in models (1) and (2) by beginning total assets. Abnormal accruals in year t is the difference between total accruals and normal accruals. Both large negative values and large positive values of discretionary accruals indicate a greater disparity between earnings and accounting fundamentals. The absolute value of discretionary accruals is our first proxy of earnings quality. This variable decreases with earnings quality.

4.2 Accruals Quality

Our second measure of earnings quality is accruals quality estimated from the Dechow and Dichev (2002) model modified by McNichols (2002). Specifically, we estimate the following regression for each year t for each of the 48 Fama-French 1997 industry groups with at least ten observations:

$$\Delta WC_{i,t} = \beta_0 + \beta_1 CFO_{i,t-1} + \beta_2 CFO_{i,t} + \beta_3 CFO_{i,t+1} + \beta_4 \Delta REV_{i,t} + \beta_5 PPE_{i,t} + \varepsilon_{i,t} \quad (3)$$

Where:

$\Delta WC_{i,t}$ = firm i 's change in working capital in year t from year $t-1$;

$CFO_{i,t-1}$ = firm i 's cash flow from operations in year $t-1$;

$CFO_{i,t}$ = firm i 's cash flow from operations in year t ;

$CFO_{i,t+1}$ = firm i 's cash flow from operations in year $t+1$;

$\Delta REV_{i,t}$ = firm i 's change in revenues in year t from year $t-1$;

$PPE_{i,t}$ = firm i 's gross property, plant, and equipment in year t ;

We scale variables in model (3) by beginning total assets. The residual from the regression measures how well current accruals map into cash flows. We use the absolute value of this residual as a proxy for earnings quality. Smaller absolute residuals indicate better mapping and thus higher earnings quality.

4.3 Network Centrality Measures

Following El-Khatib *et al.* (2015), we construct annual boardroom networks formed by overlapped board memberships. Then, we use NetworkX package (Python) to compute the four measures of CEO network centrality. Specifically, we calculate percentile values of the centrality measures each year, which makes the size of the network irrelevant and thus are comparable across time.

The first measure is DEGREE centrality (Freeman, 1979). It is defined as the total number of direct ties a CEO has to other directors via common board membership. The more connections a CEO has, the more central this CEO is in the network. In the formula below, x_{ij} equals 1 for the presence of a direct connection between a CEO and another director j of the network. Each year the degree centrality values are normalized by dividing by the maximum possible degree in a simple graph $n-1$ where n is the number of nodes in the network.

$$DEGREE_i = \sum_{j \neq i} x_{ij} \quad (4)$$

The second measure is CLOSENESS centrality (Freeman, 1979). It measures how easily a CEO reaches other directors in the network and is defined as the inverse of the average distance between a CEO and any other directors. In the formula below, d_{ij} is the shortest distance between a CEO and another director j in the network. n is the total number of directors in the connected group.

$$CLOSENESS_i = \frac{n-1}{\sum_{i \neq j} d_{ij}} \quad (5)$$

The third measure is BETWEENNESS (Freeman, 1979) centrality, which measures how often a CEO lies on the shortest paths between two other nonadjacent directors in the network. Hence, it indicates how much control a CEO could have over the information flow. To calculate betweenness, we first determine the shortest path between every pair of directors in the network.

A CEO's betweenness centrality is the average proportion of shortest paths between every pair of directors in the network that a CEO lies on. In the formula below, θ_{yz} denotes the total number of shortest paths between director y and director z. θ_{yz}^i denotes the number of shortest paths between director y and director z that pass through CEO i.

$$BETWEENNESS_i = \frac{2}{(n-1)(n-2)} \sum \frac{\theta_{yz}^{CEOi}}{\theta_{yz}} \quad (6)$$

The fourth measure is EIGENVECTOR centrality (Bonacich, 1987). It measures a CEO's importance in terms of the centrality of its neighbors. Computationally, it is the number of direct links between a CEO and other directors, weighted by how well-connected the other directors are. Connections to other well-connected directors will increase eigenvector centrality more than connections to less well-connected directors. In the equations below, matrix G is an adjacency matrix. $g_{ij}=1$ if director i and director j are directly linked. λ is the proportionality factor, representing the largest eigenvalue of the adjacency matrix G.

$$CENTRALITY_i = \frac{1}{\lambda} \sum_j g_{ij} \cdot CENTRALITY_j \quad (7)$$

EIGENVECTOR is solved by satisfying the following equation (8). The elements of *EIGENVECTOR* are individual directors' Eigenvector centrality.

$$\lambda \cdot EIGENVECTOR = G \cdot EIGENVECTOR \quad (8)$$

In line with Omer et al. (2014), we employ principal component analysis to derive a composite measure from the four individual measures, utilizing the first principal component. This composite centrality represents a linear combination of the four individual centrality variables, capturing the primary impact of all centrality factors. Moreover, following El-Khatib et al. (2015), we utilize the percentile ranking of these five centrality measures to delineate a CEO's position within the boardroom network. This approach allows us to estimate a CEO's capacity for information access through their contacts, influence over other directors in the network, and their overall impact on company decision-making processes.

4.4 Control Variables

Control variables in this study include several firm-specific determinants of earnings quality noted in the accounting literature. We control for firm size because larger firms have more stable and predictable operations and, therefore, fewer and smaller estimation errors. Small firms are more likely to have internal control deficiencies (Doyle *et al.*, 2007). We control for growth because studies find that high-growth firms have more earnings management opportunities and more measurement errors (Richardson et al., 2005; Doyle *et al.*, 2007). We control for leverage because managers in more highly levered firms could be taking actions to boost earnings so as to avoid violating a covenant (DeFond and Jiambalvo, 1994). We control for performance because strong performance may provide fewer incentives to engage in earnings management (Doyle *et al.*, 2007).

We also control for several managerial characteristics: CEO age, CEO duality indicator, and CEO tenure. Huang *et al.* (2012) find that CEO age is negatively associated with financial restatements. Feng *et al.* (2011) show that CEOs of firms with material accounting manipulations are more likely to be Chair of the Board. Ali and Zhang (2015) find that earnings overstatement is greater in the early years than in the later years of CEO's service. For governance factors affecting

earnings quality, we include variables for Big-4 auditors, number of analysts following, and board independence.

4.5 Estimation Model

To examine the hypothesis, we estimate the following regression (9). *EQ* is earnings quality measured by discretionary accruals and accruals quality. Following El-Khatib *et al.* (2015), *CEO Centrality* is the percentile ranking of CEOs' network centrality measured by Degree Rank, Eigenvector Rank, Closeness Rank, Betweenness Rank, and Composite Rank as previously defined. We include the year and industry dummy variables and winsorize continuous variables in the regression analysis at the 1% and 99% levels. Appendix I reports variable definitions. H1 predicts that CEO network centrality is associated with earning quality, or β_1 is statistically significant. A negative β_1 implies that high CEO network centrality improves earnings quality.

$$EQ_{i,t} = \beta_0 + \beta_1 CEO\ Centrality_{i,t} + \beta_2 Firm\ Size_{i,t} + \beta_3 Firm\ Leverage_{i,t} + \beta_4 Firm\ MTB_{i,t} + \beta_5 Firm\ ROA_{i,t} + \beta_6 CEO\ Age_{i,t} + \beta_7 CEO\ Tenure_{i,t} + \beta_8 CEO\ Duality_{i,t} + \beta_9 Big\ 4\ Auditor_{i,t} + \beta_{10} Analyst\ Following_{i,t} + \beta_{11} Board\ Independence_{i,t} + \varepsilon \quad (9)$$

4.6 Sample selection and descriptive statistics

We obtain information on firms' boards of directors from the BoardEx database. Specifically, we use BoardEx data to construct the annual boardroom network formed by shared directorates from 2011 to 2020 and then calculate CEO network centrality variables each year. Firm-level financial information is obtained from COMPUSTAT. Data for control variables are from ExecuComp, IBES, and Audit Analytics. Financial institutions (SICs between 6000 and 6999) are excluded from the sample because the estimation of discretionary accruals for these firms is different and problematic. Utility firms (SICs between 4000 and 4999) are also excluded because managers in regulated firms may have different incentives to manage earnings from managers of unregulated firms.

Table I
Sample Selection

	Observations
Total observations with complete CEO network centrality measures from the interaction of BoardEx and ExecuComp from 2011-2020	9,304
Less observations	
with insufficient data from Compustat	2,686
with data not available on IBES and Audit Analytics	1,260
Final Sample	5,358

Table II
Summary Statistics for Centrality Measures

Year	Number of firms	Number of directors	Average Degree	Average Eigen-vector	Average Closeness	Average Betweenness
2011	5516	30094	0.000293	0.000208	0.0803	0.0000878
2012	5579	30105	0.000296	0.000223	0.0812	0.0000894
2013	5859	31164	0.000286	0.000191	0.0845	0.0000916
2014	5969	31706	0.000283	0.000202	0.0852	0.0000921
2015	6207	33113	0.000277	0.000199	0.0857	0.0000872
2016	6064	32550	0.000284	0.000207	0.0854	0.0000888
2017	6016	32596	0.000283	0.000212	0.0835	0.0000880
2018	5996	32560	0.000282	0.000213	0.0828	0.0000891
2019	6100	33090	0.000277	0.000219	0.0816	0.0000893
2020	6195	33427	0.000274	0.000216	0.0790	0.0000870

Table I presents the detailed sample selection process. The initial sample from the interaction of BoardEx and ExecuComp consists of 9,304 observations from 2011 to 2020. After deleting 3,946 observations with missing data on control variables, the final sample with complete data consists of 5,358 firm-year observations. Table II reports the total number of firms and directors in the boardroom network from 2011 to 2020. The total numbers are increasing each year gradually. Table III shows descriptive statistics for the variables used in the empirical models. The mean values of Degree, Eigenvector, Closeness, Betweenness, and Composite Rank are 64.1, 70.07, 70.25, 54.85, and 71.69, respectively. Firm characteristics values are also consistent with prior studies. In our sample, 49% of the CEOs are also Chairs of their firms. 93% of the sample firms have a big-4 auditor. 78% of their board members are independent directors. The Pearson correlation matrix is included in Table IV. Both abnormal accruals and accruals quality are significantly and negatively correlated with the Degree, Eigenvector, Closeness, and Composite centrality rank measures.

Table III
Sample Descriptive Statistics

Variable	N	Mean	Median	S.d.	25%	75%
DISCRETIONARY ACCRUALS	5358	0.14	0.08	0.17	0.03	0.18
ACCRUALS QUALITY	5358	0.10	0.06	0.12	0.02	0.13
LOSSAVOID	5358	0.02	0	0.14	0	0
DEGREE RANK	5358	64.10	67.00	24.03	45.00	86.00
EIGENVECTOR RANK	5358	70.07	76.00	22.98	56.00	88.00
CLOSENESS RANK	5358	70.25	76.00	22.94	50.00	90.00
BETWEENNESS RANK	5358	54.85	40.00	22.30	40.00	84.00
COMPOSITE RANK	5358	71.69	79.00	23.39	58.00	90.00
Firm Size	5358	8.17	8.09	1.53	7.17	9.15
Firm Leverage	5358	0.27	0.25	0.22	0.12	0.38
Firm MTB	5358	3.06	2.54	94.18	1.53	4.33
Firm ROA	5358	0.04	0.05	0.11	0.02	0.08
CEO AGE	5358	4.04	4.04	0.12	3.97	4.11
CEO TENURE	5358	1.73	1.79	0.89	1.1	2.4
CEO DUALITY	5358	0.49	0	0.5	0	1
BIG 4 AUDITOR	5358	0.93	1	0.25	1	1
ANALYST FOLLOWING	5358	11.61	10	8.49	5	17
BOARD INDEPENDENCE	5358	0.78	0.88	0.42	0.8	0.92

Table IV
CEO Network Centrality and Earnings Quality Correlation Matrix

Variable	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	
1 DEGREE RANK	1.000																		
2 EIGENVECTOR RANK	0.606 <.0001	1.000																	
3 CLOSENESS RANK	0.660 <.0001	0.406 <.0001	1.000																
4 BETWEENNESS RANK	0.652 <.0001	0.859 <.0001	0.333 <.0001	1.000															
5 COMPOSITE RANK	0.719 <.0001	0.918 <.0001	0.396 <.0001	0.921 <.0001	1.000														
6 DISCRETIONARY ACCRUALS	-0.032 0.010	-0.085 <.0001	0.006 0.613	-0.069 <.0001	-0.061 <.0001	1.000													
7 ACCRUALS QUALITY	-0.079 <.0001	-0.079 <.0001	-0.012 0.3221	-0.086 <.0001	-0.085 <.0001	0.472 <.0001	1.000												
8 LOSSAVOID	-0.016 0.175	-0.051 <.0001	0.013 0.263	-0.054 <.0001	-0.054 <.0001	-0.023 0.063	-0.014 0.279	1.000											
9 Firm Size	0.373 <.0001	0.445 <.0001	0.123 <.0001	0.483 <.0001	0.469 <.0001	-0.057 <.0001	-0.092 <.0001	-0.010 0.394	1.000										
10 Firm Leverage	0.064 <.0001	0.104 <.0001	0.020 0.097	0.083 <.0001	0.096 <.0001	-0.006 0.607	-0.069 <.0001	0.046 0.0002	0.188 <.0001	1.000									
11 Firm MTB	0.017 0.164	0.009 0.469	0.010 0.3958	0.012 0.3209	0.011 0.3576	0.0096 0.4708	0.007 0.556	-0.000 0.996	0.027 0.026	-0.004 0.744	1.000								
12 Firm ROA	0.036 0.002	0.036 0.002	-0.014 0.251	0.054 <.0001	0.043 0.0004	-0.050 <.0001	-0.138 <.0001	-0.048 <.0001	0.129 <.0001	-0.053 <.0001	0.031 0.012	1.000							
13 CEO AGE	0.043 0.0004	-0.040 0.0011	0.096 <.0001	-0.046 0.0001	-0.034 0.005	0.026 0.039	-0.029 0.023	-0.005 0.634	0.030 0.014	-0.019 0.107	-0.002 0.830	0.016 0.183	1.000						
14 CEO TENURE	-0.031 0.015	-0.092 <.0001	0.0661 <.0001	-0.098 <.0001	-0.092 <.0001	-0.015 0.260	0.003 0.772	-0.007 0.559	-0.085 <.0001	-0.049 0.0001	0.023 0.0683	0.056 <.0001	0.341 <.0001	1.000					
15 CEO DUALITY	0.160 <.0001	0.068 <.0001	0.139 <.0001	0.110 <.0001	0.100 <.0001	0.008 0.5139	-0.054 <.0001	-0.010 0.3851	0.136 <.0001	-0.036 0.002	0.013 0.291	0.075 <.0001	0.249 <.0001	0.275 <.0001	1.000				
16 BIG 4 AUDITOR	0.162 <.0001	0.247 <.0001	0.030 0.012	0.262 <.0001	0.258 <.0001	-0.035 0.005	-0.053 <.0001	-0.001 0.9461	0.301 <.0001	0.100 <.0001	0.043 0.0005	0.058 <.0001	-0.038 0.001	-0.063 <.0001	0.013 0.281	1.000			
17 ANALYST FOLLOWING	0.203 <.0001	0.308 <.0001	0.036 0.0033	0.338 <.0001	0.320 <.0001	-0.023 0.072	0.055 <.0001	-0.048 <.0001	0.585 <.0001	-0.016 0.178	0.030 0.014	0.145 <.0001	-0.020 0.0936	-0.043 0.0007	0.069 <.0001	0.201 <.0001	1.000		
18 BOARD INDEPENDENCE	0.142 <.0001	0.165 <.0001	0.065 <.0001	0.181 <.0001	0.177 <.0001	0.001 0.8791	0.025 0.050	-0.023 0.056	0.315 <.0001	-0.011 0.338	-0.007 0.531	0.020 0.090	0.008 0.513	-0.073 <.0001	0.052 <.0001	0.077 <.0001	0.258 <.0001	1.000	

5. Main Results

5.1 Discretionary Accruals

Table V, Panel A, reports the results from estimating Equation (9). The dependent variable is the absolute value of discretionary accruals, estimated with the modified-Jones model of Larcker and Richardson (2004). Consistent with prior research, firms with larger sizes and big 4 auditors are more likely to have a smaller amount of discretionary accruals. Firms with more powerful CEOs are associated with larger discretionary accruals. CEO centrality is measured by degree, eigenvector, closeness, betweenness, and the first principal component. Controlling for the firm, managerial, and board characteristics, CEO centrality is negative and statistically significant in three of the five models: Eigenvector, Closeness, and Composite centrality measures (p-value=0.005, p-value<0.0001, and p-value=0.035 respectively). The significant negative association indicates that firms with well-connected CEOs, especially those with more important ties in the boardroom network, are associated with less discretionary accruals. To gauge the economic significance of the effect of CEO network centrality on discretionary accruals, note that our proxies for CEO network centrality are percentile values of the centrality measures annually and the mean discretionary accruals is 0.14. Thus, increasing CEO centrality from the 25th to the 75th percentile of the sample decreases the average discretionary accruals by 10.7 percent [(0.0003*50/0.14)].

5.2 Accruals Quality

Table V, Panel B, presents the results from estimating Equation (9), where the dependent variable is derived from the modified Dechow and Dichev (2002) model by McNichols (2002). The coefficients on Eigenvector, Closeness, and Composite centrality measures are negative and significant (p-value=0.002, p-value=0.003, and p-value<0.0001). The significant negative coefficients indicate that firms with better-connected CEOs, especially those with more important contacts in the boardroom network, are associated with better accrual quality. Consistent with prior research, firms with larger size, more profitable, and big-4 auditors are more likely to have accruals better matched with operating cash flows. In terms of the economic significance of the effect of CEO network centrality on accruals quality, better-connected CEOs increase the accruals quality by 15 percent [(0.0003*50/0.1)], when comparing firms with CEO centrality at the 25th to firms with CEO centrality in the 75th percentile of the sample.

In summary, Table V shows that better-connected CEOs, especially those with more important contacts in the network, are associated with smaller discretionary accruals and better quality of accruals.

5.3 Additional Analysis

To address the possibility that omitted variables may simultaneously affect CEO network centrality and earnings quality, we perform a firm fixed effects regression analysis. Table VI presents the results of firm fixed effects regression of estimating Equation (9). Specifically, Table VI, Panel A, reports that the coefficient on Eigenvector is -0.0004 (p-value<0.0001), on Closeness is -0.0004 (p-value<0.0001), and on Composite is -0.0004 (p-value<0.0001). Table VI, Panel B, reports that the coefficient on Degree is -0.0002 (p-value=0.026), Eigenvector is -0.0003 (p-value=0.0005), on Closeness is -0.0003 (p-value=0.0006), and on Composite is -0.0003 (p-value<0.0001). The results still show a significant negative relation between CEO network centrality and earnings quality. In table VI, industry dummy variables are not included as fixed effects regression excludes time-constant variables.

Behavior to avoid reporting losses may in fact decrease earnings quality (Schipper and Vincent, 2003). Therefore, we further test the relation between CEO network centrality and firm loss avoidance. Loss Avoidance is an indicator variable, which equals 1 if the income before extraordinary items is between 0 and 0.5% of total assets and 0 otherwise. This measure is designed to capture firms that are just above the threshold of reporting a loss, indicating a potential motivation to avoid reporting negative earnings. Table VII presents the results. Specifically, the coefficient on Eigenvector is -0.0004 (p-value<0.0001), on Closeness is -0.0004 (p-value<0.0001), and on Composite is -0.0004 (p-value<0.0001). The results indicate that loss avoidance is less associated with better-connected CEOs, especially those with more important contacts in the network.

Table V
CEO Network Centrality and Earnings Quality
Main Results
 Panel A: Dependent Variable = Discretionary Accruals

Parameter	Estimate	t Value	Pr > t	Estimate	t Value	Pr > t	Estimate	t Value	Pr > t	Estimate	t Value	Pr > t	Estimate	t Value	Pr > t
Intercept	0.047	0.55	0.584	0.069	0.80	0.426	0.047	0.55	0.584	0.048	0.55	0.581	0.060	0.70	0.486
DEGREE RANK	-0.0000	-0.28	0.782												
EIGENVECTOR RANK				-0.0003***	-2.83	0.005									
CLOSENESS RANK							-0.0005***	-4.39	<.0001						
BETWEENNESS RANK										0.0001	1.46	0.145			
COMPOSITE RANK													-0.0002**	-2.10	0.035
Firm Size	-0.013***	-5.69	<.0001	-0.010***	-4.49	<.0001	-0.010***	-4.16	<.0001	-0.013***	-5.69	<.0001	-0.011***	-4.80	<.0001
Firm Leverage	0.008	0.74	0.461	0.008	0.81	0.419	0.010	0.94	0.349	0.008	0.74	0.457	0.008	0.81	0.419
Firm MTB	0.000	0.94	0.347	0.000	0.93	0.352	0.000	0.92	0.358	0.000	0.94	0.351	0.000	0.93	0.350
Firm ROA	-0.025	-1.22	0.221	-0.027	-1.29	0.197	-0.028	-1.38	0.168	-0.024	-1.22	0.241	-0.027	-1.30	0.193
CEO Age	0.049**	2.28	0.022	0.044**	2.04	0.041	0.043**	1.99	0.046	0.048**	2.28	0.027	0.046**	2.14	0.032
CEO Tenure	-0.010***	-3.59	0.0003	-0.011***	-3.69	0.0002	-0.011***	-3.70	0.0002	-0.010***	-3.59	0.0003	-0.010***	-3.66	0.0003
CEO Duality	0.009***	1.80	0.008	0.010**	2.07	0.039	0.010**	1.97	0.049	0.008*	1.80	0.089	0.010**	1.98	0.048
Big4 Auditor	-0.016*	-1.71	0.087	-0.013*	-1.36	0.087	-0.011	-1.19	0.233	-0.016*	-1.71	0.089	-0.014*	-1.42	0.155
Analyst Following	0.001***	3.46	0.0005	0.001***	3.42	0.0006	0.001***	3.43	0.0006	0.001***	3.46	0.0004	0.001***	3.42	0.0006
Board Independence	0.001***	0.14	0.888	0.002***	0.28	0.778	0.002***	0.37	0.714	0.000***	0.14	0.936	0.001***	0.26	0.795
Industry	Included			Included			Included			Included			Included		
Year	Included			Included			Included			Included			Included		
Observations	5,358			5,358			5,358			5,358			5,358		
Adj. R ²	0.0104			0.0119			0.0139			0.0108			0.0112		

Panel B: Dependent Variable = Accruals Quality

Parameter	Estimate	t Value	Pr > t	Estimate	t Value	Pr > t	Estimate	t Value	Pr > t	Estimate	t Value	Pr > t	Estimate	t Value	Pr > t
Intercept	0.291***	4.91	<.0001	0.307***	5.18	<.0001	0.305***	5.14	<.0001	0.291***	4.92	<.0001	0.303***	5.12	<.0001
DEGREE RANK	-0.0001	-1.47	0.143												
EIGENVECTOR RANK				-0.0003***	-3.12	0.002									
CLOSENESS RANK							-0.0002***	-3.02	0.003						
BETWEENNESS RANK										0.0000	0.61	0.541			
COMPOSITE RANK													-0.0002***	-2.95	<.0001
Firm Size	-0.0158***	-10.49	<.0001	-0.0147***	-9.59	<.0001	-0.0150***	-9.87	<.0001	-0.0166***	-11.48	<.0001	-0.0149***	-9.73	<.0001
Firm Leverage	-0.024***	-3.43	<.0001	-0.024***	-3.37	<.0001	-0.024***	-3.30	<.0001	-0.025***	-3.44	<.0001	-0.024***	-3.43	0.0008
Firm MTB	0.000	1.03	0.302	0.000	1.01	0.313	0.000	1.00	0.316	0.000	1.02	0.310	0.000	1.01	0.314
Firm ROA	-0.128***	-9.03	<.0001	-0.128***	-9.07	<.0001	-0.129***	-9.10	<.0001	-0.127***	-8.97	<.0001	-0.129***	-9.10	<.0001
CEO Age	-0.019	-1.29	0.302	-0.023	-1.56	0.118	-0.022	-1.50	0.133	-0.020	-1.33	0.184	-0.022	-1.50	0.135
CEO Tenure	0.000	0.09	0.929	0.000	0.16	0.874	0.000	0.13	0.900	0.000	0.09	0.928	0.000	0.14	0.885
CEO Duality	-0.009***	-2.59	0.010	-0.003**	-2.54	0.011	-0.009***	-2.71	0.007	-0.009***	-2.83	0.004	-0.009***	-2.59	0.010
Big4 Auditor	-0.014**	-2.14	0.032	-0.012*	-1.87	0.061	-0.012*	-1.89	0.059	-0.015**	-2.23	0.026	-0.012*	-1.86	0.062
Analyst Following	0.003***	12.61	<.0001	0.003***	12.77	<.0001	0.003***	12.77	<.0001	0.003***	12.80	<.0001	0.003***	12.74	<.0001
Board Independence	0.011***	2.67	0.008	0.011***	2.73	0.006	0.011***	2.74	0.006	0.010***	2.56	0.010	0.011***	2.74	0.006
Industry	Included			Included			Included			Included			Included		
Year	Included			Included			Included			Included			Included		
Observations	5,358			5,358			5,358			5,358			5,358		
Adj. R ²	0.0608			0.0622			0.0620			0.0605			0.0620		

All variables are as defined in Appendix I. *, **, and *** indicate statistical significance at the 10%, 5%, and 1% (two-tailed), respectively.

Table VI
CEO Network Centrality and Earnings Quality
Firm Fixed Effects Results
 Panel A: Dependent Variable = Discretionary Accruals

Parameter	Estimate	t Value	Pr > t	Estimate	t Value	Pr > t	Estimate	t Value	Pr > t	Estimate	t Value	Pr > t	Estimate	t Value	Pr > t
Intercept	0.047	0.55	0.584	0.044	0.50	0.614	0.051	0.59	0.558	0.019	0.22	0.824	0.060	0.70	0.486
DEGREE RANK	-0.0000	-0.28	0.782												
EIGENVECTOR RANK				-0.0004***	-3.09	0.002									
CLOSENESS RANK							-0.0005***	-4.63	<.0001						
BETWEENNESS RANK										0.0001	1.14	0.253			
COMPOSITE RANK													-0.0003**	-2.43	0.015
Firm Size	-0.011***	-4.96	<.0001	-0.009***	-3.84	0.0001	-0.008***	-3.53	0.0004	-0.011***	-5.37	<.0001	-0.010***	-4.14	<.0001
Firm Leverage	0.007	0.66	0.511	0.008	0.74	0.461	0.010	0.87	0.384	0.007	0.66	0.511	0.008	0.74	0.459
Firm MTB	0.000	0.94	0.347	0.000	0.93	0.353	0.000	0.92	0.360	0.000	0.93	0.352	0.000	0.93	0.353
Firm ROA	-0.027	-1.31	0.190	-0.028	-1.37	0.170	-0.030	-1.46	0.144	-0.026	-1.26	0.207	-0.029	-1.39	0.165
CEO Age	0.053**	2.46	0.022	0.047**	2.19	0.029	0.046**	2.15	0.032	0.052**	2.41	0.016	0.050**	2.29	0.022
CEO Tenure	-0.009***	-3.23	0.0003	-0.010***	-3.34	0.0009	-0.010***	-3.35	0.0008	-0.009***	-3.26	0.001	-0.009***	-3.31	0.0009
CEO Duality	0.009***	1.75	0.001	0.010**	1.98	0.048	0.009*	1.87	0.062	0.008*	1.61	0.100	0.009*	1.89	0.059
Big4 Auditor	-0.016*	-1.72	0.080	-0.013*	-1.37	0.169	-0.012	-1.21	0.228	-0.017*	-1.75	0.081	-0.014*	-1.43	0.153
Analyst Following	0.001***	2.75	0.006	0.001***	2.77	0.006	0.001***	2.79	0.005	0.001***	2.83	0.005	0.001***	2.76	0.0006
Board Independence	0.005***	0.86	0.391	0.005***	0.97	0.334	0.006***	1.04	0.299	0.005***	0.80	0.427	0.005***	0.95	0.343
Industry	No			No			No			No			No		
Year	Included			Included			Included			Included			Included		
Observations	5,358			5,358			5,358			5,358			5,358		
Adj. R ²	0.0090			0.0107			0.0128			0.0093			0.0101		

Panel B: Dependent Variable = Accruals Quality

Parameter	Estimate	t Value	Pr > t	Estimate	t Value	Pr > t	Estimate	t Value	Pr > t	Estimate	t Value	Pr > t	Estimate	t Value	Pr > t
Intercept	0.262***	4.42	<.0001	0.307***	5.18	<.0001	0.305***	5.14	<.0001	0.262***	4.41	<.0001	0.303***	5.12	<.0001
DEGREE RANK	-0.0002**	-2.23	0.026												
EIGENVECTOR RANK				-0.0003***	-3.51	0.0005									
CLOSENESS RANK							0.0003***	-3.42	0.0006						
BETWEENNESS RANK										0.0000	0.22	0.825			
COMPOSITE RANK													-0.0003***	-3.46	<.0001
Firm Size	-0.0141***	-9.43	<.0001	-0.0132***	-8.62	<.0001	-0.0134***	-8.91	<.0001	-0.0151***	-10.53	<.0001	-0.0133***	-8.74	<.0001
Firm Leverage	-0.026***	-3.58	0.0003	-0.025***	-3.51	0.0004	-0.025***	-3.44	0.0006	-0.026***	-3.60	0.0003	-0.025***	-3.48	0.0005
Firm MTB	0.000	1.03	0.303	0.000	1.00	0.319	0.000	0.99	0.322	0.000	1.01	0.313	0.000	1.00	0.320
Firm ROA	-0.131***	-9.19	<.0001	-0.131***	-9.23	<.0001	-0.132***	-9.26	<.0001	-0.130***	-9.14	<.0001	-0.132***	-9.26	<.0001
CEO Age	-0.015	-1.00	0.315	-0.020	-1.31	0.189	-0.019	-1.25	0.213	-0.015	-1.02	0.307	-0.019	-1.25	0.2119
CEO Tenure	0.001	0.37	0.713	0.000	0.30	0.763	0.000	0.34	0.736	0.001	0.41	0.682	0.001	0.31	0.757
CEO Duality	-0.009***	-2.68	0.007	-0.009**	-2.69	0.007	-0.009***	-2.89	0.004	-0.010***	-2.98	0.003	-0.009***	-2.75	0.006
Big4 Auditor	-0.014**	-2.17	0.030	-0.013*	-1.90	0.057	-0.010*	-1.92	0.055	-0.015**	-2.31	0.021	-0.012*	-1.88	0.061
Analyst Following	0.003***	11.67	<.0001	0.003***	11.88	<.0001	0.003***	11.88	<.0001	0.003***	11.87	<.0001	0.003***	11.86	<.0001
Board Independence	0.014***	3.61	0.0003	0.014***	3.65	0.0003	0.014***	3.65	0.0003	0.014***	3.50	0.0005	0.011***	3.66	0.0003
Industry	No			No			No			No			No		
Year	Included			Included			Included			Included			Included		
Observations	5,358			5,358			5,358			5,358			5,358		
Adj. R ²	0.0573			0.0587			0.0585			0.0565			0.0586		

All variables are as defined in Appendix I. *, **, and *** indicate statistical significance at the 10%, 5%, and 1% (two-tailed), respectively.

Table VII
CEO Network Centrality and Loss Avoidance
 Dependent Variable = LossAvoid

Parameter	Estimate	t Value	Pr > t	Estimate	t Value	Pr > t	Estimate	t Value	Pr > t	Estimate	t Value	Pr > t	Estimate	t Value	Pr > t
Intercept	0.042	0.62	0.534	0.069	0.99	0.320	0.062	0.92	0.357	0.048	0.55	0.581	0.060	0.70	0.486
DEGREE RANK	-0.0001	-1.34	0.180												
EIGENVECTOR RANK				-0.0004***	-4.80	<.0001									
CLOSENESS RANK							-0.0004***	-4.49	<.0001						
BETWEENNESS RANK										0.0001	1.00	0.315			
COMPOSITE RANK													-0.0004**	-4.81	<.0001
Firm Size	0.003**	1.99	0.047	0.005***	3.16	0.002	0.005***	2.95	0.003	0.002	1.55	0.122	0.005***	3.13	0.002
Firm Leverage	0.022***	2.67	0.008	0.022***	2.73	0.006	0.023***	2.84	0.005	0.022***	2.69	0.007	0.023***	2.79	0.005
Firm MTB	0.000	0.20	0.839	0.000	0.17	0.864	0.000	0.16	0.870	0.000	0.19	0.852	0.000	0.17	0.865
Firm ROA	-0.058***	-3.51	0.0005	-0.059***	-3.57	0.0004	-0.060***	-3.62	0.0003	-0.057***	-3.45	0.0006	-0.060***	-3.63	0.0003
CEO Age	-0.008	-0.45	0.65.3	-0.013	-0.79	0.431	-0.012	-0.70	0.486	-0.009	-0.51	0.609	-0.012	-0.71	0.475
CEO Tenure	0.000	0.03	0.975	-0.000	-0.17	0.865	-0.000	-0.09	0.926	-0.000	-0.03	0.978	-0.000	-0.14	0.887
CEO Duality	-0.002	-0.56	0.578	-0.001	-0.29	0.773	-0.002	-0.54	0.590	-0.003	-0.82	0.413	-0.001	-0.35	0.725
Big4 Auditor	0.000	0.13	0.895	-0.005	0.63	0.526	-0.004	0.58	0.565	-0.000	0.05	0.959	-0.014	0.66	0.506
Analyst Following	-0.001***	-3.32	0.001	-0.001***	-3.07	0.002	-0.001***	-3.11	0.002	-0.001***	-3.19	0.001	-0.001***	-3.12	0.002
Board Independence	-0.005	-1.09	0.277	-0.004	-0.95	0.340	-0.004	-0.95	0.341	-0.005	-1.20	0.228	-0.004	-0.92	0.356
Industry	Included			Included			Included			Included			Included		
Year	Included			Included			Included			Included			Included		
Observations	5,358			5,358			5,358			5,358			5,358		
Adj. R ²	0.0072			0.0108			0.0104			0.0071			0.0108		

All variables are as defined in Appendix I. *, **, and *** indicate statistical significance at the 10%, 5%, and 1% (two-tailed), respectively.

6. Conclusion

This study investigates the relationship between CEO network centrality and earnings quality, and it provides evidence that firms with better-connected CEOs are associated with smaller discretionary accruals, better accruals quality, and a lower likelihood of reporting a loss. However, it is important to acknowledge the limitations of this study. First, the focus is limited to CEOs' boardroom network, assuming that they have no other social connections with other directors. This assumption may not fully capture the extent of CEOs' ability to access information and resources from other sources. Future research could consider constructing a more comprehensive network that includes CEOs' membership and neighborhood connections to obtain a more holistic view of their social connections.

Second, there may be concerns regarding the validity of proxies used to measure the constructs under investigation. Both earnings quality and CEO network centrality are complex and unobservable constructs. In this study, the researchers rely on previous research that has examined the properties of the earnings quality measures used and validated them as proxies for earnings quality. Similarly, multiple centrality measures are employed, including individual centrality variables and a composite measure, to enhance the confidence in the validity of the CEO network centrality measures. However, it is important to recognize that the inferences drawn from the results rely on the validity of these empirical measures.

In summary, while this study provides valuable insights into the relationship between CEO network centrality and earnings quality, it is important to consider the limitations inherent in the data and measurement techniques used. Future research should aim to address these limitations to further enhance our understanding of the dynamics between social networks, CEO characteristics, and firm outcomes.

References

- Ali, A. and Zhang, W. (2015), "CEO tenure and earnings management", *Journal of Accounting and Economics*, Vol. 59 No. 1, pp.60-79.
- Becker, C. L., DeFond, M. L., Jiambalvo, J. and Subramanyam, K. R. (1998), "The effect of audit quality on earnings management", *Contemporary Accounting Research*, Vol. 15 No. 1, pp.1-24.
- Bertrand, M. and Schoar, A. (2003), "Managing with style: The effect of managers on firm policies", *The Quarterly Journal of Economics*, Vol. 118 No. 4, pp.1169-1208
- Bikhchandani, S. Hirshleifer, D., and Welch, I. (1992), "A theory of fads, fashion, custom, and cultural change as informational cascades", *Journal of Political Economy*, Vol. 100 No. 5, pp.992-1026.
- Bonacich, P. (1987), "Power and centrality: a family of measures", *American Journal of Sociology*, Vol 92, pp.1170–1182.
- Bouchet, A., Song, X., and Sun, L. (2022), "CEO network centrality and corporate social responsibility", *Social Responsibility Journal*, Vol 18 No. 1, pp.106-127.
- Borgatti, S. P. and Halgin, D. S. (2011), "Analyzing affiliation networks", *The Sage Handbook of Social Network Analysis*, pp.417-433.
- Chahine, S., Fang, Y., Hasan, I. and Mazboudi, M., (2021), "CEO Network Centrality and the Likelihood of Financial Reporting Fraud", *Abacus*, Vol. 57 No. 4, pp.654-678.
- Chiu, P. C., Teoh, S. H. and Tian, F. (2013), "Board interlocks and earnings management contagion", *The Accounting Review*, Vol. 88 No. 3, pp.915-944.
- Cohen, L., Frazzini, A. and Malloy, C. (2010), "Sell-side school ties", *The Journal of Finance*, Vol. 65 No. 4, pp.1409-1437.
- Dechow, P. M. and Dichev, I. D. (2002), "The quality of accruals and earnings: The role of accrual estimation errors", *The Accounting Review*, Vol. 77 No. s-1, pp.35-59.
- Dechow, P., Ge, W. and Schrand, C. (2010), "Understanding earnings quality: A review of the proxies, their determinants and their consequences", *Journal of Accounting and Economics*, Vol. 50 No. 2, pp.344-401.
- Dejong, D. and Ling, Z. (2013), "Managers: Their effects on accruals and firm policies", *Journal of Business Finance and Accounting*, Vol. 40 No. 1-2, pp.82-114.
- Demerjian, P. R., Lev, B., Lewis, M. F. and McVay, S. E. (2013), "Managerial ability and earnings quality", *The Accounting Review*, Vol. 88 No. 2, pp.463-498.

Dichev, I. D., Graham, J. R., Harvey, C. R. and Rajgopal, S. (2013), "Earnings quality: Evidence from the field", *Journal of Accounting and Economics*, Vol. 56 No. 2, pp.1-33.

Doyle, J., Ge, W. and McVay, S. (2007), "Determinants of weaknesses in internal control over financial reporting", *Journal of Accounting and Economics*, Vol. 44 No. 1, pp.193-223.

El-Khatib, R., Fogel, K. and Jandik, T. (2015), "CEO network centrality and merger performance", *Journal of Financial Economics*, Vol. 116 No. 2, pp.349-382.

Feng, M., Ge, W., Luo, S. and Shevlin, T. (2011), "Why do CFOs become involved in material accounting manipulations?", *Journal of Accounting and Economics*, Vol. 51 No. 1, pp.21-36.

Finkelstein, S. (1992), "Power in top management teams: Dimensions, measurement, and validation", *Academy of Management journal*, Vol. 35 No. 3, pp.505-538.

Fracassi, C. and Tate, G. (2012), "External networking and internal firm governance", *The Journal of Finance*, Vol. 67 No. 1, pp.153-194.

Francis, J., Huang, A. H., Rajgopal, S. and Zang, A. Y. (2008), "CEO reputation and earnings quality", *Contemporary Accounting Research*, Vol. 25 No. 1, pp.109-147.

Freeman, L. C. (1979), "Centrality in social networks conceptual clarification", *Social networks*, Vol. 1 No. 3, pp.215-239.

Friedman, H. L. (2014), "Implications of power: When the CEO can pressure the CFO to bias reports", *Journal of Accounting and Economics*, Vol. 58 No. 1, pp.117-141.

Klein, A. (2002), "Audit committee, board of director characteristics, and earnings management", *Journal of Accounting and Economics*, Vol. 33 No. 3, pp.375-400.

Kuang, Y. F., Qin, B. and Wielhouwer, J. L. (2014), "CEO origin and accrual-based earnings management", *Accounting Horizons*, Vol. 28 No. 3, pp.605-626.

Ge, W., Matsumoto, D. and Zhang, J. L. (2011), "Do CFOs Have Style? An Empirical Investigation of the Effect of Individual CFOs on Accounting Practices", *Contemporary Accounting Research*, Vol. 28 No. 4, pp.1141-1179.

He, J. (2022), "Executive network centrality and corporate reporting", *Management Science*, Vol. 68 No. 2, pp.1512-1536.

Hong, A. H., Lee, S., Matsunaga, S. R., Oh, P. and Matsunaga, S. (2016), "CEO networks and information aggregation: Evidence from management forecast accuracy", Working paper, University of California, Riverside.

Hsieh, T. S., Bedard, J. C. and Johnstone, K. M. (2014), "CEO overconfidence and earnings management during shifting regulatory regimes", *Journal of Business Finance & Accounting*, Vol. 41 No. 9-10, pp.1243-1268.

- Larcker, D. F. and Richardson, S. A. (2004), "Fees paid to audit firms, accrual choices, and corporate governance", *Journal of accounting research*, Vol. 42 No. 3, pp.625-658.
- Larcker, D. F., So, E. C. and Wang, C. C. (2013), "Boardroom centrality and firm performance", *Journal of Accounting and Economics*, Vol. 55 No. 2, pp.225-250.
- Libby, R. and Luft, J. (1993), "Determinants of judgment performance in accounting settings: Ability, knowledge, motivation, and environment", *Accounting, Organizations and Society*, Vol. 18 No. 5, pp.425-450.
- Liu, Y. (2010), "The impact of networks on CEO turnover, appointment, and compensation", March 16, 2010.
- McNichols, M. (2002), "Discussion of "The quality of accruals and earnings: The role of accrual estimation errors", *The Accounting Review*, Vol. 77 (Supplement), pp.61–9.
- Ohlson, J. A. (1995), "Earnings, book values, and dividends in equity valuation", *Contemporary Accounting Research*, Vol. 11 No. 2, pp. 661-687.
- Omer, T. C., Shelley, M. K. and Tice, F. M. (2014), "Do Well-Connected Directors Affect Firm Value?", *Journal of Applied Finance*, Vol. 24 No. 2, pp.17-32.
- Omer, T. C., Shelley, M. K., and Tice, F. M. (2020), "Do director networks matter for financial reporting quality? Evidence from audit committee connectedness and restatements", *Management Science*, Vol. 66 No. 8, pp.3361-3388.
- Richardson, S. A., Sloan, R. G., Soliman, M. T. and Tuna, I. (2005), "Accrual reliability, earnings persistence and stock prices", *Journal of Accounting and Economics*, Vol. 39 No. 3, pp.437-485.
- Schipper, K. and Vincent, L. (2003), "Earnings quality", *Accounting horizons*, Vol. 17, pp.97-110.
- Skousen, C. J., Song, X. J., and Sun, L. (2018), "CEO network centrality and bond ratings. *Advances in Accounting*", Vol 40, pp.42-60.
- Shi, L., Dharwadkar, R. and Harris, D. (2013), "Board Interlocks and Earnings Quality", 2013.
- Tsai, W. (2001), "Knowledge transfer in intraorganizational networks: Effects of network position and absorptive capacity on business unit innovation and performance", *Academy of Management Journal*, Vol 44 No. 5, pp.996-1004.
- Zhu, D. H., and Chen, G. (2015), "Narcissism, director selection, and risk - taking spending", *Strategic Management Journal*, Vol 36 No. 13, pp.2075-2098.

Appendix I.

Variable definitions

Dependent Variables

Discretionary accruals	The absolute value of discretionary accruals derived from the modified-Jones model of Larcker and Richardson (2004).
Accruals quality	The absolute value of accruals errors derived from modified Dechow and Dichev (2002) model proposed by McNichols (2002).
LossAvoid	Indicator variable equals 1 if the income before extraordinary items between 0 and 0.5% of total assets and 0 otherwise.

CEO Network Centrality Variables

Degree Rank	The percentile ranking of CEOs' degree centrality, which is the number of first-degree connections of a CEO in the director network normalized by dividing by the maximum possible degree in a graph.
Closeness Rank	The percentile ranking of CEOs' closeness centrality, which is the inverse of the average length of the shortest distances between the CEO and all other directors in the network.
Betweenness Rank	The percentile ranking of CEOs' betweenness centrality, which is the average proportion of shortest paths between every pair of directors in the network that a CEO lies on.
Eigenvector Rank	The percentile ranking of CEOs' eigenvector centrality, which is the number of direct links between a CEO and other directors weighted by how well connected her neighbor directors are.
Composite Rank	The percentile ranking of CEOs' composite centrality, which is the first principal component score of all four centrality variables.

Control Variables

Firm Size	The natural log of the firm's assets reported at the end of year t.
Firm Leverage	Long-term debt divided by total assets.

Firm MTB	The market value of equity divided by book value of equity.
Firm ROA	The ratio of net income divided by average total assets.
CEO Age	The natural log of the CEO's age.
CEO Tenure	The natural log of the number of years an individual had been the CEO of a given company.
CEO Duality	Indicator variable equals 1 if the CEO is also the chair of the board and 0 otherwise.
Big4Auditor	Indicator variable equals 1 for firms audited by Big-4 audit firm in year t and 0 otherwise.
Analyst Following	The number of analysts who make periodic estimates about a firm's financials.
Board Independence	The ratio of the number of independent directors to the total number of directors on the board.